

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PALO ALTO NETWORKS, INC.,
Petitioner,

v.

FINJAN, INC.,
Patent Owner.

Case IPR2016-00159
Patent 8,677,494 B2

Before JAMES B. ARPIN, ZHENYU YANG, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Palo Alto Networks, Inc. (“Petitioner”) filed a Petition for an *inter partes* review of claims 1–18 of U.S. Patent No. 8,677,494 B2 (Ex. 1001, “the ’494 patent”). Paper 1 (“Pet.”). Finjan, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). We review the Petition under 35 U.S.C. § 314.

For the reasons that follow and on this record, we are persuaded that Petitioner demonstrates a reasonable likelihood of prevailing in showing the unpatentability of claims 1–6 and 10–15 of the ’494 patent on certain of the grounds asserted. Accordingly, we institute an *inter partes* review as to those claims.

A. Related Proceedings

According to the parties, Patent Owner previously asserted the ’494 patent against Petitioner in *Finjan, Inc. v. Palo Alto Networks, Inc.*, 3:14-cv-04908 (N.D. Cal. 2014). Pet. 2; Paper 5, 1.

The ’494 patent also has been asserted in at least four other district court actions: *Finjan, Inc. v. Sophos, Inc.*, 3:14-cv-01197 (N.D. Cal. 2014); *Finjan, Inc. v. Websense, Inc.*, 5:14-cv-01353 (N.D. Cal. 2014); *Finjan, Inc. v. Symantec Corp.*, 3:14-cv-02998 (N.D. Cal. 2014); and *Finjan, Inc. v. Blue Coat Systems, Inc.*, 5:15-cv-03295 (N.D. Cal. 2015). Pet. 2; Paper 5, 1. The ’494 patent also has been the subject of petitions in Case IPR2015-01022, filed by Sophos, Inc., and Cases IPR2015-01892 and IPR2015-01897, filed by Symantec Corporation. We previously denied the first and third of those petitions and granted the second on one asserted ground. *Sophos, Inc. v.*

Finjan, Inc., Case IPR2015-01022 (PTAB Sept. 24, 2015) (Paper 7);
Symantec Corp. v. Finjan, Inc., Case IPR2015-01892 (PTAB Mar. 18, 2016)
(Paper 9); *Symantec Corp. v. Finjan, Inc.*, Case IPR2015-01897 (PTAB Feb.
26, 2016) (Paper 7).

B. The '494 Patent

The '494 patent describes protection systems and methods “capable of protecting a personal computer (‘PC’) or other persistently or even intermittently network accessible devices or processes from harmful, undesirable, suspicious or other ‘malicious’ operations that might otherwise be effectuated by remotely operable code.” Ex. 1001, 2:51–56. “Remotely operable code that is protectable against can include,” for example, “downloadable application programs, Trojan horses and program code groupings, as well as software ‘components’, such as Java™ applets, ActiveX™ controls, JavaScript™/Visual Basic scripts, add-ins, etc., among others.” *Id.* at 2:59–64.

C. Illustrative Claims

Of the challenged claims, claims 1 and 10 are independent. Those claims are illustrative and are reproduced below:

1. A computer-based method, comprising the steps of:
 - receiving an incoming Downloadable;
 - deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 - storing the Downloadable security profile data in a database.

10. A system for managing Downloadables, comprising:
- a receiver for receiving an incoming Downloadable;
 - a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 - a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.

Ex. 1001, 21:19–25, 22:7–16. Each of challenged claims 2–9 depends directly from claim 1; and each of challenged claims 11–18 depends directly from claim 10. *Id.* at 21:26–22:6, 22:17–39.

D. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claims	Basis	Reference(s)
1, 3–6, 9, 10, 12–15, and 18	§ 102	Touboul ¹
2 and 11	§ 103	Touboul and Swimmer ²
7 and 16	§ 103	Touboul and Ji ³
8 and 17	§ 103	Touboul

¹ International Patent Publication No. WO 98/21683 to Shlomo Touboul, published May 22, 1998 (Ex. 1026, “Touboul”).

² Morton Swimmer et al., *Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns*, VIRUS BULL. CONF. 75 (Sept. 1995) (Ex. 1006, “Swimmer”).

³ U.S. Patent No. 5,983,348 to Shuang Ji, issued Nov. 9, 1999 (Ex. 1010, “Ji”).

Claims	Basis	Reference(s)
1, 2, 6, 10, 11, and 15	§ 103	Swimmer
3-5 and 12-14	§ 103	Swimmer and Martin ⁴

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, the Board interprets a claim term in an unexpired patent according to its broadest reasonable construction in light of the specification of the patent in which it appears. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 778 F.3d 1271, 1278–81 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016). Under this standard, we interpret claim terms using “the broadest reasonable meaning of the words in their ordinary usage as they

⁴ David M. Martin, Jr. et al., *Blocking Java Applets at the Firewall*, PROC. 1997 SYMP. ON NETWORK & DISTRIBUTED SYS. SEC. (©1997) (Ex. 1047, “Martin”). For reasons stated below, we conclude herein that each of the challenged claims is entitled to the benefit of a November 6, 1997 priority date. *See infra* Sections II.B.1.a., b. We note that Martin states on its face that it is from the proceedings of a symposium held February 10–11, 1997 (Ex. 1047, 1), but that the record copy of Martin bears a date stamp of June 5, 1998 (*id.* at 3), does not indicate a publication date, and merely has a 1997 copyright date (*id.* at 1). The Petition relies on a declaration of Dr. Aviel D. Rubin, Ph.D., one of the named authors of Martin, who declares that Martin was distributed to approximately 400 conference attendees in February 1997. Pet. 7 (citing Ex. 1002 ¶ 58). Patent Owner does not contest this evidence in its Preliminary Response, and we assume, for purposes of this Decision only, that Martin was published on the last day of February 1997.

would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). We presume that claim terms have their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) ("The ordinary and customary meaning is the meaning that the term would have to a person of ordinary skill in the art in question.") (internal quotation marks omitted).

Petitioner proposes constructions for three claim terms: "Downloadable security profile data," "database," and "Downloadable." Pet. 19–23. At this time, Patent Owner only challenges Petitioner's proposed construction of the first of these terms. Prelim. Resp. 9–12. We address each term in turn.

1. "*Downloadable security profile data*"

Petitioner contends that the broadest reasonable interpretation of the term "Downloadable security profile data" is "information related to whether executing a downloadable is a security risk." Pet. 19. According to Petitioner, this interpretation is consistent with the use of the term in the claims and Specification, as well as with Patent Owner's positions taken in related district court proceedings. *Id.* at 19–20.

Patent Owner disagrees, arguing that, "[w]hen read within the context of the claims, there is no need to construe the phrase 'Downloadable security profile data.'" Prelim. Resp. 9. According to Patent Owner, "the proper

construction for ‘Downloadable’ is ‘an executable application program which is downloaded from a source computer and run on the destination computer,’” and “[t]he remaining part of the term ‘security profile data’ should follow the plain language given to it in claims 1 and 10.” *Id.* Patent Owner further contends that Petitioner’s proposed construction improperly reads limitations out of the claims and is at odds with the teachings of the ’494 patent. *Id.* at 10–11. “For example, Petitioner’s interpretation improperly reads the ‘security profile’ limitation out of the claim[s] and replaces it with the vaguely worded ‘information related to.’” *Id.* at 10. Moreover, according to Patent Owner, “the ’194 Patent, which is incorporated by reference into the ’494 Patent, describes deriving (e.g. via code scanner, content inspection, decomposing, parsing) ‘Downloadable security profile data’ (aka DSP data) from the Downloadable.” *Id.* (citing Ex. 1013, 6:5–10, 8:41–54, Fig. 6A (element 628)). Further, “[a]lthough Petitioner argues for a different construction, Petitioner concedes that the ‘Downloadable security profile data’ include[] data derived from the Downloadable in its Petition.” *Id.* (citing Pet. 20).

For purposes of this Decision, we agree with Patent Owner that, in view of the agreed interpretation of the term “Downloadable” and the context provided by the claims, there is no need to separately construe the term “Downloadable security profile data.”

2. “database”

Petitioner contends that the broadest reasonable interpretation of the term “database” is “a collection of interrelated data organized according to a

database schema to serve one or more applications.” Pet. 21. As mentioned above, Patent Owner does not challenge this interpretation at this time (*see* Prelim. Resp. 12), and we adopt it for purposes of this Decision.⁵

3. “Downloadable”

Petitioner contends that the broadest reasonable interpretation of the term “Downloadable” is “an executable application program, which is downloaded from a source computer and run on the destination computer.” Pet. 23. As mentioned above, Patent Owner does not challenge this interpretation at this time (*see* Prelim. Resp. 12), and we adopt it for purposes of this Decision.

4. Other Terms

On this record and for purposes of this Decision, we determine that no other claim terms require express interpretation. *Wellman, Inc. v. Fastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’” (quoting

⁵ Indeed, as Petitioner points out (Pet. 21), this construction was proposed by Patent Owner and applied by us in prior proceedings, and it also has been adopted by the U.S. District Court for the Northern District of California in litigation involving the ’494 patent (*see Finjan, Inc. v. Sophos, Inc.*, No. 14-cv-01197 (Dkt. No. 73 (Claim Construction Order), 3–7) (N.D. Cal. Mar. 2, 2015) (Ex. 1063, 3–7); *Symantec Corp. v. Finjan, Inc.*, Case IPR2015-01892, slip op. at 7–11 (PTAB March 18, 2016) (Paper 9); *Sophos, Inc. v. Finjan, Inc.*, Case IPR2015-01022, slip op. at 9–10 (PTAB Sept. 24, 2015) (Paper 7)); *Sophos, Inc. v. Finjan, Inc.*, Case IPR2015-00907, slip op. at 8–10 (PTAB Sept. 24, 2015) (Paper 8)).

Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999))).

B. Discussion of Asserted Grounds

1. Asserted Grounds Based on Touboul

Petitioner contends Touboul anticipates claims 1, 3–6, 9, 10, 12–15, and 18. Pet. 29–33. In addition, Petitioner argues that the combination of Touboul and Swimmer renders claims 2 and 11 obvious; that the combination of Touboul and Ji renders claims 7 and 16 obvious; and that Touboul renders claims 8 and 17 obvious. *Id.* at 33–40. As a threshold question, we must determine whether Touboul qualifies as prior art to any of the challenged claims.

According to Petitioner, Touboul qualifies as prior art because none of the challenged claims is entitled to a priority date earlier than March 30, 2000. *Id.* at 5–7, 13–18. Petitioner alleges, in particular, that the challenged claims are entitled to the following priority dates:

<u>Claims</u>	<u>Priority Date</u>
Claims 1, 3–6, 9, 10, 12–15, 18:	March 30, 2000 (“Claimset 1”)
Claims 2, 11:	May 26, 2009 (“Claimset 2”)
Claims 7, 8, 16, 17:	May 7, 2006 (“Claimset 3”)

Pet. 13.

Alternatively, Petitioner argues, even if the claims of Claimset 1 are entitled to a priority date of November 6, 1997, Touboul still would qualify as prior art with respect to the claims of Claimsets 2 and 3. *Id.* at 6–7, 14–15, 18–19. Based on the record before us, and for the following reasons, we

are not persuaded by Petitioner's contentions regarding the priority of the challenged claims, except as otherwise noted below.

a. Priority Chain

The '494 patent issued from U.S. Patent Application No. 13/290,708 ("the '708 application"), filed November 7, 2011. Ex. 1001, [21], [22]. As filed, the '708 application claimed priority from seven earlier applications:

- 1) U.S. Patent Application No. 08/964,388 (Ex. 1074, "the '388 application"), filed November 6, 1997; issued as U.S. Patent No. 6,092,194 (Ex. 1013, "the '194 patent");
- 2) U.S. Patent Application No. 09/539,667 (Ex. 1071, "the '667 application"), filed March 30, 2000, as a continuation of the '388 application;
- 3) U.S. Patent Application No. 09/551,302 (Ex. 1072, "the '302 application"), filed April 18, 2000;
- 4) U.S. Provisional Patent Application No. 60/205,591 (Ex. 1073, "the '591 provisional"), filed May 17, 2000;
- 5) U.S. Patent Application No. 09/861,229 (Ex. 1014, "the '229 application"), filed May 17, 2001, as a continuation-in-part of the '667 and '302 applications and claiming the benefit of the '591 provisional; issued as U.S. Patent No. 7,058,822 B2 (Ex. 1016, "the '822 patent");
- 6) U.S. Patent Application No. 11/370,114 (Ex. 1069, "the '114 application"), filed March 7, 2006, as a continuation of the '229 application; issued as U.S. Patent No. 7,613,926 B2 (Ex. 1015, "the '926 patent"); and
- 7) U.S. Patent Application No. 12/471,942 ("the '942 application"), filed May 26, 2009, as a continuation of the '114 application.

Ex. 3001, 1.

On December 6, 2013, during prosecution of the '708 application, Applicants filed a petition to amend the application to include references to priority claims from two additional applications, namely, U.S. Patent Application No. 08/790,097 (Ex. 1075, "the '097 application"), filed January 29, 1997, of which the '302 application was a continuation; and U.S. Provisional Application No. 60/030,639 (Ex. 1027, "the '639 provisional"), filed November 8, 1996, from which each of the '388 and '097 applications had claimed priority. Ex. 3002. The Office granted Applicants' petition on December 24, 2013. Ex. 3003.

As filed, the '229 application, which eventually issued as the '822 patent, included a claim of priority from and an incorporation by reference of the '302 application, the '667 application, and the '591 provisional, but, as Petitioner points out (*see* Pet. 16), did not claim priority from or include any reference to the '520 and '194 patents or the '097 and '388 applications, from which those patents respectively issued.

Petitioner contends that "Patent Owner's failure to make a priority claim to any earlier application constitutes a 'break' in the chain back to any earlier applications"; that the '494 patent's "grandparent '926 [patent] cannot claim priority earlier than the date of the earliest date of an application on the face of its parent, the '822 patent: March 30, 2000"; and that "[i]n turn, the '494 [patent]—which depends on the '926 [patent]'s priority—has the same priority date limitation." Pet. 15–16.

As Petitioner also points out, however, Patent Owner, in the course of a reexamination of the '822 patent, filed a Petition to Accept Unintentionally

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Delayed Priority Claim Under 37 C.F.R. 1.78, requesting amendment to include references to the '520 and '194 patents. Reexamination Control No. 90/013,017, Petition dated March 6, 2014, at 1–3 (Ex. 3004 (“Priority Petition”), 1–3); *see also* Pet. 16. The Office granted the Priority Petition and issued a Corrected Filing Receipt including the priority claim to the previously omitted applications in July 2014. *See* Reexamination Control No. 90/013,017, Decision mailed July 25, 2014, at 1–3 (Ex. 1017, 1–3); Reexamination Control No. 90/013,017, Corrected Filing Receipt dated July 24, 2014, at 1 (Ex. 3005, 1). While acknowledging the Office’s Decision on the Priority Petition, Petitioner suggests that, because the Examiner in the reexamination later concluded that certain claims of the '822 patent are entitled to a priority date no earlier than May 17, 2000 (*see* Pet. 16 (citing Ex. 1082 at 7), because “[n]o certificate of correction has been published” (*id.*), and because “[t]he reexamination of the '822 patent “has not completed and is currently on appeal after all petitioned claims in the '822 patent were rejected as invalid” (*id.*), the Priority Petition is ineffectual with respect to the '494 patent’s entitlement to the benefit of the November 6, 1997 filing date of the '388 application. Petitioner’s suggestion is not persuasive. Petitioner cites no authority for the proposition that a granted petition to accept an unintentionally delayed priority claim is effective only upon issuance of a certificate of correction or reexamination certificate, and not upon grant of the petition. In any event, as Patent Owner points out in its Preliminary Response, the Board reversed the rejection of all appealed claims in the reexamination of the '822 patent (*see* Ex. 2007) and a

reexamination certificate was issued by the Office on February 16, 2016 (Ex. 2009). Prelim. Resp. 18.

Notably, however, we are persuaded by Petitioner, on this record, that the '494 patent cannot priority from the '639 provisional (*see* Pet. 18–19), notwithstanding the Office's decision (Ex. 3003) granting the Applicants' petition to amend the '708 application to include priority claims to the '639 provisional and the '097 application (Ex. 3002). As Petitioner points out, the earliest priority document cited on the face of the '926 patent through which the '494 claims priority is the '194 patent (*see* Pet. 18), and there is no indication in the record that the '926 patent, or the '114 application, from which it issued, was ever the subject of a petition to accept a delayed priority claim to either the '639 provisional or the '097 application. We also note that Patent Owner does not challenge this contention in its Preliminary Response. Accordingly, for purposes of this Decision, we conclude that the '494 patent is not entitled to the benefit of either the November 8, 1996 filing date of the '639 provisional or the January 29, 1997 filing date of the '097 application, and cannot claim any earlier priority date than the November 6, 1997 filing date of the '388 application that issued as the '194 patent.

b. Support for Claimsets 1–3

i. Claimset 1

Apart from the arguments discussed above, Petitioner does not challenge the entitlement of claims 1, 3–6, 9, 10, 12–15, and 18 of the '494

patent (Claimset 1) to the benefit of the November 6, 1997 filing date of the '388 application. *See* Pet. 15–19. Thus, based on the record before us and for the reasons stated above, we determine that challenged claims 1, 3–6, 9, 10, 12–15, and 18 of the '494 patent are entitled to the benefit of the November 6, 1997 filing date of the '388 application.

ii. Claimset 2

Claim 2 depends from claim 1 of the '494 patent and recites “storing a date & time when the Downloadable security profile data was derived, in the database.” Ex. 1001, 21:26–28. Claim 11 depends from claim 10, and recites a similar limitation. *Id.* at 22:17–20.

Petitioner argues that written description support was not provided for claims 2 and 11 until the filing of the '942 application on May 26, 2009, because “no pre-'942 application discloses storing a ‘date.’” Pet. 14. Thus, Petitioner contends, the earliest priority date for claims 2 and 11 is May 26, 2009. *Id.* at 6, 13, 14.

Patent Owner responds that even if the '194 patent does not contain in *ipsissima verba* the phrase “date & time,” a person of ordinary skill in the art would have understood from the '194 patent that the inventor had possession of the subject matter of claims 2 and 11 at the time the application for that patent was filed. Prelim. Resp. 24. Patent Owner points, in particular, to the following disclosure in the '194 patent:

The event log analysis engine 510 determines whether notification of the user (e.g., the security system manager or [management information systems] director) is warranted. For example, the event log analysis engine 510 may warrant user

notification whenever ten (10) suspicious Downloadables have been discarded by internal network security system 110 within a thirty (30) minute period, thereby flagging a potential imminent security threat.

Ex. 1013, 7:32–39 (cited at Prelim. Resp. 24). Patent Owner contends that a person of ordinary skill in the art would understand from this disclosure that the inventor was in possession of a system that indicated the relevant dates and times for events, including the dates and time that Downloadable security profile data were derived, and stored that information in a database. Prelim. Resp. 25.

We are persuaded by Patent Owner’s argument. In order for event log analysis engine 510 to determine that ten suspicious Downloadables have been discarded within a thirty-minute period, it follows that the date and time associated with derivation of the security profile data for each Downloadable must be logged.

Thus, based on the record before us and for the reasons stated above, we determine that challenged claims 2 and 11 of the ’494 patent also are entitled to the benefit of the November 6, 1997 filing date of the ’388 application that issued as the ’194 patent.

iii. Claimset 3

Claims 7 and 8 directly depend from claim 1 of the ’494 patent and recite that “the Downloadable security profile data” include “a URL from where the Downloadable originated” and “a digital certificate,” respectively.

Ex. 1001, 21:38–40, 22:1–3. Claims 16 and 17 depend from claim 10, and recite similar limitations. *Id.* at 22:31–35.

Petitioner argues that written description support was not provided for Claimset 3 until the filing of the '114 application on March 7, 2006.⁶ In particular, according to Petitioner,

[i]t is not until the '114 App[lication] . . . that any suggestion of including a certificate or a URL *within the security profile data* is made. (Ex. 1069 at 89-90.) Earlier applications such as the one that issued as the '194 patent (filed Nov. 6, 1997) show “Known Certificates 309” stored *separately* from “DSP Data 310.” (Ex. 1013 at Fig. 3.).

Pct. 14–15.

Patent Owner responds that the '194 patent explicitly discloses these limitations, as both URLs and digital certificates are derived from an incoming Downloadable. Prelim. Resp. 25. Patent Owner points, in particular, to the following statements in the '194 patent: “The ID generator 315 recited a Downloadable (including the URL from which it came)” (*id.* (citing Ex. 1013, 4:41–45)); and “The certificate comparator 345 retrieves known certificates 309 that were deemed trustworthy by the security administrator and compares the found certificate with the known certificates 309 to determine whether the Downloadable was signed by a trusted certificate” (*id.* (citing Ex. 1013, 6:31–35)).

⁶ Petitioner repeatedly misstates the filing date of the '114 application as May 7, 2006. *See* Pet. 6, 13, 14.

We again are persuaded by Patent Owner's argument. Thus, based on the record before us and for the reasons stated above, we determine that challenged claims 7, 8, 16, and 17 of the '494 patent also are entitled to the benefit of the November 6, 1997 filing date of the '388 application that issued as the '194 patent.

c. Touboul is Not Prior Art Under 35 U.S.C. § 102(b)

As explained above, on this record, we determine that all of the challenged claims are entitled to the benefit of the November 6, 1997 filing date of the '388 application. Touboul was published on May 22, 1998. Ex. 1003, [43]. Accordingly, Touboul does not qualify as prior art to the challenged claims of the '494 patent under 35 U.S.C. § 102(b), as asserted by Petitioner. Pet. 6

d. Conclusion

On this record, Petitioner has not shown that Touboul is prior art to the challenged claims of the '494 patent. Accordingly, Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenge to the patentability of claims 1, 3–6, 9, 10, 12–15, and 18 as anticipated by Touboul or its challenges to the patentability of claims 2, 7, 8, 11, 16, and 17 as obvious over Touboul alone or in combination with Swimmer or Ji.

2. Obviousness over Swimmer

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are “such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art⁷; and (4) objective evidence of nonobviousness, i.e., secondary considerations.⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Petitioner contends that claims 1, 2, 6, 10, 11, and 15 of the ’494 patent are unpatentable under 35 U.S.C. § 103(a) over Swimmer. Pet. 40–51. We begin our analysis with a brief overview of Swimmer, and we then address the parties’ contentions with respect to the challenged claims.

a. Overview of Swimmer

Swimmer generally is directed to a system, referred to as the “Virus Intrusion Detection Expert System” (“VIDES”), described as “a prototype for an automatic analysis system for computer viruses.” Ex. 1006, 1. In Swimmer’s system, an emulator is used to monitor the system activity of a virtual computer. *Id.* Sets of rules are used to detect viruses and extract details of their behavior. *Id.* The emulator collects system activity data and

⁷ Petitioner proposes a definition for a person of ordinary skill in the art. Pet. 9–10; *see* Ex. 1018 ¶ 30. Patent Owner does not challenge this definition. For purposes of this Decision and to the extent necessary, we adopt Petitioner’s definition.

⁸ *See infra* Section II.C.

creates a set of audit record attributes that identify, among other things, disk operating system (“DOS”) functions requested by the program, the register/memory values used in calls to the DOS functions, and the register/memory values returned by the function calls. *Id.* at 1, 7, 9. The emulator provides the resulting audit trail in a canonical format as an activity data record for further analysis by a tool referred to as “Advanced Security audit trail Analysis on uniX” (“ASAX”). *Id.* at 9–12. ASAX analyzes the activity data collected by the emulator and detects viruses by employing rules that model typical virus behavior, using a rule-based language (“RULes-baSeD Sequence Evaluation Language,” or “RUSSEL”) to identify the virus attack. *Id.* at 2, 4–5, 10–13. Swimmer discloses that ASAX also can pipe its output as a Normalized Audit Data Format (“NADF”) file for further processing. *Id.* at 7, 12. Swimmer also states that “VIDES could conceivably be used outside the virus lab to detect viruses in a real environment” and that “[o]ne possibility is to use it as a type of firewall for programs entering a protected network.” *Id.* at 13.

b. Discussion

In support of its argument that claims 1, 2, 6, 10, 11, and 15 are unpatentable over Swimmer, Petitioner provides a claim chart and further description detailing its mapping of Swimmer’s disclosure onto each element of challenged independent claims 1 and 10. Pet. 41–49. Petitioner then provides analysis pointing to Swimmer’s teaching of storing timestamps among stored security profile data, suggesting the “date & time” limitations of dependent claims 2 and 11, and detailing Swimmer’s

disclosure of each of the types of suspicious computer operations recited in dependent claims 6 and 15, including calls made a file system, calls made to memory, calls made to a network system, and calls made to an operating system. *Id.* at 49–51. Petitioner relies upon the Declaration of Dr. Aviel D. Rubin (Ex. 1002) to support its positions.

We have considered Petitioner’s explanations and supporting evidence in view of Patent Owner’s Preliminary Response (Prelim. Resp. 27–40), and we are persuaded that Petitioner demonstrates a reasonable likelihood that it would succeed at trial in showing that each of claims 1, 2, 6, 10, 11, and 15 is unpatentable over Swimmer. We address each of Patent Owner’s arguments in turn.

Patent Owner argues, first, that Petitioner has not demonstrated that Swimmer discloses “receiving an incoming Downloadable,” as recited in claims 1 and 10, because, according to Patent Owner, “Swimmer only operates on files that are installed and running on the system.” Prelim. Resp. 27. According to Patent Owner, “Swimmer requires a virus to be installed and running on the user’s machine in order to run the emulation,” and “[t]hus, the emulator does not run on an ‘incoming Downloadable’ (aka a Downloadable intended for a destination computer), but rather a Downloadable that has already been installed and running on the target machine.” *Id.* As Patent Owner recognizes (*see id.* at 29–30), however, Petitioner cites Swimmer’s disclosure that “[o]ne possibility is to use [the VIDFS system] as a type of firewall for programs *entering* a protected network” (Ex. 1006, 13 (emphasis added) (cited at Pet. 41, 43)). Contrary to

Patent Owner's contention that Swimmer's disclosure "teaches away" from employing this embodiment (*see* Prelim. Resp. 29–30), Swimmer explicitly states that "[a] concept for this is currently under development" (Ex. 1006, 13) and provides further guidance by stating that "[f]or such a system to be accepted, it must not cause false positives," and "must also be unnoticeable unless a virus is found," as well as that "a virtual 8086 machine will be the basis for this" (*id.*).

Patent Owner additionally alleges "[t]he problems with Petitioner's 'firewall' theory are further compounded by Swimmer's statement that any such firewall would be based on a virtual machine embodiment—not the emulator embodiment that forms the basis for Petitioner's invalidity theories." Prelim. Resp. 28. On this record, however, we are not persuaded that a skilled artisan would perceive that to be a meaningful difference. Indeed, Swimmer's statement quoted by Patent Owner in support of its contention that a virtual machine will be basis for Swimmer's firewall makes clear that Swimmer's audit system and ASAX tool would be employed, and suggests that no more than routine experimentation (i.e., "tun[ing]") would be required: "As a virtual 8086 machine will be the basis for this, the only extra overhead will come from the audit system and from ASAX. The audit system can be tuned to provide only the necessary data, . . . [and] ASAX has proven itself very fast: only the rules must be tuned for speed." Ex. 1006, 13 (cited at Prelim. Resp. 30).

Because Swimmer expressly contemplates analyzing "programs entering a protected network" and Patent Owner has not persuaded us to the

contrary on this record, we are persuaded, for purposes of this Decision, by Petitioner's assertion that Swimmer teaches the limitation "receiving an incoming Downloadable." Pet. 44

Patent Owner next argues that Petitioner has not demonstrated that Swimmer discloses "deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable," as recited in claims 1 and 10. Prelim. Resp. 31.

According to Patent Owner,

Petitioner notes that Swimmer generates a stream of system activity data but ignores what this activity data is. Petition at 44. This activity data includes "all opcodes corresponding with the events" caused by the program running in the emulator. Swimmer at 9. Thus, the system simply creates an audit trail of any program activity rather than deriving "a list of suspicious computer operations that may be attempted by the Downloadable." That is, Swimmer is agnostic to the nature of the records it creates—it simply records any events. See Swimmer at 5 ("In terms of auditing, irrelevant audit records may be present in the sequence of audit records . . ."). Thus, to find the claims obvious in view of Swimmer's audit trail, the claimed list of "suspicious computer operations" must be read out of the claim language and ignored.

Prelim. Resp. 31–32.

Patent Owner's arguments are unpersuasive. As Petitioner points out, Swimmer's VIDES system monitors the execution of application programs, generating a stream of activity data that can be used to construct rules for detecting computer viruses. Pet. 44. "Among the activity data VIDES collects in each stored audit record is the 'function number' of a[n] MS-DOS

function requested by a program.” *Id.* (citing Ex. 1006, 9). Although Swimmer does not use the terms “security profile data” or “suspicious computer operations” to refer to such functions, Swimmer indicates that the audit records are based on a slight modification of a pattern “representing the program behaviour in general, and virus activity in particular.”

Ex. 1005, 9. Indeed, as Petitioner points out, “the functions identified by Swimmer’s audit process . . . are the very same types of operations identified in the specification of the ’494 patent as examples of ‘malicious operations.’” Pet. 44 (citing Ex. 1001, 18:62-19:2 (“Malicious operations can for example include, in a Windows environment: file operations (e.g. reading, writing, deleting or renaming a file), network operations (e.g. listen on or connect to a socket, send/receive data or view intranet), OS registry or similar operations (read/write a registry item), OS operations (exit as/client, kill or change the priority of a process/thread, dynamically load a class library), resource usage thresholds (e.g. memory, CPU, graphics), etc.”); Ex. 1084, 6–11; Ex. 1002 ¶ 96). Petitioner points out that “[e]lsewhere, the ’494 patent links ‘suspicious’ operations with ‘malicious’ operations.” *Id.* at 46 (citing Ex. 1001, 2:54–55 (referring to “suspicious or other ‘malicious’ operations.”)). Indeed, as noted above, these include each of the same four types of operations recited in dependent claims 6 and 15, and, as Petitioner points out, also are the same types of operations referred to by applications related to the ’494 patent as examples of “Downloadable security profile data.” *Id.* at 45 (citing Ex. 1027, 11:9–13).

Although the challenged claims require that the Downloadable security profile data “includ[e] a list of suspicious computer operations that may be attempted by the Downloadable” (*see, e.g.*, claims 1, 10), the claims do *not* require that the list consist *only* of suspicious operations.

Accordingly, we are not persuaded by Patent Owner’s contention that “to find the claims obvious in view of Swimmer’s audit trail, the claimed list of ‘suspicious computer operations’ must be read out of the claim language and ignored.” Prelim. Resp. 32.

We also are not persuaded by Patent Owner’s arguments that “Petitioner nonsensically relies on the same audit trail element disclosed in Swimmer for both the ‘Downloadable security profile data’ and the ‘database’ in which the Downloadable security profile data is stored” (Prelim. Resp. 32), and that “Petitioner does not identify any element disclosed in Swimmer that could be considered a ‘database’” (*id.* at 34). Petitioner explains that the activity data (i.e., the Downloadable security profile data) are each stored in a structured format that a person of ordinary skill in the art would have recognized corresponds to a “database schema.” Pet. 46 Petitioner further explains, “[m]oreover, since Swimmer’s activity data [are] collected to support subsequent virus detection by an expert system called ‘ASAX’ (Ex. 1006 at 11), the activity data (the recited ‘security profile data’) [are] stored ‘to server on or more applications,” and “[t]herefore, Swimmer meets the [broadest reasonable interpretation] of ‘database’ discussed above.” *Id.* Because we understand Petitioner to equate the *collection* of Swimmer’s activity data, each stored according to a

database schema, with the database of claims 1 and 10, we do not understand Petitioner to rely on the “same . . . element” for both the Downloadable security profile data and the database as Patent Owner suggests. Prelim. Resp. 32.

We also are not persuaded by Patent Owner’s characterization of Swimmer’s audit trail as a “simple log file.” Prelim. Resp. 35. As explained by Swimmer, the activity data generated by the VIDES system is organized with a specific “canonical format” to serve the ASAX tool. Ex. 1006, 9–10. As explained above, we are persuaded on this record that the collection of activity data, so organized, constitutes a database as that term is construed herein as “a collection of interrelated data organized according to a database schema to serve one or more applications.”

Our decision in *Sophos, Inc. v. Finjan, Inc.*, Case IPR2015-01022 (PTAB Sept. 24, 2015) (Paper 7), cited by Patent Owner as allegedly holding that “simple log files like these are not databases” (Prelim. Resp. 35), does not compel a different conclusion. Although we determined that the petitioner in that case had not persuasively demonstrated that a particular log file, disclosed in a reference that is not at issue in this proceeding, constituted a database, we did not announce a per se rule that a log file cannot be a database. In contrast with Swimmer’s collection of activity data organized with a canonical format to serve ASAX, the log file disclosed by the reference in that case had no discernable organization or service to any other applications. *See Sophos*, slip op. at 14 (“TBAV does not appear to disclose that the log file has any particular organization or

serves any other applications, which . . . are among the hallmarks of a database. Instead, the log file appears . . . to be a simple output of ‘infected program files, specifying heuristic flags . . . and complete pathnames’ either to a printer or to a file that is, by default, overwritten by the results of each new scan by the TbScan program.”).

Patent Owner’s contention that Swimmer fails to disclose “storing” Downloadable security profile data because Swimmer states that records need only be “processed once” by RUSSEL is also unpersuasive. Prelim. Resp. 36. Notwithstanding Patent Owner’s argument that “[t]his technique stands in stark contrast to the one disclosed in the ’494 patent, which includes storing DSP data in a database so that when a known Downloadable is received, it may not need to be rescanned; rather, its DSP data can simply be retrieved from the database” (*id.* at 36–37 (citing Ex. 1001, 5:36–41)), none of the challenged claims recite that the database must permit DSP data to be retrieved “when a known Downloadable is received.”

Regarding dependent claims 2 and 11, Patent Owner argues that, “because Swimmer does not disclose any element that could be considered a database,” “[f]or at least the same reason, Swimmer does not disclose storing a date & time when the Downloadable security profile data was derived in the database.” Prelim. Resp. 38. For the reasons previously stated, we are not persuaded by Patent Owner’s argument that Swimmer does not disclose a database. Moreover, we are persuaded by Petitioner’s explanations and supporting evidence that Swimmer’s inclusion of timestamp data among the

collected activity data suggests the limitations of claims 2 and 11. *See* Pet. 49–50 (citing Ex. 1006, 9–10, Fig. 3; Ex. 1002 ¶ 101).

Lastly, Patent Owner contends that the Petition does not discuss the “calls made to an operating system” element recited in dependent claims 6 and 15, and, therefore, Petitioner cannot establish that those claims are obvious. Prelim. Resp. 39. Patent Owner also contends that “the Petition gives no effect to the ‘calls to a network system’ language and the ‘calls to memory’ language” in claims 6 and 15. *Id.* According to Patent Owner:

Petitioner attempts to abstract away the claimed “network system” and “memory” by describing various “function numbers” (i.e. 72–74, 88, 94 and 95) and calling them “memory related operations (calls made to memory)” and “network-related operations (calls made to a network system).” Petition at 51. But Swimmer does not recite any of these function numbers, let alone any “calls made to memory” or any “calls made to a network system.”

Thus, Petitioner has failed to demonstrate Swimmer renders obvious claims 6 and 15 at least because it has not accounted for all limitations of the claim.

Prelim. Resp. 39–40.

Patent Owner’s arguments are again unpersuasive. First, as explained in the Petition,

Among the activity data VIDES collects in each stored audit record is the “function number” of a MS-DOS function requested by a program. (Ex. 1006 at 9.) Swimmer explains that all DOS services are provided to application programs via interrupts and that such services are provided primarily through “interrupt 0x21.” (Ex. 1006 at 7.) . . . Since all of these functions are provided via MS-DOS interrupt 0x21 and MS-DOS is a well-

known operating system, they all qualify as “calls made to an operating system.” (Ex. 1006 at 4 (referring to DOS as the “underlying operating system” in prior-art virus-detection systems), 7; Ex. 1084 at 6-11 (Int 21H functions by number and category); Ex. 1002 at ¶¶ 102-103.)

Pet. 31. We are persuaded by Petitioner’s explanation and supporting evidence that *each* of the function numbers collected by Swimmer’s VIDES is a “call[] made to an operating system,” as recited in claims 6 and 15. Moreover, Petitioner also explains that certain function numbers, such as 72–74 and 88, were known to correspond to memory-related operations. *Id.* Petitioner’s supporting evidence indicates, for example, that function number 73, referenced in Figure 3 of Swimmer (*see* Ex. 1006, 9), corresponds to a function call entitled “Release Memory Block” (Ex. 1084, 7). Similarly, Petitioner explains that function numbers such as 94 and 95 correspond to network-related operations. Pet. 31. We are persuaded on this record that such memory-related and network-related operations are “calls made to memory” and “calls made to a network system,” respectively, as those terms are broadly, but reasonably, interpreted.

3. *Obviousness over Swimmer and Martin*

Petitioner contends that claims 3–5 and 12–14 of the ’494 patent are unpatentable under 35 U.S.C. § 103(a) over the combination of Swimmer and Martin. Pet. 51–54. Petitioner concedes that “Swimmer does not mention the terms ‘applet,’ ‘active control,’ and ‘program script,’” as recited in dependent claims 3–5, respectively, as well as in dependent claims 12–14, respectively. Pet. 52. Petitioner contends, however, that “Martin expressly

discloses blocking Java applets, ActiveX controls, and Javascript programs at a firewall,” and that “[i]t would have been obvious to a [person of ordinary skill in the art] implementing a firewall according to the teachings in Swimmer to process incoming applets, active controls (e.g., ActiveX controls), or program scripts (c.g., Javascript programs) at a firewall, as taught in Martin.” *Id.* (citing Ex. 1047, 5, 11–13). According to Petitioner, “Martin expressly teaches that blocking those three kinds of mobile code had become important due to their increasing popularity,” and “the express teachings in Martin . . . would have motivated a [person of ordinary skill in the art] to cover those types of mobile code in implementing a system like that described in Swimmer.” *Id.* at 52–53 (citing Ex. 1047, 5, 12; MPEP § 2143(I), Rationale (G); Ex. 1002 ¶ 104). Petitioner further contends that “Swimmer discusses detecting viruses in the context of particular types of DOS executable files” and that a person of ordinary skill in the art “would have understood that analogous code-auditing techniques could be applied to other types of executable code such as Java applets, ActiveX controls, or Javascript programs.” *Id.* at 53. According to Petitioner, “[s]uch a modification of the teachings in Swimmer would amount to the ‘[s]imple substitution of one known element [i.e., an auditing system tailored to a different kind of mobile code] for another to obtain predictable results.’” *Id.* (citing MPEP § 2143(I), Rationale (B); Ex. 1002 at ¶ 105). “This conclusion is reinforced, in the case of Java applets, by the observation that the Java Virtual Machine (JVM), the platform-independent software environment in which Java applets are executed, already included rules intended to prevent

an applet from performing malicious operations.” *Id.* at 53–54 (citing Ex. 1002 at ¶ 105). Patent Owner does not provide any response, at this time, to Petitioner’s contentions.

Based on Petitioner’s explanations and supporting evidence, we are persuaded that Petitioner demonstrates a reasonable likelihood that it would succeed at trial in showing that each of claims 3–5 and 12–14 also is unpatentable over Swimmer.

C. Secondary Considerations

Petitioner contends that no secondary considerations of non-obviousness exist in this case. Pet. 54. Citing evidence that Finjan “sold off its product development unit” before the ’494 patent issued, Petitioner contends that “the ’494 [patent] was not practiced by Patent Owner, and there can be no evidence of commercial success to support non-obviousness.” *Id.* (citing Ex. 1035, 1). Further, according to Petitioner,

While Patent Owner tried to present evidence of secondary considerations at trial, Patent Owner failed to analyze secondary considerations with respect to the Petitioned Claims or even the ’494 patent specifically as required by law. (*See, e.g., Demaco Corp. v. F. Von Langsdorff Licensing, Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)) (Patent Owner must establish “requisite nexus” to rely on secondary considerations).

Other evidence confirms that there is no nexus between the alleged long-felt need or alleged copying and the Petitioned Claims. The Patent Owner’s expert, Dr. Heberlein, testified on secondary considerations for the similar ’194 patent. (Ex. 1067 at 2-4.) Dr. Heberlein said that a “long-felt need” (for claims in the ’194 that are similar to the Petitioned Claims) was pre-parsing programs and then re-using that information to save time

later. (*Id.* at 3-4.) However, the Petitioned Claims do not deal with any re-use of DSP data. (Ex. 1002 at ¶ 107.) Instead, the claims discuss only the broad process of “deriving” and storing that data. And as the Patent Owner admitted in the [’194] patent, deriving DSP data by parsing programs was a “conventional” technique, as references like Swimmer and Ji confirm. (Ex. 1013 at 5:41-45.) Similarly, storing data in a database is not a point of novelty that somehow supports a long-felt need. (Ex. 1002 at ¶ 107.)

Patent Owner also failed to show evidence at trial of copying and licensing sufficient to establish non-obviousness. (*See, e.g.*, Ex. 1003 at 60.)

Pet. 54–55.

Patent Owner counters that “Petitioner’s failure to present the Board with a complete obviousness analysis in its Petitioner is, as a matter of law, enough to deny the institution of a trial on Section 103 grounds.” Prelim. Resp. 41. More particularly, according to Patent Owner,

Petitioner has already received numerous forms of objective indicia of nonobviousness, in the active litigation between Patent Owner and Petitioner. In fact, the substantial evidence provided to Petitioner included: industry praise; licensing of Finjan’s patent portfolio, including the ’926 patent, to several technology companies, including McAfee, Inc./Intel Corporation, Websense, Inc., Webroot Inc., Trustwave Holdings, Inc., M86 Security and Microsoft; copying by competitors; and commercial success. *See* Ex. 2010 at 4–6. But none of the evidence presented is ever addressed by the Petition. Rather Petitioner’s secondary considerations argument relies on conclusory statements that refuse to acknowledge that any of this evidence exists.

Id.

We are persuaded that Petitioner’s discussion of Patent Owner’s alleged evidence of secondary considerations is sufficient at this stage of the proceeding. Pet. 54–55. Thus far, Patent Owner has provided to us only a copy of a partially redacted interrogatory response that provides insufficient detail for us to evaluate the strength of its evidence. Ex. 2010, 4–6. The interrogatory response alleges the existence and dates of agreements with the above-identified companies, but does not establish any nexus between the recitations of the challenged claims and the licenses themselves. *Id.* at 4–5. Moreover, the licenses are not part of the record, and Patent Owner provides no evidence showing that the licensing program was successful either because of the recitations of the challenged claims or because they were entered into as business decisions to avoid litigation, because of prior business relationships, or for other economic reasons.

“Without a showing of nexus, ‘the mere existence of . . . licenses is insufficient to overcome the conclusion of obviousness.’” *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) (quoting *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 255 F.3d 1349, 1358 (Fed. Cir. 2000)); *see also In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995).

Patent Owner’s interrogatory response also cites praise for its products, provides revenue figures from the 2001–06 time period, and alleges:

Based on information presently available to Finjan, Finjan’s Vital Security 7.0 product in or about 2004, and later versions,

incorporated technology of: claim 1, claim 9, claim 17, and claim 18 of the '780 Patent; claim 1, claim 4, claim 9, claim 12, claim 16, and claim 28 of the '822 Patent; claim 1, claim 8, claim 13, claim 14, claim 21, claim 28, claim 34, and claim 41 of the '633 Patent; claim 1, claim 13, claim 23, claim 26, claim 32, and claim 33 of the '968 Patent; and claim 1, claim 6, claim 7, claim 13, claim 14, claim 17, claim 18, claim 20, and claim 22 of the '731 Patent.”

Ex. 2010, 6. Patent Owner has not made any evidence supporting this allegation of record in this proceeding, and notably absent from this list—and, indeed, the interrogatory response more generally—is any reference whatsoever to the '494 patent. Indeed, even Patent Owner's argument in the Preliminary Response, as quoted above, refers to Patent Owner's '926 patent but does not mention the '494 patent.

On this record, the relatively weak evidence of secondary considerations does not overcome the relatively strong evidence of obviousness.

III. CONCLUSION

On this record, taking into account the arguments presented in Patent Owner's Preliminary Response, we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail at trial in demonstrating that claims 1–6 and 10–15 of the '494 patent are unpatentable under 35 U.S.C. § 103 on certain of the grounds presented. We, however, are not persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in demonstrating that claims 7–9 and 16–18 of the '494

patent are unpatentable under 35 U.S.C. § 103 on any of the grounds presented. At this stage of the proceeding, we have not made a final determination with respect to claim construction or the patentability of challenged claims 1–6 and 10–15.

IV. ORDER

Upon consideration of the record before us, it is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4, an *inter partes* review is hereby instituted based on the following grounds:

- A. claims 1, 2, 6, 10, 11, and 15 as being unpatentable under § 103(a) over Swimmer; and
- B. claims 3- 5 and 12–14 as being unpatentable under § 103(a) over the combination of Swimmer and Martin;

FURTHER ORDERED that no other grounds are authorized for this *inter partes* review other than those specifically identified above; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

IPR2016-00159
Patent 8,677,494 B2

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SYMANTEC CORP.,
Petitioner,

v.

FINJAN, INC.,
Patent Owner.

Case IPR2015-01892
Patent 8,677,494 B2

Before JAMES B. ARPIN, ZHENYU YANG, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Symantec Corp. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review pursuant to 35 U.S.C. § 311 of claims 1, 2, 5, 6, 10, 11, 14, and 15 of U.S. Patent No. 8,677,494 B2 to Ederly et al. (Ex. 1001, “the ’494 patent”). Pet. 1. Finjan, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). We review the Petition under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

For the reasons that follow and on this record, we are persuaded that Petitioner demonstrates a reasonable likelihood of prevailing in showing the unpatentability of each of the challenged claims. Accordingly, we institute an *inter partes* review as to those claims.

A. The ’494 Patent

The ’494 patent, entitled “Malicious Mobile Code Runtime Monitoring System and Methods,” issued March 18, 2014, from U.S. Patent Application No. 13/290,708 (“the ’708 application”), filed November 7, 2011. Ex. 1001, [21], [22], [45], [54]. On its face, the ’494 patent purports to claim priority from nine earlier applications, of which the earliest-filed is U.S. Provisional Application No. 60/030,639, filed November 8, 1996 (Ex. 1002, “the ’639 application”). We need not make a determination on this record whether or not the challenged claims are entitled to the benefit of the filing dates of any of those earlier applications.

The '494 patent describes protection systems and methods “capable of protecting a personal computer (‘PC’) or other persistently or even intermittently network accessible devices or processes from harmful, undesirable, suspicious or other ‘malicious’ operations that might otherwise be effectuated by remotely operable code.” *Id.* at 2:51–56. “Remotely operable code that is protectable against can include,” for example, “downloadable application programs, Trojan horses and program code groupings, as well as software ‘components’, such as Java™ applets, ActiveX™ controls, JavaScript™/Visual Basic scripts, add-ins, etc., among others.” *Id.* at 2:59–64.

B. Related Proceedings

The '494 patent is the subject of a district court action between the parties, *Finjan, Inc. v. Symantec Corp.*, 3:14-cv-02998 (N.D. Cal. 2014), and has also been asserted in three other district court actions, *Finjan, Inc. v. Sophos, Inc.*, 3:14-cv-01197 (N.D. Cal. 2014), *Finjan, Inc. v. Palo Alto Networks, Inc.*, 3:14-cv-04908 (N.D. Cal. 2014), and *Finjan, Inc. v. Blue Coat Systems, Inc.*, 5:15-cv-03295 (N.D. Cal. 2015). Pet. 1; Paper 5, 1.

Petitioner also filed another petition seeking *inter partes* review of the '494 patent (Case IPR 2015-01897), a petition seeking *inter partes* review of related U.S. Patent No. 6,154,844 (Case IPR2015-01894), and two petitions seeking *inter partes* review of related U.S. Patent No. 7,613,926 (Cases IPR2015-01893 and IPR2015-01895). Pet. 1. Each of those petitions has been denied (Case IPR2015-01893, Paper 8; Case IPR2014-01894, Paper 7; Case IPR2015-01895, Paper 7; Case IPR2015-01897, Paper 7). Additionally, a petition filed by Sophos Inc. seeking *inter partes* review of the '494 patent was denied on September 24, 2015 (Case IPR2015-01022,

Paper 7), and a petition filed by Palo Alto Networks, Inc. seeking *inter partes* review of the '494 patent is pending currently (Case IPR2016-00159, Paper 1).

C. Illustrative Claims

Of the challenged claims, claims 1 and 10 are independent. Those claims are illustrative and are reproduced below:

1. A computer-based method, comprising the steps of:
 - receiving an incoming Downloadable;
 - deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 - storing the Downloadable security profile data in a database.

10. A system for managing Downloadables, comprising:
 - a receiver for receiving an incoming Downloadable;
 - a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 - a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.

Ex. 1001, 21:19–25, 22:7–16. Each of challenged claims 2, 5, and 6 depends directly from claim 1; and each of challenged claims 11, 14, and 15 depends directly from claim 10. *Id.* at 21:26–28, 21:33–37, 22:17–20, 22:26–30.

D. References Relied Upon

Petitioner relies on the following references:

Exhibit	Reference
1003	US 5,313,616, issued May 17, 1994 (“Cline”)
1004	Stephanie Forrest et al., <i>A Sense of Self for Unix Processes</i> , PROC. 1996 IEEE SYMPOSIUM ON SEC. & PRIVACY 120 (1996) (“Forrest”) ¹
1005	Morton Swimmer et al., <i>Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns</i> , VIRUS BULL. CONF. 75 (Sept. 1995) (“Swimmer”) ²
1012	US 5,623,600, issued Apr. 22, 1997 (filed Sept. 26, 1995) (“Ji”)

Pet. 3–5. Petitioner also relies on declarations of Sylvia Hall-Ellis, Ph.D. (Ex. 1006) and Jack W. Davidson, Ph.D. (Ex. 1018).

¹ Petitioner adduces evidence that Forrest was available to the public as of June 21, 1996. Pet. 4 (citing Ex. 1006, 7–8, 11–12, 15–17; Ex. 1008; Ex. 1009).

² Petitioner adduces evidence that Swimmer was available to the public as of December 1, 1995. Pet. 4–5 (citing Ex. 1006, 7–8, 11–12, 18–20; Ex. 1010; Ex. 1011).

E. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of the challenged claims on the following grounds:

Reference(s)	Basis	Claims Challenged
Swimmer	§ 102(b)	1, 2, 6, 10, 11, and 15
Swimmer	§ 103(a)	5 and 14
Swimmer	§ 103(a)	1, 2, 5, 6, 10, 11, 14, and 15
Cline and Ji	§ 103(a)	1, 2, 5, 6, 10, 11, 14, and 15
Forrest and Ji	§ 103(a)	1, 2, 5, 6, 10, 11, 14, and 15

Pet. 5.

In determining whether to institute an *inter partes* review of a patent, the Board, in its discretion, may “deny some or all grounds for unpatentability for some or all of the challenged claims.” 37 C.F.R.

§ 42.108(b). Because Petitioner alternatively challenges claims 1, 2, 6, 10, 11, and 15 as either anticipated by Swimmer or as rendered obvious over Swimmer (Pet. 12–25), we exercise our discretion and decline to reach the anticipation challenge. 37 C.F.R. § 42.108(a).

II. DISCUSSION

A. Claim Interpretation

In an *inter partes* review proceeding, claims of an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012); *In re*

Cuozzo Speed Techs., LLC, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 890 (2016). Under this standard, we interpret claim terms using “the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant’s specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). We presume that claim terms have their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (“The ordinary and customary meaning is the meaning that the term would have to a person of ordinary skill in the art in question.”) (internal quotation marks omitted).

“Database”

The term “database” is recited in each of independent claims 1 and 10, as well as in dependent claims 2 and 11. Petitioner asserts that the broadest reasonable interpretation of the term “database” is “an organized collection of data.” Pet. 10–11. Citing definitions from three dictionaries and Dr. Davidson’s declaration for support, Petitioner contends this construction is consistent with the plain and ordinary meaning of the term to a person of ordinary skill in the art at the time of the ’494 patent. *Id.* at 11 (citing RANDOM HOUSE WEBSTER’S COLLEGE DICTIONARY, 339 (2nd ed. 1999) (Ex. 1014, 3); WEBSTER’S NINTH NEW COLLEGIATE DICTIONARY, 325 (1991) (Ex. 1015, 4); WEBSTER’S NEW WORLD DICTIONARY OF COMPUTER TERMS, 95 (4th ed. 1992) (Ex. 1016, 3); Ex. 1018 ¶¶ 84–85). Moreover, according to Petitioner, “neither the specification, nor the challenged claims, say anything about the form or structure of the claimed ‘database,’” but “merely

describe the type of data that is stored in the database (*e.g.*, [Downloadable security profile ('DSP')] data)." *Id.* (citing Ex. 1001, 3:47–50, 4:14–18, 9:52–55, Fig. 2, Fig. 3, claim 1). Petitioner contends that this construction is also consistent with Petitioner's position concerning the proper construction of this term in the related district court proceeding. *Id.* at 11–12 (citing *Finjan, Inc. v. Symantec Corp.*, 3:14-cv-2998 (N.D. Cal. 2014), Joint Claim Construction and Pre-Hearing Statement at 4 (Ex. 1017, 4)). According to Petitioner:

[I]n the district court, Patent Owner agreed that a "database" is a collection of organized data. Ex. 1017, p. 4. Patent Owner argued, however, that the claimed "database" further requires the data to be organized "according to a database schema" and must "serve one or more applications." *See* Ex. 1017, p. 4. Patent Owner's proposed construction adds limitations that are unnecessary, confusing and, more importantly, have no support whatsoever in the intrinsic record. This appears to be nothing more than attempt to salvage the challenged claims by excluding certain types of databases described in the prior art, such as log files. *See* Ex. 1017, p. 4. Significantly, in the district court proceeding, Patent Owner and its expert acknowledged that, even under Patent Owner's proposed construction, at least some types of log files are "databases."

Id. at 12.

Patent Owner responds that the proper construction of "database" is instead "a collection of interrelated data organized according to a database schema to serve one or more applications." Prelim. Resp. 9. As Patent Owner points out (*id.*), this construction previously was adopted by the district court in Patent Owner's litigation with Sophos, Inc. concerning the '494 patent (*see Finjan, Inc. v. Sophos, Inc.*, No. 14-cv-01197 (N.D. Cal. 2014), Claim Construction Order at 7 (Ex. 2002, 7)), and also has been

applied by the Board in two previous *inter partes* review proceedings. *See Sophos, Inc. v. Finjan, Inc.*, Case IPR2015-00907, slip op. at 8–10 (Paper 8) (Ex. 2003) (concerning related U.S. Patent No. 7,613,926); *Sophos, Inc. v. Finjan, Inc.*, Case IPR2015-01022, slip op. at 9–10 (Paper 7) (Ex. 2004) (concerning the '494 patent).

Patent Owner asserts that its proposed construction in the concurrent district court litigation is “exactly the construction proposed herein,” and, therefore, Petitioner’s claim that “Patent Owner agreed that a database is a collection of organized data” (Pet. 12) “blatantly misrepresents Patent Owner’s position taken in the concurrent district court litigation.” Prelim. Resp. 11. Patent Owner contends that “[t]he goal of Petitioner’s construction is to broaden the term database beyond the specification so that it reads upon the techniques described in the cited prior art (e.g., a log file).” *Id.* at 10. Patent Owner further contends that Figure 3 of related U.S. Patent No. 6,092,194 (Ex. 3001, “the '194 patent”)³ “clearly illustrates that the security database 240 that stores DSP data 310 is completely different than a simple log file (i.e., Event Log 245).”⁴

³ The '194 patent is incorporated by reference in the '494 patent. *See* Ex. 1001, 1:35–38.

⁴ Patent Owner also contends that “Petitioner neglects to mention one of the passages of the '494 Patent specifically relied upon by both the district court [in] *Finjan, Inc. v. Sophos, Inc.* as well as the Board in *Sophos, Inc. v. Finjan, Inc.*, Case Nos. IPR2015-00907 . . . and IPR2015-01022, that led both bodies to the conclusion that the claimed database could not be equated with a simple log file.” *Id.* at 10–11. Patent Owner then provides a quotation from a footnote in the district court’s claim construction order, stating in part that “[t]he fact that a database is listed along with more simple files **does not mean that the database includes or is equated with these types of files**” and that “[i]n fact, one could argue that this list serves to

On this record, we agree with Patent Owner that the district court's construction in the litigation between Patent Owner and Sophos, as previously applied by the Board, represents the broadest reasonable construction of "database" in light of the claim language and the specification of the '494 patent. *See Morris*, 127 F.3d at 1054; *see also Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326–27 (Fed. Cir. 2015) ("The fact that the board is not generally bound by a previous judicial interpretation of a disputed claim term does not mean . . . that it has no obligation to acknowledge that interpretation or to assess whether it is consistent with the broadest reasonable construction of the term."). As explained by the district court, the '494 patent does not define the term "database"; there is no evidence that Patent Owner disavowed the full scope of that term either in the Specification or during prosecution; and Patent Owner's definition appears to reflect both the context of the patent, as well as a well-accepted definition of the term. *Ex. 2002*, 5–7; *see also IBM DICTIONARY OF COMPUTING*, 165 (10th ed. 1993) (*Ex. 2001*, 3).

further differentiate a database from simpler files" (*id.* at 11 (quoting *Ex. 2002*, 5 n.1 (emphasis added by Patent Owner))), and cites certain pages of the Board's decisions (*id.* (citing *Ex. 2003*, 9; *Ex. 2004*, 9–10)). Patent Owner, however, does not identify the "one of the passages of the '494 Patent" upon which it alleges the court and the Board "specifically relied." Indeed, neither the quoted portion of Exhibit 2002 nor the cited portions of Exhibits 2003 and 2004 explicitly rely upon any passages of the '494 patent in reaching their respective conclusions. Exhibit 2002 does refer to column 9, lines 54–55 of related U.S. Patent No. 7,613,926, but it is unclear to us what relevance Patent Owner would intend us to ascribe to that citation.

Accordingly, on this record and for purposes of this Decision, we construe “database” to mean “a collection of interrelated data organized according to a database schema to serve one or more applications.”

B. Asserted Grounds of Unpatentability

Petitioner argues that claims 1, 2, 5, 6, 10, 11, 14, and 15 of the '494 patent are rendered obvious under 35 U.S.C. § 103 by the references described above. *See supra* Sec. I.E. A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are “such that the subject matter[,] as a whole[,] would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art⁵; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We analyze the asserted grounds with the principles identified above in mind.

⁵ Petitioner proposes a definition for a person of ordinary skill in the art. Pet. 9–10; *see* Ex. 1018 ¶ 30. Patent Owner does not challenge this definition. For purposes of this Decision and to the extent necessary, we adopt Petitioner’s definition.

1. Obviousness over Swimmer

a. Overview of Swimmer

Swimmer is generally directed to a system, referred to as the “Virus Intrusion Detection Expert System” (“VIDES”), described as “a prototype for an automatic analysis system for computer viruses.” Ex. 1005, 1. In Swimmer’s system, an emulator is used to monitor the system activity of a virtual computer. *Id.* Sets of rules are used to detect viruses and extract details of their behavior. *Id.* The emulator collects system activity data and creates a set of audit record attributes that identify, among other things, disk operating system (“DOS”) functions requested by the program, the register/memory values used in calls to the DOS functions, and register/memory values returned by the function calls. *Id.* at 1, 7, 9. The emulator provides the resulting audit trail in a canonical format as an activity data record for further analysis by a tool referred to as “Advanced Security audit trial Analysis on uniX” (“ASAX”). *Id.* at 9–12. ASAX analyzes the activity data collected by the emulator and detects viruses by employing rules that model typical virus behavior, using a rule-based language (“RUles-baSed Sequence Evaluation Language,” or “RUSSEL”) to identify the virus attack. *Id.* at 2, 4–5, 10–13. Swimmer discloses that ASAX also can pipe its output as a Normalized Audit Data Format (“NADF”) file for further processing. *Id.* at 7, 12. Swimmer also states that “VIDES could conceivably be used outside the virus lab to detect viruses in a real environment” and that “[o]ne possibility is to use it as a type of firewall for programs entering a protected network.” *Id.* at 13.

b. Discussion

Petitioner contends that Swimmer teaches or suggests all of the limitations of each of the challenged claims. Pet. 12–25.

First, Petitioner contends that Swimmer discloses both a “computer-based method,” as recited in the preamble of claim 1, as well as a “system for managing Downloadables,” as recited in the preamble of claim 10. *Id.* at 13–14. In particular, Petitioner contends, “Swimmer explains that its VIDES system is used to detect viruses in application programs and program code by monitoring and analyzing the functions and operations these programs attempt to invoke.” *Id.* at 14 (citing Ex. 1005, 7; Ex. 1018 ¶ 89). “These application programs can include ‘programs entering a protected network’ (*i.e.*, executable code being downloaded over a network).” *Id.* (citing Ex. 1005, 13).

Second, according to Petitioner, because Swimmer “explains that the VIDES system can be used in a networked environment as part of a firewall for a protected network,” Swimmer explicitly discloses that an incoming Downloadable is received over a network, as recited in claim 1. *Id.* at 15 (citing Ex. 1005, 13; Ex. 1018 ¶¶ 92–93 (explaining that firewalls are security devices or software located between an outside network, such as the Internet, and an internal network, such as an intranet that connects client computers)).

Relying on the testimony of Dr. Davidson, Petitioner further contends that, “in order for VIDES to be used at a firewall for ‘programs entering a protected network’ (*i.e.*, receive and analyze incoming Downloadables), a [person of ordinary skill in the art] would have understood that the system necessarily included a ‘receiver’ (*i.e.*, networking components) for receiving

these Downloadables.” *Id.* at 16 (citing Ex. 1018 ¶ 94). Petitioner, accordingly, asserts that “Swimmer also discloses that the VIDES system includes a ‘receiver’ for receiving the Downloadable,” as recited in claim 10. *Id.* Petitioner also argues, in the alternative, that this feature would have been obvious based on the teachings in Swimmer. *Id.* at 23–24. In particular, according to Petitioner, it would have been obvious that Swimmer’s VIDES “could be used at a network device, such as a gateway or [file transfer protocol (“FTP”)] or Web server in order to intercept incoming Downloadables and analyze them before they are sent to a destination computer,” and “[o]ne of ordinary skill in the art would have been motivated to do so for a number of reasons, such as to improve the efficiency when checking incoming Downloadables.” *Id.* at 23–24. Petitioner contends that, “[f]or one of ordinary skill in the art, this would have involved nothing more than combining well-known prior art elements (i.e., a gateway with Swimmer’s VIDES system) according to well-known software programming techniques in order to yield a predictable result (i.e., a gateway scanner that receives Downloadables and analyzes their behavior).” *Id.* at 24 (citing Ex. 1018 ¶ 95).

Third, Petitioner contends, “Swimmer discloses [a Downloadable scanner coupled with said receiver for] deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable,” as recited in claims 1 and 10. *Id.* at 16 (alteration in original) (boldface omitted). In particular, Petitioner alleges, to generate system activity data, Swimmer’s emulator “accepts the entire instruction set of a processor as input, and interprets the binary code as the original processor would.” *Id.* (quoting Ex. 1005, 8). Swimmer discloses

that the “audit record attributes of records as collected by the PC emulator have the following meaning . . . [t]he final format for an MS-DOS audit record is as follows: <code segment, RecType[,] StartTime, EndTime, function number, [arg(...), ret(...)]>.” *Id.* at 17 (quoting Ex. 1005, 9) (italics omitted by Petitioner). “In other words, the audit system and/or emulator generates audit records for the Downloadables (i.e., Downloadable security profile data) that identifies and lists functions (i.e., operations) that the Downloadables attempt to invoke.” *Id.* (citing Ex. 1005, Fig. 3 (illustrating an exemplary audit record listing identified operations); Ex. 1018 ¶¶ 98–99).

Petitioner further contends:

Swimmer explains that audit records generated by the audit system include a field, called “function number,” which is the “number of the DOS function requested by the program.” [Ex. 1005,] 9. As explained by Dr. Davidson, in DOS, function numbers are assigned to “INT 21h” functions, which include various types of system operations. [*Id.* at] 7 (“Primarily, interrupt 0x21 is used”); [Ex. 1018] ¶ 100. For example, function numbers 0, 49, 76 are program termination operations. Function numbers 15 are file operations (open, close). Functions 72-74, and 88 are memory operations. Function numbers 68, 94, and 95 are network operations. [*Id.* at] ¶ 101. Significantly, these operations identified by Swimmer’s audit system are the very same types of operations referred to by the applications related to the ’494 patent as examples of “suspicious operations.” [Ex. 1002, 18:9-13] (DSP data “includes the fundamental computer operations,” in a Downloadable such as “file management operations, system management operations, memory management operations and CPU allocation operations.”). Thus, Swimmer discloses deriving security profile data (e.g., audit records) that includes a list of suspicious operations that the Downloadable may attempt to invoke (e.g., INT 21h system functions). [Ex. 1018] ¶ 102.

Id. at 17–18.

Additionally, Petitioner contends, “Swimmer discloses that this Downloadable security profile data is derived by a Downloadable scanner (*e.g.*, an emulator and/or audit system).” *Id.* at 18 (citing Ex. 1005, 8 (stating that the emulator is “a program which accepts the entire instruction set of a processor as input, and interprets the binary code as the original processor would”); Ex. 1018 ¶¶ 103–105 (explaining that identification and recordation of DOS function call numbers in Swimmer determines and identifies suspicious operations in the same manner as the code scanner described in the ’194 patent)). Petitioner contends that the Downloadable scanner also is coupled to the receiver (*e.g.*, the network components at the firewall). *Id.*

Lastly, Petitioner argues that Swimmer discloses that the audit records (*i.e.*, Downloadable security profile data) are stored in a database, and that, accordingly, “Swimmer discloses [a database manager coupled with said Downloadable scanner, for] storing the Downloadable security profile data is a database,” as recited in claims 1 and 10. *Id.* at 18–19 (alteration in original) (boldface omitted). Petitioner contends, in particular, that Figure 3 of Swimmer shows that “the audit record includes a list of suspicious operations identified by the audit system that are organized according to a clearly defined structure with various fields (*i.e.*, an organized collection of data that is organized based on a particular schema).” *Id.* at 19. Petitioner equates Swimmer’s “audit system or a portion thereof” with the “database manager” recited in claim 10, and contends that “the database manager is coupled to the Downloadable scanner (*e.g.*, emulator),” as “both components are located on the same computer system (*e.g.*, a firewall) and would be stored together in memory (*e.g.*, RAM).” *Id.* at 20. Moreover, Petitioner

contends, “to the extent Patent Owner argues that the claimed ‘database’ must ‘serve one or more applications,’ Swimmer . . . discloses that the audit records stored in the database are used by other processes.” *Id.* at 19–20. “For example, the database is used by an expert system (*e.g.*, application) to analyze program behavior using virus behavior rules.” *Id.* at 20 (citing Ex. 1005, 1, 2).

Petitioner also argues, in the alternative, that “the claimed [database manager for] storing the DSP data in a database would have been obvious based on the teachings in Swimmer.” *Id.* at 24–25 (alteration in original). In particular, according to Petitioner, “it would have been obvious to one of ordinary skill in the art that the security profile data in Swimmer could have been stored in any suitable format or structure, such as a relational database.” *Id.* (citing Ex. 1018 ¶ 111). “One of ordinary skill in the art would have been motivated to use such a database for a number of reasons,” Petitioner contends, including “to improve the organization, efficiency and speed when storing and retrieving this data.” *Id.* at 25 (citing Ex. 1018 ¶ 111). “Additionally, one of ordinary skill in the art would have also found it obvious to use a database manager with these types of databases.” *Id.* (citing Ex. 1018 ¶¶ 112–113).

With respect to dependent claims 2 and 11, which depend from claims 1 and 10, respectively, and further recite “stor[ing] a date & time when the Downloadable security profile data was derived [by said Downloadable scanner], in the database,” Petitioner points to Swimmer’s disclosure that each audit record entry includes “StartTime” and “EndTime” fields that indicate when the audit record was generated by the emulator and/or audit system. *Id.* at 20–21 (citing Ex. 1005, 9, 10, Fig. 3; Ex. 1018 ¶¶ 115–116).

With respect to claims 5 and 14, which depend from claims 1 and 10, respectively, and recite that the Downloadable “includes program script,” Petitioner points to Swimmer’s disclosure that VIDES can be used to derive security profile data for application programs and code, including programs received at a firewall, and argues that “[a]lthough Swimmer does not explicitly state that the Downloadables that are received and analyzed include ‘program scripts,’ this would have been obvious” to a person of ordinary skill in the art. *Id.* at 22 (citing Ex. 1005, Abst., 13; Ex. 1018 ¶¶ 121–122). Petitioner also points out that the ’494 patent admits that various kinds of program scripts, including scripts received over a network, were well-known and disclosed in the prior art. *Id.* (citing Ex. 1001, 2:22–27). Thus, Petitioner contends, for a person of ordinary skill in the art, “this would have merely involved applying the same techniques to another well-known form of executable code (*e.g.*, receiving program scripts at a firewall and using the emulator to identify and record suspicious operations in the script),” and a person of ordinary skill in the art “would have been motivated to do so for a number of reasons, including to improve the effectiveness of the virus detection system taught by Swimmer by enabling use with a wider range of Downloadables.” *Id.* at 23 (citing Ex. 1018 ¶¶ 124–125).

With respect to dependent claims 6 and 15, which depend from claims 1 and 10, respectively, and further recite that the suspicious computer operations “include calls made to an operating system, a file system, a network system, and to memory,” Petitioner contends that “Swimmer discloses that the emulator and/or audit system identifies and records DOS system calls (*i.e.*, suspicious operations) that a Downloadable attempts to

invoke.” *Id.* at 21 (citing Ex. 1005, Fig. 3). Citing Dr. Davidson’s testimony that different function numbers are assigned to the different types of system calls, including function numbers for file system operations, network system operations, and memory operations, Petitioner contends a person of ordinary skill in the art would have considered all of the system calls to be “operating system operations.” *Id.* Petitioner additionally contends that certain other function numbers correspond to operating system operations for terminating a program, which, Petitioner points out, is an example of an operating system operation explicitly discussed in the ’194 patent. *Id.* at 21–22 (citing Ex. 1005, Fig. 3; Ex. 1018 ¶¶ 119–120; Ex. 3001, 5:66–6:3).

Patent Owner raises a number of arguments in response to Petitioner’s contentions, including that “Swimmer is not enabling and cannot, therefore, anticipate the ’494 patent”; that Swimmer does not disclose “receiving an incoming Downloadable” or “a receiver for receiving an incoming Downloadable”; that Petitioner has not met its burden to demonstrate that Swimmer teaches the claimed “security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable”; that “Swimmer does not teach storing Downloadable security profile data in a database because it does not teach the derivation of the claimed Downloadable security profile data”; and that, “additionally, Petitioner does not identify any element disclosed in Swimmer that could be considered a ‘database.’” Prelim. Resp. 13–22. With respect to claims 6 and 15, Patent Owner contends that, “even under its own theory, Petitioner has not met its burden to demonstrate that Swimmer discloses suspicious operations for all four distinct systems (i.e., ‘an operating system, a file

system, a network system, and to memory’) recited in the claim language.” *Id.* at 23. And with respect to claims 5 and 14, Patent Owner argues “Petitioner does not provide any evidence that Swimmer’s emulator could analyze a Downloadable that included program script or even how a system could operate,” and “[t]hus, Petitioner has failed to meet its burden that the ’94 Patent is invalid because Swimmer’s does not disclose this element and it is not enabled to processes scripts.” *Id.* at 24.

We are persuaded on this record that Petitioner has demonstrated a reasonable likelihood that it would prevail at trial in showing that the subject matter of each of the challenged claims is unpatentable over Swimmer under 35 U.S.C. § 103. We are satisfied at this stage of the proceeding that Petitioner adequately accounts for all limitations of each claim, and we are not persuaded by Patent Owner’s contention that “Swimmer is not enabled.”

Although, as Patent Owner points out, Swimmer states that “[t]he present version of VIDES is only of interest to virus researchers; it is not designed to be a practical system for the end-user” (Ex. 1005, 2), it does not follow necessarily that Swimmer “cannot teach one of skill in the art how to make and use such a system without ‘undue experimentation,’” as argued by Patent Owner. Prelim. Resp. 14 (quoting *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1334 (Fed. Cir. 2003)). Petitioner has proposed that the person of ordinary skill in the art relevant to the ’94 patent would have, for example, “a Master’s degree in computer science, computer engineering, or a similar field, or a Bachelor’s degree in computer science, computer engineering, or a similar field, with approximately two years of industry experience relating to computer security” and that “significant experience in the field of computer

programming and malicious code might substitute for formal education.” Pet. 9–10. Patent Owner has not challenged that definition, and, on this record, we regard that definition as appropriate to the subject matter of the challenged claims. *See supra* note 5. Importantly, we also observe that that definition much more closely approximates the skill level of a “[computer] virus researcher” than the skill level of an “end user.” Moreover, although enablement is a threshold issue with respect to anticipation, *Amgen*, 314 F.3d at 1354, “a non-enabling reference may qualify as prior art for the purpose of determining obviousness under § 103.” *Symbol Techs. Inc. v. Opticon Inc.*, 935 F.2d 1569, 1578 (Fed., Cir. 1991). In the context of § 103, “[e]ven if a reference discloses an inoperative device, it is prior art for all that it teaches.” *Beckman Instruments Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989).

Regarding Patent Owner’s argument that Swimmer does not disclose “receiving an incoming Downloadable” or “a receiver for receiving an incoming Downloadable” (Prelim. Resp. 15), we are satisfied that those limitations are suggested by Swimmer’s disclosure that “VIDES could conceivably be used outside the virus lab to detect viruses in a real environment” and that “[o]ne possibility is to use it as a type of firewall for programs *entering* a protected network” (Ex. 1005, 13 (emphasis added)). Contrary to Patent Owner’s argument that “Swimmer acknowledges that . . . it is unclear how such a system would operate” (Prelim. Resp. 16), Swimmer specifies that “[f]or such a system to be accepted, it must not cause false positives,” that “[a] concept for this is currently under development,” and that “a virtual 8086 machine will be the basis for this” (Ex. 1005, 13).

We find that Petitioner has met its burden to demonstrate that Swimmer teaches the claimed “security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable.” As Petitioner points out, Swimmer’s audit trail includes a field entitled “function number” that identifies and lists numbers corresponding to DOS functions requested by an analyzed program. Pet. 17. Petitioner provides evidence that such function numbers were known in the prior art to correspond to, among other functions, the same four types of operations that are recited as “suspicious computer operations” in challenged dependent claims 6 and 15. Pet. 17–18, 21–22 (citing Ex. 1018 ¶¶ 117–120 (citing Duncan, “Advanced MS-DOS,” Microsoft Press (1986) at 272–82 (Ex. 1020, 3–13) (listing function numbers corresponding to, *inter alia*, calls made to an operating system (e.g., function numbers 0, 49, 76), a file system (15, 19), a network system (68, 94, 95), and to memory (72, 73, 74, 88)))). Although Swimmer does not use the terms “security profile data” or “suspicious computer operations” to refer to such functions, Swimmer indicates that the audit records are based on a slight modification of a pattern “representing the program behaviour in general, and virus activity in particular.” Ex. 1005, 9. Moreover, although the challenged claims require that the DSP data “includ[e] a list of suspicious computer operations that may be attempted by the Downloadable” (*see, e.g.*, claims 1, 10), the claims do *not* require that the list consist *only of* suspicious operations. Accordingly, we are not persuaded by Patent Owner’s contention that “to find the claims anticipated by Swimmer’s audit trail . . . would improperly read the limitation ‘suspicious’ out of the claim language.” Prelim. Resp. 18.

We also are not persuaded by Patent Owner’s argument that “Petitioner does not identify any element disclosed in Swimmer that could be considered a ‘database.’” *Id.* at 19. Whereas Patent Owner contends that Swimmer’s audit record is “a log of program activity, not a database,” we disagree. As explained by Swimmer, the audit record includes records collected by Swimmer’s VIDES system, organized with a specific “canonical format” to serve the ASAX tool. Ex. 1005, 9–10. We are persuaded on this record that the audit record is a database as that term is construed herein as “a collection of interrelated data organized according to a database schema to serve one or more applications.” *See* Section II.A, *supra*.

We, accordingly, conclude that Petitioner has identified sufficient evidence to establish a reasonable likelihood of showing at trial that Swimmer teaches or suggests the subject matter of each of claims 1, 2, 5, 6, 10, 11, 14, and 15 of the ’494 patent and that those claims are unpatentable under 35 U.S.C. § 103.

2. *Obviousness over Cline and Ji*

a. *Overview of Cline*

Cline describes a method for certifying the portability of software between computer systems, including certification tests to ensure that application programs will run on any conforming computer system regardless of the vendor. Ex. 1003, 2:66–3:5. The certification tests include a static analysis, in which the object code of an application program is analyzed against a “conformance database” of allowable external calls to determine whether any illegal or erroneous calls are being made, and a

dynamic analysis, in which the application program is analyzed as it is being run to determine any runtime errors in the calls. *Id.* at 3:6–16. If no errors are detected in either analysis, the application program then is certified to be compatible and transportable without change between all certified compatible computer systems. *Id.* at 3:16–21.

b. Overview of Ji

Ji describes a system for detecting and eliminating viruses on a computer network, wherein a File Transfer Protocol (“FTP”) proxy server is used to scan incoming and outgoing files for viruses and to transfer those files if they do not contain viruses. Ex. 1012, Abst. According to Ji, “[w]ith the advent of the Internet and its increased popularity, there are no prior art methods that have been able to successfully scan connections . . . such as those utilized by a gateway node in communicating with other networks,” and, therefore, “there is a need for a system and method that can detect and eliminate viruses in networks attached to other information systems by way of gateways or the Internet.” *Id.* at 2:19–22, 33–35. Ji discloses a method for processing a file before transmission into or from a network, including the steps of receiving a data transfer command and file name; transferring the file to a proxy server or system node; performing virus detection on the file; and determining whether the file contains any viruses. *Id.* at Abst., 3:4–11. If the file does not contain any viruses, the file is transferred from the system to a recipient node. *Id.* at Abst., 3:11–12. If the file does contain a virus, the file is deleted or some other preset action is performed. *Id.* at Abst., 3:13–14.

c. Discussion

Petitioner generally relies on Cline for teaching all limitations of independent claims 1 and 10 (Pet. 27–41), but additionally contends that, to the extent Cline does not expressly teach “receiving an incoming Downloadable,” that limitation is taught by Ji (*id.* at 30). Petitioner also contends that “Ji explicitly teaches that its techniques can be used to scan files and messages including program code that are received or downloaded over a network,” and, “[a]ccordingly, Ji teaches receiving and scanning incoming files and messages that include program code (*i.e.*, Downloadables).” *Id.* at 31. According to Petitioner, it would have been obvious for a person of ordinary skill in the art to combine the teachings of Cline and Ji, because both references are generally directed to scanning/analyzing executable programs and code, and a person of ordinary skill in the art would have been motivated to combine these teachings “for a number of reasons, including to verify that incoming Downloadables conform to certain rules before allowing computers on a network (*e.g.*, an Intranet) to download and execute the Downloadables.” *Id.* at 31–32.

In response to Petitioner’s contentions, Patent Owner argues, *inter alia*, that Cline is not analogous art to the ’494 patent and that Petitioner has not demonstrated that the combination of Cline and Ji discloses “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable” and “storing the Downloadable security profile data in a database,” as required by each of the challenged claims. Prelim. Resp. 28–42.

As an initial matter, we are not persuaded, on this record, by Patent Owner’s assertions that Cline is not analogous art to the ’494 patent. *Id.* at

28–31. Although Cline is concerned with interoperability, rather than security per se, we decline Patent Owner’s invitation to define the field of endeavor so narrowly. Both Cline and the ’494 patent fundamentally are concerned with the analysis of computer code, even if their intended applications differ. Moreover, we are not prepared, on this record, to say that methods that may be employed in determining compatibility are not reasonably pertinent to identifying security threats. *See In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011) (“A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor’s endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.”).

Nonetheless, we are persuaded by Patent Owner’s substantive arguments that Petitioner has not demonstrated on this record that the combination of Cline and Ji teaches or suggests “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable” and “storing the Downloadable security profile data in a database.” *Id.* at 31–42. Although Cline monitors and records system and procedure calls made by an application being tested, we are not persuaded, on this record, that Cline derives “security profile data,” as that term is used in the challenged claims. Unlike Swimmer, discussed in Section II.B.2, *supra*, Cline does not relate records of such system and procedure calls to virus activity, but instead relates those calls with compliance testing. *Compare* Ex. 1005, 9, *with* Ex. 1003, 3:6–21. We agree with Patent Owner that Cline’s dynamic and static analyses do not derive security profile data. Prelim. Resp. 32–39. And as

Patent Owner further points out (Prelim. Resp. 31), Petitioner has not cited Ji in connection with these limitations, except as allegedly teaching, in combination with Cline, that Cline's dynamic analyzer "would be coupled to the network components that receive incoming Downloadables" (Pet. 36).

On this record, Petitioner has not identified sufficient evidence that the combination of the teachings of Cline and Ji teaches or suggests all of the limitations recited in independent claims 1 and 10, and, in particular, "deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable" and "storing the Downloadable security profile data in a database." Consequently, we are not persuaded that Petitioner demonstrates a reasonable likelihood that it would prevail at trial in showing that the subject matter of those claims or of dependent claims 2, 5, 6, 11, 14, or 15 would have been obvious over Cline and Ji.

3. Obviousness over Forrest and Ji

a. Overview of Forrest

Forrest is directed generally to "anomaly intrusion detection," wherein "it is assumed that the nature of [an] intrusion is unknown, but that the intrusion will result in behavior different from that normally seen in the system." Ex. 1004, 2. According to Forrest, because anomaly intrusion detection relies on detecting behavior that is different from what is considered normal, it is important to define normal behavior. *Id.* at 1 ("An important prerequisite of such a system is an appropriate definition of self, which is the subject of this paper."). Forrest, thus, discloses systems that are used to develop a database of normal program behavior of executable

programs and to analyze such programs for subsequent anomalous behavior characterized by Forrest as intrusions. *Id.* at Abst., 1, 3. Forrest “defines normal behavior in terms of short sequences of system calls in a running process.” *Id.* at 2. These sequences of system calls are stored in a database associated with a particular process. *Id.* (“The overall idea is to build up a separate database of normal behavior for each process of interest.”); *id.* at 3 (“[W]e scan traces of normal behavior and build up a database of characteristic normal patterns (observed sequences of system calls).”). To generate the pattern of normal behavior, the program is run and data is collected using a utility referred to as “strace.” *Id.* at 4. Deviations from the normal behavior sequences are detected as potential intrusions. *Id.* at 8 (“If a program enters an unusual error state during an attempted break-in, and if this error condition executes a sequence of system calls that is not already covered by our normal database, we are likely to notice the attack.”). Additionally, Forrest teaches its techniques can be “implemented as an online system, in which the kernel checked each system call . . . [and] each site would generate its own normal database, based on the local software/hardware configuration and usage patterns.” *Id.* at 7.

b. Discussion

Petitioner generally relies on Forrest as teaching each limitation of independent claims 1 and 10. Pet. 48–57. Petitioner equates Forrest’s “anomaly intrusion detection” system with the “computer-based method” of claim 1 and the “system for managing Downloadables” of claim 10. *Id.* at 48–49. Petitioner contends that a person of ordinary skill in the art would have understood that the Sun SPARCstations on which Forrest disclosed its systems to run “would have typically included I/O hardware such as network

cards, telephone modems, parallel ports, [and] serial ports, which would be capable of receiving ‘incoming Downloadables.’” *Id.* at 49. Furthermore, Petitioner contends, “Forrest explains that these systems are capable of running applications such as sendmail[,] . . . a well-known email transfer utility,” and “it also was well-known that generally any type of file (including executable programs) could be attached to e-mails, thus allowing a computer system running sendmail to receive and transfer these attachments to an ultimate destination (*e.g.*, a client).” *Id.* Still further, however, Petitioner contends that, “[t]o the extent Forrest does not expressly teach ‘receiving an incoming Downloadable,’ this feature is clearly disclosed by Ji,” which “recognized that with the proliferation of the Internet, there was a need to scan and verify incoming executables at the connection points between networks (*e.g.*, gateways).” *Id.* at 50 (citing Ex. 1012, 2:13–29). According to Petitioner, it would have been obvious for a person of ordinary skill in the art to combine the teachings of Forrest and Ji, because both references “are directed to scanning/analyzing executable software (*i.e.*, Downloadables),” specifically, “anomaly intrusion detection” in Forrest, and “behavior detection” in Ji. *Id.* at 51–52 (citing Ex. 1018 ¶¶ 200–202). Petitioner argues that, “based on the teachings of Ji, it would have been obvious for Forrest[’s] ‘anomaly intrusion detection’ system to receive ‘Downloadables’ and to determine/verify their behavior.” *Id.* at 52 (citing Ex. 1018 ¶ 203).

With respect to the claimed “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable,” Petitioner points, *inter alia*, to Forrest’s disclosure that “we scan traces of normal behavior and build up a database

of characteristic normal patterns (observed sequences of system calls)” and contends that “these traces represent ‘operations that may be attempted by the Downloadable.’” *Id.* at 54 (citing Ex. 1004, 2–4; Ex. 1018 ¶¶ 207–209). Petitioner further contends that a person of ordinary skill in the art “would have understood that system calls correspond closely the types of ‘suspicious operations’ provided by the ’639 provisional (which is incorporated by reference by the ’494 patent).” *Id.* at 54–55 (citing Ex. 1002, 18:9–13; Ex. 1018 ¶¶ 210–212. Further, according to Petitioner, “Forrest teaches that the system calls (*i.e.* suspicious operations) are maintained in a list.” *Id.* at 55 (citing Ex. 1003, 3).

Lastly, with respect to the claimed “storing the Downloadable security profile data in a database,” Petitioner again points to Forrest’s disclosure that a database is built up of “characteristic normal patterns (observed sequences of system calls),” as well as disclosure in Forrest that “[t]he overall idea is to build up a separate database of normal behavior for each process of interest.” *Id.* at 56 (quoting Ex. 1003, 2–3). Further, Petitioner contends, “[t]o the extent [Patent Owner] argues that a database must ‘serve one or more applications,’ Forrest discloses that the database is used by further processes. More specifically, the database is used to analyze program behavior based upon newly captured traces of a program’s execution in order to detect anomalies.” *Id.* (citing Ex. 1003, 2–3, 7; Ex. 1018 ¶¶ 217–219).

Patent Owner responds that Petitioner has not demonstrated that the combination of Forrest and Ji discloses “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable” and “storing the Downloadable security profile data in a database,” as required by each of the challenged claims.

Prelim. Resp. 43–48. With respect to the first of those limitations, in particular, Patent Owner argues, “Petitioner completely omits any explanation as to how the references teach the recited ‘deriving security profile data for the Downloadable,’” and “[a]dditionally, Petitioner fails to demonstrate that Forrest in view of Ji discloses ‘a list of . . . suspicious computer operations that may be attempted by the Downloadable.’” *Id.* at 44. According to Patent Owner, whereas “Petitioner attempts to equate ‘traced normal behavior’ with ‘operations that may be attempted by the Downloadable,’” Forrest instead explains that “a trace ‘build[s] up a database of characteristic normal patterns (observed sequences of system calls)’” and “[o]nce these sequences are saved in a database Forrest discloses ‘check[ing] new traces against it using the same method.’” *Id.* at 44–45 (quoting Ex. 1004, 3). “Accordingly, what Forrest generates and stores in this database is neither a security profile for a Downloadable nor a list of suspicious operations; rather Forrest generates a database including *sequences of calls* that a process performs during normal operations.” *Id.* at 45. “Second, the sequences of calls that are written to the database define a process’s *normal behavior*,” and “Petitioner fails to explain how calls that are explicitly designated as normal could be considered ‘suspicious computer operations.’” *Id.* Patent Owner contends that, whereas Petitioner asserts that a person of ordinary skill in the art “would have understood that system calls correspond closely the types of ‘suspicious operations’ provided by the ’639 provisional,” the cited portion of the ’639 provisional “does not state or imply that all system calls are suspicious and all other computer operations are benign as implied in the Petition and cannot therefore cure Forrest’s deficiencies.” *Id.* at 45–46 (citing Pet. 54–55; Ex. 1002, 18:9–13).

We agree with Patent Owner that Petitioner has not demonstrated on this record that the combination of Forrest and Ji teaches or suggests “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable” and “storing the Downloadable security profile data in a database.” *Id.* at 43–48. As Patent Owner points out (*id.* at 44–45), whereas Petitioner equates Forrest’s “traced normal behavior” with the claimed “operations that may be attempted by the Downloadable” (Pet. 54), Forrest discloses instead that that traced normal behavior is used to build up a database of characteristic normal patterns against which new traces may be checked. *Id.* at 44–45; Ex. 1004, 3. Further, despite Petitioner’s citation to the ’639 provisional as providing exemplary “suspicious operations,” we also agree with Patent Owner that Petitioner fails to provide any persuasive explanation as to how calls that are explicitly designated as “normal” could be considered ‘suspicious computer operations.’” Prelim. Resp. at 45. Indeed, to the extent Forrest suggests that any operations at all might be suspicious, those would be *abnormal* operations, rather than the “normal operations” included in Forrest’s database.

On this record, Petitioner has not identified sufficient evidence that the combination of the teachings of Forrest and Ji teaches or suggests all of the limitations recited in independent claims 1 and 10, and, in particular, “deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable” and “storing the Downloadable security profile data in a database.” Consequently, we are not persuaded that Petitioner demonstrates a reasonable likelihood that it would prevail at trial in showing that the

subject matter of those claims or of dependent claims 2, 5, 6, 11, 14, or 15 would have been obvious over Forrest and Ji.

C. Secondary Considerations

Patent Owner contends that Petitioner ignored evidence of secondary considerations that Patent Owner asserted in litigation with Petitioner, allegedly including evidence of “industry praise; licensing of Finjan’s patent portfolio, including the ’494 patent, to several technology companies, including McAfee, Inc./Intel Corporation, Websense, Inc., Webroot Inc., Trustwave Holdings, Inc., M86 Security and Microsoft; copying by competitors; and commercial success” (Prelim. Resp. 48–51). Thus far, however, Patent Owner has provided only a copy of an interrogatory response that provides insufficient detail for us to evaluate the strength of its evidence. Ex. 2005, 10–13. The interrogatory response alleges the existence and dates of agreements with the above-identified companies, but does not establish any nexus between the recitations of the challenged claims and the licenses themselves. *Id.* at 12. The licenses are not part of the record, and Patent Owner provides no evidence showing that the licensing program was successful either because of the recitations of the challenged claims or because they were entered into as business decisions to avoid litigation, because of prior business relationships, or for other economic reasons. “Without a showing of nexus, ‘the mere existence of . . . licenses is insufficient to overcome the conclusion of obviousness.’” *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) (quoting *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 255 F.3d 1349, 1358 (Fed. Cir. 2000)); *see also In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). Patent Owner’s interrogatory response also cites praise for its

products, provides sales figures from the 2004–06 time period with a statement that “[t]hese sales were primarily the result of the Finjan platform, specifically the Vital Security suite,” and alleges that versions of that product “in or about 2004 and later versions incorporated technology of claims 1, 7, 11, 15, 16, 41, and 43 of the ’844 Patent,” but Patent Owner has not made any evidence supporting this allegation of record in this proceeding. Ex. 2005, 11–12. On this record, the relatively weak evidence of secondary considerations does not overcome the relatively strong evidence of obviousness.

III. CONCLUSION

On this record, we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail at trial in demonstrating that claims 1, 2, 5, 6, 10, 11, 14, and 15 of the ’494 patent are unpatentable over Swimmer.

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim or the construction of any claim term.

IV. ORDER

Upon consideration of the record before us, it is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314, an *inter partes* review is instituted as to claims 1, 2, 5, 6, 10, 11, 14, and 15 of the ’494 patent under 35 U.S.C. § 103(a) as unpatentable over Swimmer;

FURTHER ORDERED that no other ground of unpatentability alleged in the Petition for any claim is authorized for this *inter partes* review; and

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FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this Decision.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SYMANTEC CORP.,
Petitioner,

v.

FINJAN, INC.,
Patent Owner.

Case IPR2015-01897
Patent 8,677,494 B2

Before JAMES B. ARPIN, ZHENYU YANG, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Symantec Corp. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review pursuant to 35 U.S.C. § 311 of claims 1, 2, 5, 6, 10, 11, 14, and 15 of U.S. Patent No. 8,677,494 B2 to Edery *et al.* (Ex. 1001, “the ’494 patent”). Pet. 1. Finjan, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). We review the Petition under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

For the reasons that follow and on this record, we are not persuaded that Petitioner demonstrates a reasonable likelihood of prevailing in showing the unpatentability of any of the challenged claims on the asserted grounds. Accordingly, we *deny* Petitioner’s request to institute an *inter partes* review.

A. The ’494 Patent

The ’494 patent, entitled “Malicious Mobile Code Runtime Monitoring System and Methods,” issued March 18, 2014, from U.S. Patent Application No. 13/290,708 (“the ’708 application”), filed November 7, 2011. Ex. 1001, [21], [22], [45], [54]. On its face, the ’494 patent purports to claim priority from nine earlier applications, including U.S. Patent Application No. 08,964,388 (“the ’388 application”), filed November 6, 1997, which issued July 18, 2000, as U.S. Patent No. 6,092,194 (Ex. 1007, “the ’194 patent” or “Touboul I”). Ex. 1001, [60], [63], col. 1, ll. 7–55. For reasons stated below, we determine on this record that the challenged claims are entitled at least to the benefit of the November 6, 1997 filing date of the ’388 application.

B. Related Proceedings

The '494 patent is the subject of a district court action between the parties, *Finjan, Inc. v. Symantec Corp.*, 3:14-cv-02998 (N.D. Cal.), and has also been asserted in three other district court actions, *Finjan, Inc. v. Sophos, Inc.*, 3:14-cv-01197 (N.D. Cal.), *Finjan, Inc. v. Palo Alto Networks, Inc.*, 3:14-cv-04908 (N.D. Cal.), and *Finjan, Inc. v. Blue Coat Systems, Inc.*, 5:15-cv-03295 (N.D. Cal.). Pet. 1; Paper 5, 1. Petitioner also has filed another petition seeking *inter partes* review of the '494 patent, a petition seeking *inter partes* review of related U.S. Patent No. 6,154,844 (hereinafter "Touboul II"), and two petitions seeking *inter partes* review of related U.S. Patent No. 7,613,926, in Cases IPR2015-01892, IPR2015-01894, IPR2015-01893, and IPR2015-01895, respectively. Pet. 1. Palo Alto Networks, Inc. also has filed a petition seeking *inter partes* review of the '494 patent (Case IPR2016-00159, Paper 2), and a petition filed by Sophos Inc. seeking *inter partes* review of the '494 patent was denied on September 24, 2015 (Case IPR2015-01022, Paper 7).

C. References Relied Upon

Petitioner relies on the following references:

Exhibit	Reference
1007	US 6,092,194, issued July 18, 2000 ("Touboul I")
1016	US 6,154,844, issued Nov. 28, 2000 ("Touboul II")

Pet. 23–24. Petitioner also relies on the Declaration of Jack W. Davidson (Ex. 1021).

D. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of the challenged claims on the following four grounds:

Reference	Basis	Claims Challenged
Touboul I	§ 102(b)	1, 5, 6, 10, 14, and 15
Touboul I	§ 103(a)	2 and 11
Touboul II	§ 102(b)	1, 5, 6, 10, 14, and 15
Touboul II	§ 103(a)	2 and 11

Pet. 24.

II. DISCUSSION

A. Claim Interpretation

In an *inter partes* review proceeding, claims of an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 890 (2016). On this record and for purposes of this Decision, we determine that no claim terms require express construction.

B. Priority Date

1. Background

As filed, the '708 application from which the '494 patent issued claimed priority from the following seven earlier-filed applications:

1) U.S. Patent Application No. 08/964,388 (“the '388 application”) to Shlomo Touboul, which, as indicated in Section I.A. above, was filed on November 6, 1997, and issued as Touboul I on July 18, 2000;

2) U.S. Patent Application No. 09/539,667 (“the '667 application”) to Mr. Touboul, filed March 30, 2000, as a continuation of the '388 application; the '667 application issued October 12, 2004, as U.S. Patent No. 6,804,780 B1 (Ex. 1006, “the '780 patent”);

3) U.S. Patent Application No. 09/551,302 (“the '302 application”) to Mr. Touboul, filed April 18, 2000; the '302 application issued November 12, 2002, as U.S. Patent No. 6,480,962 B1 (Ex. 1009, “the '962 patent”);

4) U.S. Provisional Patent Application No. 60/205,591 (Ex. 1005, “the '591 provisional”) to Nimrod Itzhak Vered, Yigal Mordechai Edery, and David R. Kroll, filed May 17, 2000;

5) U.S. Patent Application No. 09/861,229 (“the '229 application”) to Messrs. Edery, Vered, Kroll, and Touboul,¹ filed May 17, 2001, as a

¹ The '229 application, as filed, named only Messrs. Vered, Edery, and Kroll as inventors. However, a Request to Correct Inventorship, requesting to add Mr. Touboul as an inventor, was filed on June 21, 2005. Ex. 2005, 3. The Request was accompanied by supporting papers, including a statement signed by Mr. Touboul and stating that the error in inventorship occurred inadvertently and that there was no deceptive intent on his part; an Assent of Assignee To Correction And/Or Addition of Inventor; a new Declaration signed by Messrs. Vered, Edery, Kroll, and Touboul; and an Assignment executed by Mr. Touboul. *Id.* at 4–14. The Office granted the Request on

continuation-in-part of the '667 and '302 applications and claiming the benefit of the '591 provisional; the '229 application issued June 6, 2006, as U.S. Patent No. 7,058,822 B2 (Ex. 1004, "the '822 patent");

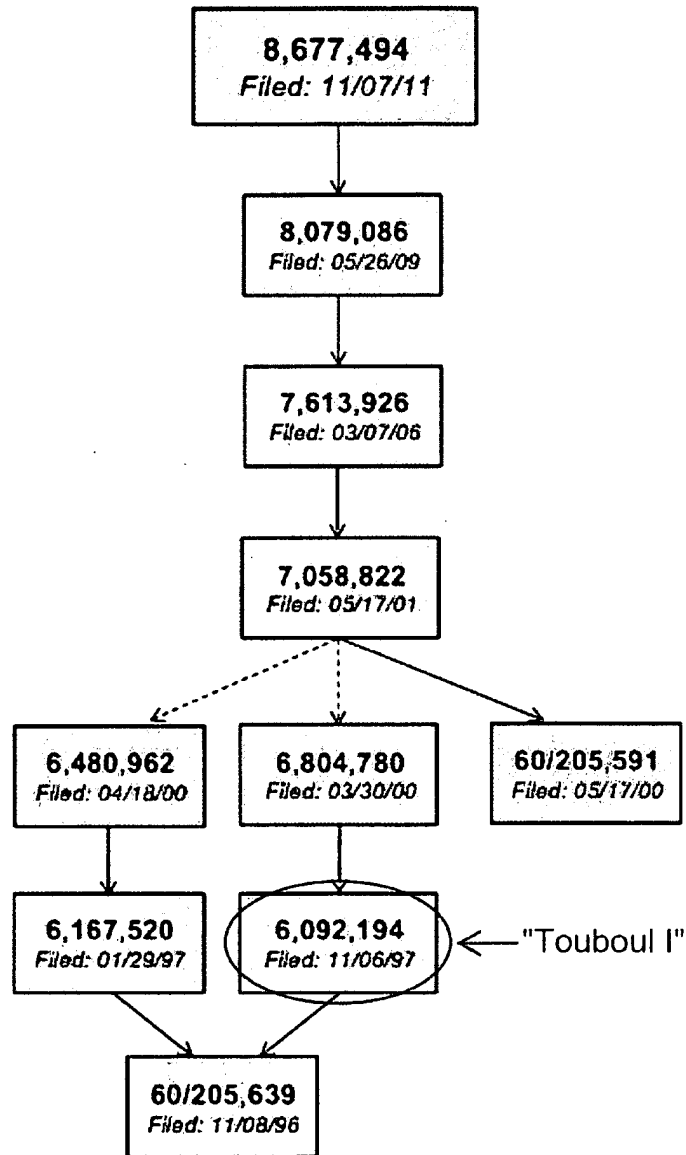
6) U.S. Patent Application No. 11/370,114 ("the '114 application") to Messrs. Edery, Vered, Kroll, and Touboul, filed March 7, 2006, as a continuation of the '229 application; the '114 application issued November 3, 2009, as U.S. Patent No. 7,613,926 B2 (Ex. 1003, "the '926 patent"); and

7) U.S. Patent Application No. 12/471,942 ("the '942 application") to Messrs. Edery, Vered, Kroll, and Touboul, filed May 26, 2009, as a continuation of the '114 application; the '942 application issued December 13, 2011, as U.S. Patent No. 8,079,086 B1 (Ex. 1002, "the '086 patent").
Ex. 3002, 1.

On December 6, 2013, during original prosecution of the '708 application, Applicants filed a petition to amend the application to include references to priority claims from two additional applications, namely, U.S. Patent Application No. 08/790,097 ("the '097 application") to Mr. Touboul, filed January 29, 1997, which issued as U.S. Patent No. 6,167,520 (Ex. 1010, "the '520 patent"), and of which the '302 application was a continuation; and U.S. Provisional Application No. 60/030,639 (Ex. 1008, "the '639 provisional") to Mr. Touboul, filed November 8, 1996, from which the '388 and '097 applications had both claimed priority. Ex. 3003. The Office granted the Applicants' petition on December 24, 2013. Ex. 3004.

August 11, 2005, before the '822 patent issued. *Id.* at 15–17. Although Mr. Touboul's name was not printed on the '822 patent when it issued (Ex. 1004, [75]), it was later added by a Certificate of Correction (*id.* at 25) issued on a request filed under 37 C.F.R. § 1.322 ("Certification of correction of Office mistake"). Ex. 3001.

To better understand Patent Owner's claims to priority for the '494 patent, Petitioner prepared a chart, which we have reproduced below with an annotation to identify the '194 patent as Touboul I:



Petitioner's chart provides "a graphical depiction of the claimed priority chain in the '494 patent (with dashed arrows indicating that the later application is a continuation-in-part of the earlier application)." Pet. 4.

As set forth in Section I.D. above, Petitioner contends that claims 1, 5, 6, 10, 14, and 15 of the '494 patent are anticipated—and claims 2 and 11 of the '494 patent are rendered obvious—by each of Touboul I and Touboul II. Pet. 24. Although neither Touboul I nor Touboul II issued until 2000, Petitioner contends that the priority claims in the '494 patent are “defective for a number of reasons and, therefore, the challenged claims are not entitled to earlier priority based on any of the Priority Applications.” Pet. 5. In particular, according to Petitioner,

It is well settled that, in order for a later-filed application to be entitled to the benefit of the filing dates of earlier-filed applications, **each application in the priority chain** must, *inter alia*: (i) satisfy the written description requirement of § 112 for the claims of the later-filed application; and (ii) include specific references to each of the earlier-filed applications in the chain.

Here, the priority chain of the '494 patent fails to meet either requirement. The Priority Applications lack the continuing disclosure throughout the chain that is necessary to support the challenged claims of the '494 patent. In particular, each of the '086, '926, and '822 patents lacks sufficient disclosure under § 112 for virtually all of the elements recited in the challenged claims. Thus, each of these patents constitutes a break in the priority chain and, therefore, the challenged claims are not entitled to earlier priority. Moreover, neither the '086 patent, nor the '926 patent, include a priority claim or any reference whatsoever to a number of earlier-filed applications (*i.e.*, the '194 patent, '520 patent and '639 provisional) that are included in the priority chain of the '494 patent. Thus, the '086 and '926 patents both fail to satisfy the specific-reference requirement under § 120 and, for this additional reason, these patents constitute a break in the priority chain.

Additionally, when it issued in 2006, the '822 patent also lacked any priority claim or any reference whatsoever to these earlier-filed applications (nor did it even share any inventors in common with the many of the earlier-filed applications). This remained the case until 2014 . . . when Patent Owner amended

the priority claims during an *ex parte* reexamination of the '822 patent.

Id. at 5–6 (internal citations omitted). Accordingly, Petitioner contends, “the earliest possible priority date of the challenged claims is the filing date of the '494 patent, *i.e.*, November 7, 2011,” and both Touboul I and Touboul II are “prior art to the '494 patent under pre-AIA 35 U.S.C. § 102(b).” *Id.* at 8, 23, 24.

Patent Owner counters, *inter alia*, that the '494 patent properly claims priority back to Touboul I, rendering both Touboul I and Touboul II “inoperative as prior art.” Prelim. Resp. 1. For the reasons that follow, we agree with Patent Owner.

2. *Continuity of Disclosure*

To claim priority from an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earliest application must comply with the written description requirement of 35 U.S.C. § 112. *Zenon Envtl., Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378 (Fed. Cir. 2007); *see also In re Hogan*, 559 F.2d 595, 609 (CCPA 1977) (“[T]here has to be a continuous chain of copending applications each of which satisfies the requirements of § 112 with respect to the subject matter presently claimed.”). If any application in the priority chain fails to make the requisite disclosure, the later-filed application is not entitled to the benefit of the filing date of applications preceding the break in the priority chain. *Lockwood v. Am. Airlines Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997).

Petitioner contends that the priority chain of the '494 patent does not satisfy the requirement set forth by the Federal Circuit and the Board that each application must include sufficient disclosure to satisfy the written

description requirements of 35 U.S.C. § 112 for the claims at issue to secure the benefit of the earliest claimed priority date. Pet. 8 (citing *Holmer v. Harari*, 681 F.3d 1351, 1355 (Fed. Cir. 2012); *Hyatt v. Boone*, 146 F.3d 1348, 1354–55 (Fed. Cir. 1998); *In re Hogan*, 559 F.2d at 609; *Polaris Wireless, Inc. v. TruePosition, Inc.*, Case IPR2013-00323, Paper 62, slip op. at 22 (PTAB Nov. 3, 2014); *Focal Therapeutics, Inc. v. Senorx, Inc.*, Case IPR2014-00116, Paper 8, slip op. at 12 (PTAB Apr. 22, 2014)). According to Petitioner, claim elements and features such as “deriving security profile data for [a] Downloadable,” Downloadable security profile (“DSP”) data “including a list of suspicious computer operations that may be attempted by the Downloadable,” and “storing the [DSP] data in a database,” as recited in challenged independent claims 1 and 10; “stor[ing] a date & time when the [DSP] data was derived [by said Downloadable scanner], in the database,” as recited in dependent claims 2 and 11; and “suspicious computer operations includ[ing] calls made to an operating system, a file system, a network system, and to memory,” as recited in dependent claims 6 and 15, “are described in some of the earliest-filed applications in the priority chain, namely: the ’780 patent, the ’194 patent, and the ’639 provisional.” Pet. 9. Petitioner asserts that, “[i]mportantly, however, none of this same disclosure corresponding to these claim elements is included in the specifications of the ’086, ’926, or ’822 patents. Nor are these claim elements described anywhere in the ’086, ’926, or ’822 patents.” *Id.* at 9–10 (citations omitted). Further, Petitioner asserts, “[a]lthough the ’822 patent is characterized as a ‘continuation-in-part’ of the ’780 patent, the ’822 patent specification is directed to completely new subject matter and is missing the vast majority of the disclosure in the ’780 patent.” *Id.* at 10.

Petitioner's assertions are not persuasive. As Patent Owner points out, the '822 patent incorporates by reference the '780 and '962 patents; the '926 patent incorporates by reference the '194, '780, '962, and '822 patents; the '086 patent incorporates by reference the '194, '780, '962, '822, and '926 patents; and the '494 patent incorporates by reference the '822, '926, and '086 patents. Prelim. Resp. 17. The '494 patent also incorporates by reference the '194, '780, and '962 patents. Ex. 1001, 1:31–32, 35–38, 47–48.

As Patent Owner correctly explains (Prelim. Resp. 17–18), material necessary to provide a written description of a claimed invention as required by 35 U.S.C. § 112 may be incorporated into a patent application by reference, provided that the incorporated reference is a U.S. patent or U.S. patent application publication that does not itself incorporate such “essential material” by reference, by “[e]xpress[ing] a clear intent to incorporate by reference by using the words ‘incorporat(e)’ and ‘reference’” and “[c]learly identify[ing] the referenced patent [or] application.” 37 C.F.R. § 1.57(c), (d). Moreover, the Federal Circuit has explained that “incorporated patents are ‘effectively part of the host [patents] as if [they] were explicitly contained therein.’” *X2Y Attenuators, LLC v. U.S. Int’l Trade Comm’n*, 757 F.3d 1358, 1362–63 (Fed. Cir. 2014) (alterations in original) (quoting *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1329 (Fed. Cir. 2001)). Contrary to Petitioner’s contentions (Pet. 11–15), the “boilerplate language” used in the '822, '926, '086, and '494 patents, broadly stating without further qualification that the earlier-filed patents are “incorporated by reference,” is sufficient in view of Federal Circuit

precedent to incorporate the disclosure of at least the '780 patent² into each later-filed patent. *See, e.g., Harari v. Lee*, 656 F.3d 1331, 1335 (Fed. Cir. 2011) (finding “entire . . . application disclosure was incorporated by the broad and unequivocal language: ‘The disclosures of the two applications are hereby incorporate[d] by reference’”). We agree with Patent Owner that the facts here are distinguishable from those in cases on which Petitioner relies. Prelim. Resp. 23–24. For example, in *Zenon*, as Patent Owner asserts, there was a lack of continuity of disclosure in a priority chain because the priority references were not incorporated in their entirety, but only with respect to specific portions. *Id.*

On this record, and particularly in view of Petitioner’s statement that the specification of the '780 patent, among others, describes the “claim elements and features” not otherwise included in the specifications of the '822, '926, '086, and '494 patents (Pet. 10)—and, thus, does not itself incorporate such “essential material” by reference (*see* 37 C.F.R. §1.57(d))—we agree with Patent Owner’s conclusion that “each application in the priority chain contains written description support for the challenged claims, and continuity of disclosure exists up to and including the '494 [p]atent without interruption.” Prelim. Resp. 16.³

² We note that, although the '822 patent does not expressly incorporate by reference the '194 patent, the '667 application from which the '780 patent issued was a *continuation* of the '388 patent from which the '194 patent issued, and the '194 and '780 patents share essentially the same disclosure. *Compare* Ex. 1006 with Ex. 1007.

³ Petitioner also asserts that “the '822 patent did not even include any inventors in common with the earlier applications until Patent Owner ‘corrected’ the inventorship more than 5 years after the '822 patent issued.” Pet. 10. As explained in note 1 *supra*, however, the inventorship of the '229

3. *Specific Reference to Earlier-Filed Applications*

A patent is entitled to the priority date of an earlier filed application if, among others, it contains or is amended to contain a specific reference to the earlier filed application. 35 U.S.C. § 120.

Contrary to Petitioner's assertion that "neither the '086 patent, nor the '926 patent, include a priority claim or any reference whatsoever to a number of earlier-filed applications (*i.e.*, the '194 patent, '520 patent and '639 provisional) that are included in the priority chain of the '494 patent" (Pet. 6), the '086 and '926 patents both include priority claims to the '194 patent and incorporate the '194 patent by reference in its entirety. Ex. 1002, [63], 1:26–30; Ex. 1003, [63], 1:23–27. Moreover, as Patent Owner points out, the '520 patent and '639 provisional are not within the priority chain from the '494 patent to the '194 patent, and the failure of the '926 and '086 patents to include a priority claim or reference to the '520 patent and '639 provisional does not affect the '494 patent's entitlement to the benefit of the November 6, 1997 filing date of the '388 application that matured into the '194 patent (*i.e.*, Touboul I).

Petitioner also argues that the failure of the '926 and '086 patents to include a priority claim or any reference to the '520 patent and '639 provisional constitutes a break in the priority chain of the '494 patent. Pet. 17. For purposes of this Decision, however, we need not reach this issue.

application from which the '822 patent issued was corrected in 2005, prior to the issuance of the '822 patent. *See* Ex. 2005. Accordingly, Petitioner's assertion is both incorrect and unpersuasive.

4. *Delay in Correction of '822 Patent Priority Claim*

As filed, the '229 application that matured into the '822 patent included a claim of priority from, and incorporated by reference, the '302 application that matured into the '962 patent, the '667 application that matured into the '780 patent, and the '591 provisional, but it did not claim priority from or include any reference to the '520 and '194 patents or the '097 and '388 applications from which those patents respectively issued. As Petitioner points out, however, Patent Owner, in the course of *ex parte* reexamination of the '822 patent in 2014, filed a Petition to Accept Unintentionally Delayed Priority Claim Under 37 C.F.R. 1.78, requesting amendment to include references to the '520 and '194 patents.

Reexamination Control No. 90/013,017, Petition dated March 6, 2014, at 1–3 (Ex. 1015, 7–9); *see also* Pet. 18. The Office granted Patent Owner's Petition on July 25, 2014. Reexamination Control No. 90/013,017, Decision dated July 25, 2014, at 1–3 (Ex. 1015, 1–3)).

Notwithstanding Patent Owner's representation that the delay in requesting correction of the priority claim was unintentional, Petitioner asserts that "the publically available information concerning the '822 patent, as well as other patents in the same family and other applications owned by Patent Owner, *cast[s] serious doubts* concerning the veracity of Patent Owner's representation that this delayed priority claim in the '822 patent was 'unintentional.'" Pet. 19 (emphasis added). In support of this assertion, Petitioner points to Patent Owner's amendment of the priority claim in the application that matured into the '494 patent; the assertions of priority claims going through the '822 patent in the applications for the '926, '086, and '494 patents; and amendments of priority claims in one other application

and one other patent, and *suggests* that “it appears Patent Owner has, on numerous occasions, attempted to gain extra patent term for its patents by not making certain priority claims up front, and then only doing so in certain applications when an earlier priority date is needed to avoid/disqualify intervening prior art.” *Id.* at 20–22.

Patent Owner responds, *inter alia*, that “Petitioner is essentially alleging inequitable conduct by questioning the veracity of Patent Owner’s Statement to the USPTO,” and “validity challenges based on inequitable conduct are improper in a petition for *Inter Partes* Review.” Prelim. Resp. 28. We agree. The Board is not a court of general jurisdiction, but an administrative tribunal whose jurisdiction is limited statutorily in the context of *inter partes* review proceedings to determinations of patentability pursuant to 35 U.S.C. §§ 102 and 103 based on prior art consisting of patents and printed publications. 35 U.S.C. § 311(b). Thus, we do not make any determination with respect to Petitioner’s allegations regarding the veracity of Patent Owner’s statements to the Office in prior proceedings. Moreover, Petitioner’s doubts and inferences regarding Patent Owner’s past actions and motives are insufficient bases for us to question Patent Owner’s candor in this proceeding. *See* 37 C.F.R. § 42.11.

C. Anticipation by and Obviousness over Touboul I and Touboul II

On this record and for the reasons stated in Section II.B. above, we are persuaded that claims 1, 2, 5, 6, 10, 11, 14, and 15 of the ’494 patent are entitled at least to the benefit of the November 6, 1997 filing date of the ’388 patent that matured into the ’194 patent, and, accordingly, that neither Touboul I (i.e., the ’194 patent) nor Touboul II, which issued on November 28, 2000, from an application filed December 22, 1997, constitutes prior art

to those claims. We conclude, therefore, that Petitioner has not demonstrated a reasonable likelihood that it would prevail at trial on any of the asserted grounds.

III. CONCLUSION

On this record, Petitioner has not shown that Touboul I and Touboul II are prior art to the challenged claims of the '494 patent. Accordingly, Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenges to the patentability of those claims on the grounds asserted in the Petition.

IV. ORDER

Upon consideration of the record before us, it is, therefore,
ORDERED that the Petition is *denied*, and no *inter partes* review is instituted as to any claim of the '494 patent.

IPR2015-01897
Patent 8,677,494 B2

For PETITIONER:

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Dawnmarie@beycotropia.com

May 1, 2015

**PRIVILEGED & CONFIDENTIAL
ATTORNEY/CLIENT COMMUNICATION**

Re: Change of Assignee's Address

Dear Sir/Madam,

This letter is being filed by the undersigned on all patents listed on Attachment A hereto to make it part of the record for each matter. The Assignee's address has changed, and the new address is as follows. This does **NOT** change the correspondence address for these matters.

Finjan, Inc.
2000 University Avenue
Suite 600
East Palo Alto, CA 94303

If you have any questions regarding the above, please do not hesitate to contact me.

Best regards,

/Dawn-Marie Bey/

Dawn-Marie Bey

Encl.

ATTACHMENT A

CHANGE OF ASSIGNEE ADDRESS FOR FINJAN, INC.

Serial No./Patent No.	Docket No.	Title
08/964,388 Filed November 6, 1997 6,092,194 Issued July 18, 2000	FIN0001	System and Method For Protecting a Computer and a Network From Hostile Downloadables
09/539,667 Filed March 30, 2000 6,804,780 Issued October 12, 2004	FIN0001-CON1	System and Method For Protecting a Computer and a Network From Hostile Downloadables
09/861,229 Filed May 17, 2001 7,058,822 Issued June 6, 2006	FIN0001-CON1-CIP1	Malicious Mobile Code Runtime Monitoring System and Methods
11/159,455 Filed June 22, 2005 7,647,633 Issued January 12, 2010	FIN0001-CON1-CIP1-CON1	Malicious Mobile Code Runtime Monitoring System and Methods
11/370,114 Filed March 7, 2006 7,613,926 Issued November 3, 2009	FIN0001-CON1-CIP1-CON2	Method and System For Protecting a Computer and a Network From Hostile Downloadables
12/471,942 Filed May 26, 2009 8,079,086 Issued December 13, 2011	FIN0001-CON1-CIP1-CON3	Malicious Mobile Code Runtime Monitoring System and Methods
13/290,708 Filed November 7, 2011 8,677,494 Issued March 18, 2014	FIN0001-CON1-CIP1-CON4	Malicious Mobile Code Runtime Monitoring System and Methods
10/930,884 Filed August 30, 2004 8,225,408 Issued July 17, 2012	FIN0001-CON1-CIP3	Method and System For Adaptive Rule-Based Content Scanners
11/009,437 Filed December 9, 2004 7,975,305 Issued July 5, 2011	FIN0001-CON1-CIP3-CIP1	Method and System For Adaptive Rule-Based Content Scanners For Desktop

ATTACHMENT A
CHANGE OF ASSIGNEE ADDRESS FOR FINJAN, INC.

Serial No./Patent No.	Docket No.	Title
08/995,648 Filed December 22, 1997 6,154,844 Issued November 28, 2000	FIN0002	System and Method For Attaching a Downloadable Security Profile to a Downloadable
08/790,097 Filed January 29, 1997 6,167,520 Issued December 26, 2000	FIN0003	System and Method For Protecting a Client From Hostile Downloadables
09/551,302 Filed April 18, 2000 6,480,962 Issued November 12, 2002	FIN0003-CON1	System and Method For Protecting a Client During Runtime From Hostile Downloadables
10/838,889 Filed May 3, 2004 7,418,731 Issued 8/26/08	FIN0003-CON1-CIP2	Method and System For Caching at Secure Gateways
10/376,215 Filed February 27, 2003 6,965,968 Issued November 15, 2005	FIN0005	Policy-Based Caching
10/768,920 Filed January 30, 2004 7,756,996 Issued July 13, 2010	FIN0007	Embedding Management Data Within HTTP Messages
11/298,475 December 12, 2005 7,757,289 July 13, 2010	FIN0008	System and Method For Inspecting Dynamically Generated Executable Code
12/814,584 Filed June 14, 2010 8,141,154 Issued March 20, 2012	FIN0008-DIV1	System and Method For Inspecting Dynamically Generated Executable Code
11/354,893 Filed February 16, 2006 7,613,918 November 3, 2009	FIN0009	System and Method For Enforcing a Security Context on a Downloadable
11/606,707 Filed November 29, 2006 8,015,182 Issued September 6, 2011	FIN0011	System and Method for Appending Security Information to Search Engine Results
11/606,663 Filed November 29, 2006 7,930,299 Issued April 19, 2011	FIN0012	System and Method For Appending Security Information to Search Engine Results

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Serial No./Patent No.	Docket No.	Title
11/797,539 Filed May 4, 2007 8,087,079 Issued December 27, 2011	FIN0013	Byte-Distribution Analysis of File Security
12/178,558 Filed July 23, 2008 8,566,580 Issued October 22, 2013	FIN0015	Splitting an SSL Connection Between Gateways

Electronic Acknowledgement Receipt

EFS ID:	22230407
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	01-MAY-2015
Filing Date:	07-NOV-2011
Time Stamp:	13:51:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	finjan_executed_itrrepatentowerschangeofaddressforallissu dpatents_forfiling5_1_15.pdf	164889 <small>45fc7afe5f6819005fdd8e5c3c11129690171 254</small>	no	4

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



Bey & Cotropia PLLC
213 Bayly Court
Richmond, Virginia 23229

Dawn-Marie Bey, Partner
Direct Dial: 804-441-8530
Mobile: 804-399-7257
Dawnmarie@beycotropia.com

April 20, 2015

**PRIVILEGED & CONFIDENTIAL
ATTORNEY/CLIENT COMMUNICATION**

Re: Change of Assignee's Address

Dear Sir/Madam,

This letter is being filed by the undersigned on all patents listed on Attachment A hereto to make it part of the record for each matter. The Assignee's address has changed, and the new address is as follows. This does **NOT** change the correspondence address for these matters.

Finjan, Inc.
2000 University Avenue
Suite 600
East Palo Alto, CA 94025

If you have any questions regarding the above, please do not hesitate to contact me.

Best regards,

/Dawn-Marie Bey/

Dawn-Marie Bey

Encl.

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10/930,884 Filed August 30, 2004 8,225,408 Issued July 17, 2012	FIN0001-CON1-CIP3	Method and System For Adaptive Rule-Based Content Scanners
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12/178,558 Filed July 23, 2008 8,566,580 Issued October 22, 2013	FIN0015	Splitting an SSL Connection Between Gateways

Electronic Acknowledgement Receipt

EFS ID:	22119940
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	21-APR-2015
Filing Date:	07-NOV-2011
Time Stamp:	12:04:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	finjan_executed_itrrepatentowerschangeofaddressforallissuedpatents.pdf	224888 <small>fb7f999c8de00d31b1f122d7e1b2c29a2ec632b6</small>	no	4

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New International Application Filed with the USPTO as a Receiving Office

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TO: Mail Stop 8 Director of the U.S. Patent & Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
---	---

In Compliance with 35 § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
 filed in the U.S. District Court Northern District of California on the following Patents or Trademarks:

DOCKET NO. CV 14-04908 JSC	DATE FILED 11/4/2014	U.S. DISTRICT COURT 450 Golden Gate Avenue, P.O. Box 36060, San Francisco, CA 94102
PLAINTIFF FINJAN INC		DEFENDANT PALO ALTO NETWORKS INC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 see Complaint		
2 6,804,780		
3 6,965,968		
4 7,058,822		
5 7,418,731		

In the above—entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
1 7,613,918			
2 7,613,926			
3 7,647,633			
4 8,141,154			
5 8,325,408			
8,677,494			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK Richard W. Wiekling	(BY) DEPUTY CLERK Sheila Rash	DATE November 5, 2014
------------------------------	----------------------------------	--------------------------

Copy 1—Upon initiation of action, mail this copy to Commissioner Copy 3—Upon termination of action, mail this copy to Commissioner
 Copy 2—Upon filing document adding patent(s), mail this copy to Commissioner Copy 4—Case file copy

Blue Coat Systems - Exhibit 1004

AO 120 (Rev. 2/99)

TO: Mail Stop 8 Director of the U.S. Patent & Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
---	--

In Compliance with 35 § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Northern District California on the Patents or Trademarks:

DOCKET NO. CV 14-02998 RS	DATE FILED June 30, 2014	U.S. DISTRICT COURT 450 Golden Gate Avenue, 16 th Floor, San Francisco CA 94102
PLAINTIFF FINJAN INC		DEFENDANT SYMANTEC CORP
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,154,844		
2 7,613,926		
3 7,756,996		
4 7,757,289		
5 7,930,299		

In the above—entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY <input checked="" type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
1 8,015,192		***see Attach First Amended Complaint***	
2 8,141,154			
3 8,677,494			
4			
5			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK Richard W. Wicking	(BY) DEPUTY CLERK Gina Augustine	DATE September 18, 2014
-----------------------------	-------------------------------------	----------------------------

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,677,494 B2
APPLICATION NO. : 13/290708
DATED : March 18, 2014
INVENTOR(S) : Yigal Mordechai Edery et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, item (75) Inventors -

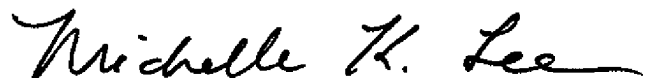
Change "Nirmrod Itzhak Vered" to -- Nimrod Itzhak Vered --.

On Title Page 4, Column 2, Line 18, change

"printed Dec. 23, 2998, URL: <http://www.microsft.com/workshop/>"

to -- printed Dec. 23, 1998, URL: <http://www.microsoft.com/workshop/> --.

Signed and Sealed this
Ninth Day of September, 2014



Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Yigal Mordechai EDERY, et al.

Confirmation No.: 4120

Application No.: 13/290,708

Group Art Unit: 2431

Patent No.: 8,677,494

Examiner: Christopher A. Revak

Filed: November 7, 2011

Issued: March 18, 2014

Title: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**REQUEST FOR ISSUANCE OF CERTIFICATE OF CORRECTION PURSUANT
TO 35 U.S.C. § 254 AND 37 C.F.R. § 1.322**

Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Upon review of U.S. Patent No. 8,677,494, Patentee notes errors in the patent which should be corrected as shown on the enclosed Form PTO/SB/44. One of the inventor's names is incorrect under the heading "(75) Inventors" on the face of the patent. There is also an error in the date of one of the references cited on page 4 of the patent.

The undersigned does not believe that a fee is required, as this was not an error caused by the Patentee.

Accordingly, Patentee respectfully solicits the issuance of the requested Certificate of Correction.

Respectfully submitted,

Date: July 10, 2014
Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229
(804) 441-8530

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 8,677,494

APPLICATION NO.: 13/290,708

ISSUE DATE : March 18, 2014

INVENTOR(S) : Yigal Mordechai EDERY, Nimrod Itzhak VERED, David R. KROLL, Shlomo TOUBOUL

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Heading (75) Inventors -

Please change "Nirmrod Itzhak Vered" to -- Nimrod Itzhak Vered --.

On Page 4, Column 2, Line 18, please change "printed Dec. 23, 2008, URL: <http://www.microsoft.com/workshop/>" to -- printed Dec. 23, 1998, URL: <http://www.microsoft.com/workshop/> --.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Dawn-Marie Bey, Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229

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Electronic Acknowledgement Receipt

EFS ID:	19543572
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	10-JUL-2014
Filing Date:	07-NOV-2011
Time Stamp:	14:27:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	fin0001con1cip1con4_executed_requestforcertificateofcorrection.pdf	89881 <small>56d3a202a1b9663d2bc8ba54dd85d55eb6b59c0b</small>	no	1

Warnings:

Information:

2	Request for Certificate of Correction	fin0001con1cip1con4_certificat eofcorrection.pdf	150647 d8925af063a3d88c3aa0cbb215284950baa 47d51	no	1
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Total Files Size (in bytes):	240528
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	03/18/2014	8677494	FIN0001-CON1-CIP1-CON4	4120

115222 7590 02/26/2014
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

	24	Docket for Finjan Software Ltd. v. Aladdin Knowledge Systems, Inc., et al., U.S. District Court, District of Delaware (Wilmington), Civil Docket No.1 :08-cv-00300-GMS, 5 pp., retrieved on October 24, 2008 from https://lecf.ded.uscourts.gov/cgi-bin-DktRpt.pl?994267838982431-L 567 0-1	<input type="checkbox"/>
	25	Firewall Toolkit (FWTK) 2.0 Beta Release, 1996	<input type="checkbox"/>
	26	International Search Report for Application No. PCT/ILOSI0091S, 2 pp., dated March 3, 2006	<input type="checkbox"/>
	27	Written Opinion for Application No. PCT/ILOSI0091S, 5 pp., dated March 3, 2006 (mailing date)	<input type="checkbox"/>
	28	International Search Report for Application No. PCT/IBO/01138, 3 pp., September 20, 2002 (mailing date)	<input type="checkbox"/>
	29	International Preliminary Examination Report for Application No. PCT/IBO/01138, 2 pp., dated December 19, 2002	<input type="checkbox"/>
	30	Gerzic, Amer, "Write Your Own Regular Expression Parser," November 17, 2003, 18 pp., Retrieved from the Internet: http://www.codeguru.com/Cpp/Cpp/cpp_mfc/parsing/article.php/c4093/	<input type="checkbox"/>
	31	Power, James, "Lexical Analysis," 4 pp., May 14, 2006, Retrieved from the Internet: http://www.cs.may.ie/~jpower/Courses/compilers/notes/lexical.pdf	<input type="checkbox"/>
	32	Sitaker, Kragen, "Rapid Genetic Evolution of Regular Expressions" [online], The Mial Archive, April 24, 2004 (retrieved on December 7, 2004), 5 pp., Retrieved from the Internet: http://www.mail-archive.com/kragen-tol@canonical.org/msg00097.html	<input type="checkbox"/>
Change(s) applied to document, /C.L./ 10/9/2013	33	"Lexical Analysis: DF A Minimization & Wrap Up" [online], Fall, 2004 [retrieved on March 2, 2005], 8 pp., Retrieved from the Internet: http://www.owlnet.rice.edu/~comp412/Lectures/L06LexWrapup4.pdf	<input type="checkbox"/>
	34	"Minimization of DFA" [online], [retrieved on December 7, 2004], 7 pp., Retrieved from the Internet: http://www.cs.odu.edu/~toida/nerzic/390teched/regular/fa/min-fa.html	<input type="checkbox"/>

Receipt date: 05/07/2013 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	13290708 - GAU: 2431
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit		2431	
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4	

	86	7143444		2006-11-28	Porras, et al.	
	87	7210041		2007-04-24	Gryaznov, et al.	
	88	7308648		2007-12-11	Buchthal, et al.	
	89	7343604		2008-03-11	Grabamik, et al.	
	90	7418731		2008-08-26	Touboul	
	91	7613926		2009-11-03	Ederly, et al.	
	92	7647633		2010-01-12	Ederly, et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
Change(s) applied to document, /C.L./ 10/9/2013	1	20100195909		2010-08-05	Wasson Ederly , et al.	
	2	20030014662		2003-01-16	Gupta, et al.	

Receipt date: 05/07/2013 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	13290708 - GAU: 2431
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit		2431	
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4	

	31	5740248		1998-04-14	Fieres, et al.	
Change(s) applied to document, /C.L./ 10/9/2013	32	5740441		1998-04-14	Yellin Shao , et al.	
	33	5761421		1998-06-02	Van Hoff, et al.	
	34	5765030		1998-06-09	Nachenberg, et al.	
	35	5765205		1998- 08 ⁶ -09	Breslau, et al.	
	36	5784459		1998-07-21	Devarakonda, et al.	
	37	5796952		1998-08-18	Davis, et al.	
	38	5805829		1998-09-08	Cohen, et al.	
	39	5809230		1998-09-15	Pereira, J. L. A.	
	40	5825877		1998-10-20	Dan, et al.	
	41	5832208		1998-11-03	Chen, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	13290708 - GAU: 2431
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit		2431	
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4	

	20	5606668		1997-02-25	Shwed	
	21	5621889		1997-04-15	Lermuzeaux, et al.	
	22	5623600		1997-04-22	Ji, et al.	
	23	5623601		1997-04-22	Vu	
	24	5638446		1997-06-10	Rubin	
	25	5675711		1997-10-07	Kephart, et al.	
Change(s) applied to document, /C.L./ 10/9/2013	26	5692047		¹¹ 1997- 12 -25	McManis	
	27	5692124		1997-11-25	Holden, et al.	
	28	5696822		1997-12-09	Nachenberg	
	29	5720033		1998-02-17	Deo	
	30	5724425		1998-03-03	Chang, et al.	

Receipt date: 05/07/2013 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

Change(s) applied to document, /C.L./ 10/9/2013	9	5361359		1992-08-31	Tajalli, et al.	November 1, 1994
	10	5398196		1995-03-14	Chambers	
	11	5412717		1995-05-02	Fischer	
	12	5414833		1995-05-09	Hershey, et al.	
	13	5440723		1995-08-08	Arnold, et al.	
	14	5452442		1995-09-19	Kephart	
	15	5483649	January 9, 1996	1996-06-09	Kuznetsov, et al.	
	16	5485409		1996-01-16	Gupta, et al.	
	17	5485575		1996-01-16	Chess, et al.	
	18	5524238		1996-06-04	Miller, et al.	
19	5579509		1996-11-26	Furtney, et al.		

Receipt date: 05/07/2013

13290708 - GAI: 2431

Doc code: IDS

P10/08/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708
	Filing Date		2011-11-07
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

U.S.PATENTS						
Examiner Initial	Cite Changes, applied to document, No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/D.H.P./	1	8079086		2011-12-13	Ederly, et al.	
Change(s) applied to document	2	4562305		1985 1995 -12-31	Gaffney, Jr. Ji, et al.	
/J.M.R./	3	5077677		1991-12-31	Murphy, et al.	
	4	5263147		1993-11-16	Francisco, et al.	
Change(s) applied to document,	5	5278901		1994-05-05	Shieh, et al.	January 11, 1994
/C.L./	6	5311591		1994-05-10	Fischer	
10/9/2013	7	5319776		1994-06-07	Hile , et al. Hile	
	8	5359659		1994-10-25	Rosenthal	



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4

CONFIRMATION NO. 4120

115222
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

**PUB REQUEST ACCEPTANCE
LETTER**



Date Mailed: 02/07/2014

NOTICE OF ACCEPTANCE OF PUBLICATION REQUEST

The request for voluntary publication, amended publication, early publication, redacted publication, republication, corrected publication or revised publication has been received for this application. The request, including payment of any necessary fee(s), is in compliance with 37 CFR 1.215, 1.217, 1.219 or 1.221.

The projected publication date is 05/15/2014.

/dterry/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No. 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

REQUEST TO APPLY PREVIOUSLY PAID ISSUE FEE PAYMENT

United States Patent and Trademark Office
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This document is being filed to request that the issue fee previously paid on September 19, 2013, be applied to the issue fee due by January 27, 2014. The Part B – Fee Transmittal was recently filed on January 13, 2014 (see attachment A).

On August 29, 2013, a Notice of Allowance was issued on the above application. On September 19, 2013, the Part B – Fee Transmittal was filed and the issue and publication fees were paid. The application was withdrawn from issue on October 1, 2013. On October 25, 2013, a second Notice of Allowance was issued. On January 13, 2014, the Part B – Fee Transmittal was filed.

The undersigned respectfully requests that the previously paid issue fee be applied to the current Notice of Allowance and the application proceed to issuance. In addition, if any additional fees are required in connection with this Request, the Commissioner is hereby authorized to charge the same to Deposit Account 50-6099.

Respectfully submitted,

Date: January 23, 2014

By: /Dawn-Marie Bey – 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229
(804) 441-8530

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TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE.

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS.

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
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3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
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(B) RESIDENCE: (CITY and STATE OR COUNTRY): Wilmington, DE

Please check the appropriate assignee category or categories (will not be printed on the patent): [] Individual [X] Corporation or other private group entity [] Government

4a. The following fee(s) are submitted: [] Issue Fee [] Publication Fee [] Advance Order
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- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

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Authorized Signature /Dawn-Marie Bey/

Date January 13, 2014

Typed or printed name Dawn-Marie Bey

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EFS ID:	18002591
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey.
Filer Authorized By:	
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	23-JAN-2014
Filing Date:	07-NOV-2011
Time Stamp:	13:38:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	fin0001con1cip1con4_executed_requesttoapplypreviouslypaidissuelfee.pdf	225049 <small>1273c7e4e4a6c118408c1b71cf2e47d66702e70b</small>	no	3

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$0	\$0	\$1780	\$0	01/27/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2431	726-024000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Bey & Cotropia PLLC
 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Finjan, Inc. (B) RESIDENCE: (CITY and STATE OR COUNTRY) Wilmington, DE

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

4a. The following fee(s) are submitted:
 Issue Fee
 Publication Fee (No small entity discount permitted)
 Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
 A check is enclosed.
 Payment by credit card. Form PTO-2038 is attached.
 The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-6099 (enclose an extra copy of this form).

Adjustment date: 01/30/2014 EEKUBAY2
 09/20/2013 INTEFSW 00002867 13290708
 01 FC:1501 -1780.00 OP

01/30/2014 EEKUBAY2 00000002 13290708
 01 FC:1501 960.00 OP
 02 FC:1508 820.00 OP

5. Change in Entity Status (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Dawn-Marie Bey/

Date January 13, 2014

Typed or printed name Dawn-Marie Bey

Registration No. 44,442

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Yigal Mordechai EDERY, et al.



Group Art Unit: 2431

Serial No. 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

REQUEST TO APPLY PREVIOUSLY PAID ISSUE FEE PAYMENT

United States Patent and Trademark Office
Customer Service Window, Mail Stop Issue Fee
Randolph Building
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This document is being filed to request that the issue fee previously paid on September 19, 2013, be applied to the issue fee due by January 27, 2014. The Part B – Fee Transmittal was recently filed on January 13, 2014 (see attachment A).

On August 29, 2013, a Notice of Allowance was issued on the above application. On September 19, 2013, the Part B – Fee Transmittal was filed and the issue and publication fees were paid. The application was withdrawn from issue on October 1, 2013. On October 25, 2013, a second Notice of Allowance was issued. On January 13, 2014, the Part B – Fee Transmittal was filed.

The undersigned respectfully requests that the previously paid issue fee be applied to the current Notice of Allowance and the application proceed to issuance. In addition, if any additional fees are required in connection with this Request, the Commissioner is hereby authorized to charge the same to Deposit Account 50-6099.

Respectfully submitted,

Date: January 23, 2014

By: /Dawn-Marie Bey – 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229
(804) 441-8530



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Ederly FIN0001-CON1-CIP1-CON4 4120

115222 7590 01/17/2014
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2431

NOTIFICATION DATE DELIVERY MODE

01/17/2014

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dawnmarie@beycotropia.com
bey_cotropia_docketing@cardinal-ip.com



UNITED STATES DEPARTMENT OF COMMERCE

U.S. Patent and Trademark Office

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P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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13/290,708

07 November, 2011

EDERY ET AL.

FIN0001-CON1-CIP1-

CON4

Bey & Cotropia PLLC (Finjan Inc.) 213 Bayly Court Richmond, VA 23229	EXAMINER	
	CHRISTOPHER REVAK	
	ART UNIT	PAPER
	2431	20140111

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

PTO Form 1449 filed on January 8, 2014 complies with the requirement of the paper mailed December 30, 2013 requiring missing documentation of the IDS filed on 5/7/13. A copy of the corrected IDS filed on 1/8/14 in included with this correspondence.

/CHRISTOPHER REVAK/
Primary Examiner, Art Unit 2431

Form PTO-1449 (Rev. 2-32)	U.S. Department of Commerce Patent & Trademark Office	Atty. Docket No. FIN0001-CON1-CIP1- CON4	Serial No. 13/290,708
INFORMATION DISCLOSURE STATEMENT			
<i>(Use several sheets if necessary)</i>		Applicant Yigal Mordechai EDERY, et al.	
		Filing Date November 7, 2011	Group 2431

U.S. PATENT DOCUMENTS

Examiner Initial	Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)

FOREIGN PATENT DOCUMENTS

--	--	--	--	--	--	--

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	<p>"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point FireWall-1 on Single NT Server; E-mail virus detection and content management can reside on Firewall server, saving money and supports costs" [online], The Free Library, September 16, 1996 [retrieved on March 20, 2012], 4 pp., Retrieved From the Internet: http://www.thefreelibrary.com/Internet+Security+gets+Less+Costly+and+Easier+to+Manage%3a+Integralis...-a018675791%22%3EInternet%20Security%20gets%20Less%20Costly%20and%20Easier%20to%20Manage:%20Integralis%20Announces%20MIMESweeper%20Compatible%20with%20Check%20Point%20FireWall-1%20on%20Single%20NT%20Server;%20E-mail%20virus%20detection%20and%20content%20management%20can%20reside%20on%20Firewall%20server,%20saving%20money%20and%20support%20costs (Current Link: http://www.thefreelibrary.com/Internet Security gets Less Costly and Easier to Manage: Integralis...-a018675791)</p>

EXAMINER /Christopher Revak/ **DATE CONSIDERED** 01/11/2014

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

Receipt date: 01/08/2014

13290708 - GAI: 2431

Doc code: IDS
 Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	
	Filing Date		2011-11-07	
	First Named Inventor	Yigal Mordechai EDERY, et al.		
	Art Unit	2431		
	Examiner Name	Christopher A. Revak		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

U.S. PATENTS						Remove
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.		T ⁵

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	13290708 - GAU: 2431
	Filing Date		2011-11-07	
	First Named Inventor	Yigal Mordechai EDERY, et al.		
	Art Unit		2431	
	Examiner Name	Christopher A. Revak		
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4	

1		"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point FireWall-1 on Single NT Server; E-mail virus detection and content management can reside on Firewall server, saving money and supports costs" [online]. The Free Library, September 16, 1996 [retrieved on March 20, 2012], 4 pp., Retrieved From the Internet: http://www.thefreelibrary.com/Internet+Security+gets+Less+Costly+and+Easier+to+Manage%3a+Integralis...-a018675791%22%3EInternet%20Security%20gets%20Less%20Costly%20and	<input type="checkbox"/>
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If you wish to add additional non-patent literature document citation information please click the Add button **Add**

EXAMINER SIGNATURE

Examiner Signature	/Christopher Revak/	Date Considered	01/11/2014
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	Yigal Mordechai EDERY, et al.	
	Art Unit	2431	
	Examiner Name	Christopher A. Revak	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2014-01-08
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

115222 7590 10/25/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Values: 13/290,708; 11/07/2011; Yigal Mordechai Edery; FIN0001-CON1-CIP1-CON4; 4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Values: nonprovisional; UNDISCOUNTED; \$0; \$0; \$1780; \$0; 01/27/2014

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS
Values: REVAK, CHRISTOPHER A; 2431; 726-024000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.
(A) NAME OF ASSIGNEE: Finjan, Inc.
(B) RESIDENCE: (CITY and STATE OR COUNTRY) Wilmington, DE

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual [X] Corporation or other private group entity [] Government

4a. The following fee(s) are submitted: Issue Fee, Publication Fee, Advance Order
4b. Payment of Fee(s): A check is enclosed, Payment by credit card, The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-6099

5. **Change in Entity Status** (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
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NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Dawn-Marie Bey/

Date January 13, 2014

Typed or printed name Dawn-Marie Bey

Registration No. 44,442

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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EFS ID:	17902771
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	13-JAN-2014
Filing Date:	07-NOV-2011
Time Stamp:	23:56:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	fin0001con1cip1con4_execute d_partb_feesp.pdf	260912 <small>7108fd5096aff6cdd1fa1a9159f16d23a57856d</small>	no	2

Warnings:

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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
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Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

115222 7590 10/25/2013
Bey & Cotropia PLLC (Finjan Inc.)
 213 Bayly Court
 Richmond, VA 23229



Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$0	\$0	\$1780	\$0	01/27/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2431	726-024000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). <input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. <input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.	2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.	1 <u>Bey & Cotropia PLLC</u> 2 _____ 3 _____
---	---	--

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **Finjan, Inc.**
 (B) RESIDENCE: (CITY and STATE OR COUNTRY) **Wilmington, DE**

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

4a. The following fee(s) are submitted: <input type="checkbox"/> Issue Fee <input type="checkbox"/> Publication Fee (No small entity discount permitted) <input type="checkbox"/> Advance Order - # of Copies _____	4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above) <input type="checkbox"/> A check is enclosed. <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. <input checked="" type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number <u>50-6099</u> (enclose an extra copy of this form).
--	---

5. Change in Entity Status (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Dawn-Marie Bey/

Date January 13, 2014

Typed or printed name Dawn-Marie Bey

Registration No. 44,442

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Ederly FIN0001-CON1-CIP1-CON4 4120

115222 7590 01/08/2014
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

Table with 1 column: EXAMINER

REVAK, CHRISTOPHER A

Table with 2 columns: ART UNIT, PAPER NUMBER

2431

Table with 2 columns: NOTIFICATION DATE, DELIVERY MODE

01/08/2014

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dawnmarie@beycotropia.com
bey_cotropia_docketing@cardinal-ip.com

Response to Rule 312 Communication	Application No. 13/290,708	Applicant(s) EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. The amendment filed on 12/6/13 under 37 CFR 1.312 has been considered, and has been:

a) entered.

b) entered as directed to matters of form not affecting the scope of the invention.

c) disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) disapproved. See explanation below.

e) entered in part. See explanation below.

	/CHRISTOPHER REVAK/ Primary Examiner, Art Unit 2431
--	--

OK TO ENTER: /C.R./

FIN0001-CON1-CIP1-CON4

PATENT

01/03/2014

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHOFDS

AMENDMENT TO THE SPECIFICATION UNDER 37 C.F.R. § 1.312

Commissioner for Patents
Mail Stop: **Issue Fee**
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In conjunction with the Request for Reconsideration of the Dismissed Renewed Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. §119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) entry of the following amendment to the specification and consideration of the remarks submitted herein is respectfully requested.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	
	Filing Date		2011-11-07	
	First Named Inventor	Yigal Mordechai EDERY, et al.		
	Art Unit		2431	
	Examiner Name	Christopher A. Revak		
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4	

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² j	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS				Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.		T ⁵

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708
	Filing Date		2011-11-07
	First Named Inventor	Yigal Mordechai EDERY, et al.	
	Art Unit		2431
	Examiner Name	Christopher A. Revak	
	Attorney Docket Number		FIN0001-CON1-CIP1-CON4

1	"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point FireWall-1 on Single NT Server; E-mail virus detection and content management can reside on Firewall server, saving money and supports costs" [online], The Free Library, September 16, 1996 [retrieved on March 20, 2012], 4 pp., Retrieved From the Internet: http://www.thefreelibrary.com/Internet+Security+gets+Less+Costly+and+Easier+to+Manage%3a+Integralis...-a018675791%22%3EInternet%20Security%20gets%20Less%20Costly%20and	<input type="checkbox"/>
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If you wish to add additional non-patent literature document citation information please click the Add button **Add**

EXAMINER SIGNATURE

Examiner Signature	Date Considered
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13290708
Filing Date	2011-11-07
First Named Inventor	Yigal Mordechai EDERY, et al.
Art Unit	2431
Examiner Name	Christopher A. Revak
Attorney Docket Number	FIN0001-CON1-CIP1-CON4

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2014-01-08
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	17851112
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	08-JAN-2014
Filing Date:	07-NOV-2011
Time Stamp:	12:48:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	fin0001con1cip1con4_executed_responsetomiscellaneouscommunication.pdf	1349417 <small>84c06f2a7d8c174dd8698127327ea57f28461a29</small>	no	2

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_sb08formisccomm.pdf	612454	no	4
			2f693082d7b85260da7a0f7b35a87eabc7d9b598		

Warnings:

Information:

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

3	Non Patent Literature	fin0001con1cip1con4_reference.pdf	205070	no	4
			3717539921aefe429cddb2029564eea117f4ae8		

Warnings:

Information:

Total Files Size (in bytes):	2166941
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Yigal Mordechai EDERY, et al.

Serial No.: 13/290,708

Group Art Unit: 2431

Filed: November 7, 2011

Examiner: Christopher A. Revak

For: **MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS**

**RESPONSE TO MISCELLANEOUS COMMUNICATION TO APPLICANT
(DATED DECEMBER 30, 2013)**

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop ISSUE FEE
Randolph Building
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This document is being filed in response to the Miscellaneous Communication To Applicant issued by the Examiner on December 30, 2013. The reference noted on the attached SB-08 form is hereby brought to the attention of the Examiner.

The undersigned received a call from the Examiner on December 19, 2013 regarding missing portions of a citation on the Information Disclosure Statement filed on May 7, 2013. The undersigned resubmits the original, complete citation, an updated citation for viewing the reference online, and a copy of the article. The Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. 1.16 or 1.17 which may be required during the pendency of this application, or to credit any overpayment, to Deposit Account No. 50-6099.

The above information is presented so that the United States Patent and Trademark Office may, in the first instance, determine any materiality thereof to the claimed invention. See

37 C.F.R. §§ 1.104(a) conferring the PTO duty to consider and use any such information. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the “References Cited” on any patent to issue therefrom.

Respectfully submitted,

Date: January 8, 2014

By: /Dawn-Marie Bey – 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229
(804) 441-8530

Form PTO-1449 (Rev. 2-32)	U.S. Department of Commerce Patent & Trademark Office	Atty. Docket No. FIN0001-CON1-CIP1- CON4	Serial No. 13/290,708
INFORMATION DISCLOSURE STATEMENT			
<i>(Use several sheets if necessary)</i>		Applicant Yigal Mordechai EDERY, et al.	
		Filing Date November 7, 2011	Group 2431

U.S. PATENT DOCUMENTS

Examiner Initial	Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)

FOREIGN PATENT DOCUMENTS

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	<p>"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point FireWall-1 on Single NT Server; E-mail virus detection and content management can reside on Firewall server, saving money and supports costs" [online], The Free Library, September 16, 1996 [retrieved on March 20, 2012], 4 pp., Retrieved From the Internet: http://www.thefreelibrary.com/Internet+Security+gets+Less+Costly+and+Easier+to+Manage%3a+Integralis...-a018675791%22%3EInternet%20Security%20gets%20Less%20Costly%20and%20Easier%20to%20Manage:%20Integralis%20Announces%20MIMESweeper%20Compatible%20with%20Check%20Point%20FireWall-1%20on%20Single%20NT%20Server;%20E-mail%20virus%20detection%20and%20content%20management%20can%20reside%20on%20Firewall%20server,%20saving%20money%20and%20support%20costs (Current Link: http://www.thefreelibrary.com/Internet Security gets Less Costly and Easier to Manage: Integralis...-a018675791)</p>

EXAMINER	DATE CONSIDERED
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

Electronic Acknowledgement Receipt

EFS ID:	17851307
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	08-JAN-2014
Filing Date:	07-NOV-2011
Time Stamp:	13:00:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_1449_misccomm.pdf	102444 <small>9225aa1595f69fe27325b553acd15cd572531e66</small>	no	1

Warnings:

Information:

Total Files Size (in bytes):

102444

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New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Ederly FIN0001-CON1-CIP1-CON4 4120

115222 7590 12/30/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2431

NOTIFICATION DATE DELIVERY MODE

12/30/2013

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dawnmarie@beycotropia.com
bey_cotropia_docketing@cardinal-ip.com



**UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office**

Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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13/290,708

07 November, 2011

EDERY ET AL.

FIN0001-CON1-CIP1-

CON4

Bey & Cotropia PLLC (Finjan Inc.) 213 Bayly Court Richmond, VA 23229	EXAMINER	
	CHRISTOPHER REVAK	
	ART UNIT	PAPER
	2431	20131223

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The Examiner contacted the Attorney of record, Dawn-Marie Bey on Thursday December 19th in an attempt to resolve missing documentation from an IDS filed on 5/7/13. It was noted that item #7 titled "Internet Security Gets Less Costly and Easier to Manage....." was missing citation documentation cutoff by size limitations in the entry field. The Examiner indicated that the Applicant would be given a 30 day response period to submit the missing information. The 30 day response period is not extendable and failure to respond to this notice would result in the abandonment of the application.

/CHRISTOPHER REVAK/
Primary Examiner, Art Unit 2431



Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond VA 23229

MAILED

DEC 24 2013

OFFICE OF PETITIONS

In re Application of	:	
Edery et al.	:	
Application No. 13/290,708	:	DECISION GRANTING PETITIONS
Filed: November 7, 2011	:	UNDER 37 CFR 1.78(a)(3) AND (a)(6)
Attorney Docket No. FIN0001-CON1-CIP1-CON4	:	

This is a decision on the renewed petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6), filed December 6, 2013, to accept an unintentionally delayed claim under 35 U.S.C. §§ 120 and 119(e) for the benefit of priority to the prior-filed nonprovisional and provisional applications set forth in the concurrently filed amendment.

The petition is **GRANTED**

A petition for acceptance of a claim for late priority under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii). In addition, the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) must be accompanied by:

- (1) the reference required by 35 U.S.C. §§ 120 and 119(e) and 37 CFR §§ 1.78(a)(2)(i) and 1.78(a)(5)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in § 1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

Additionally, the instant nonprovisional application must be pending at the time of filing of the reference to the prior-filed provisional application as required by 37 CFR 1.78(a)(5)(ii). Further, a nonprovisional application in the priority chain claiming the benefit of the prior-filed provisional application must have been filed within twelve months of the filing date of the prior-filed provisional application.

All the above requirements having been satisfied, the late claim for benefit of priority under 35 U.S.C. §§ 120 and 119(e) is accepted as being unintentionally delayed.

The granting of the petition to accept the delayed benefit claim to the prior-filed applications under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) should not be construed as meaning that this application is entitled to the benefit of the filing date of the prior-filed applications. In order for this application to be entitled to the benefit of the prior-filed applications, all other requirements under 35 U.S.C. §§120 and 1.78(a)(1) and (a)(2) and under 35 U.S.C. §119(e) and 37 CFR 1.78(a)(4) and (a)(5) must be met. Similarly, the fact that the corrected Filing Receipt accompanying this decision on petition includes the prior-filed applications should not be construed as meaning that applicant is entitled to the claim for benefit of priority to the prior-filed applications noted thereon. Accordingly, the examiner will, in due course, consider this benefit claim and determine whether the application is entitled to the benefit of the earlier filing date.

A corrected Filing Receipt, which includes the priority claim to the prior-filed applications, accompanies this decision on petition.

Any questions concerning this matter may be directed to the undersigned at (571) 272-3230. All other inquiries concerning either the examination procedures or status of the application should be directed to the Technology Center.

This application is being forwarded to Technology Center Art Unit 2431 for consideration by the examiner of the claim under 35 U.S.C. § 120 and 119(e) of the prior-filed nonprovisional and provisional applications.



Shirene Willis Brantley
Attorney Advisor
Office of Petitions

ATTACHMENT : Corrected Filing Receipt



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/290,708, 11/07/2011, 2431, 1550, FIN0001-CON1-CIPI-CON4, 18, 2

CONFIRMATION NO. 4120

CORRECTED FILING RECEIPT



115222
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

Date Mailed: 12/23/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application, must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s)

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Applicant(s)

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Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

Domestic Priority data as claimed by applicant

This application is a CON of 12/471,942 05/26/2009 PAT 8079086
which is a CON of 11/370,114 03/07/2006 PAT 7613926
which is a CON of 09/861,229 05/17/2001 PAT 7058822
which claims benefit of 60/205,591 05/17/2000
and is a CIP of 09/539,667 03/30/2000 PAT 6804780
which is a CON of 08/964,388 11/06/1997 PAT 6092194
which claims benefit of 60/030,639 11/08/1996
and said 09/861,229 05/17/2001
is a CIP of 09/551,302 04/18/2000 PAT 6480962
which is a CON of 08/790,097 01/29/1997 PAT 6167520
which claims benefit of 60/030,639 11/08/1996

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/290,708**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Preliminary Class

726

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative,

page 2 of 4

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

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Bib Data Sheet

CONFIRMATION NO. 4120

SERIAL NUMBER 13/290,708	FILING OR 371(c) DATE 11/07/2011 RULE	CLASS 726	GROUP ART UNIT 2431	ATTORNEY DOCKET NO. FIN0001-CON1- CIP1-CON4
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AIA (First Inventor to File): NO

INVENTORS

Yigal Mordechai Edery, Pardesia, ISRAEL;
 Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
 David R. Kroll, San Jose, CA;
 Shlomo Touboul, Kefar-Haim, ISRAEL;

APPLICANTS

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 Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
 David R. Kroll, San Jose, CA;
 Shlomo Touboul, Kefar-Haim, ISRAEL;

**** CONTINUING DATA *******

This application is a CON of 12/471,942 05/26/2009 PAT 8079086
 which is a CON of 11/370,114 03/07/2006 PAT 7613926
 which is a CON of 09/861,229 05/17/2001 PAT 7058822
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 which is a CON of 08/790,097 01/29/1997 PAT 6167520
 which claims benefit of 60/030,639 11/08/1996

**** FOREIGN APPLICATIONS *******

IF REQUIRED, FOREIGN FILING LICENSE
 GRANTED ** 11/17/2011

Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no	STATE OR COUNTRY ISRAEL	SHEETS DRAWING 10	TOTAL CLAIMS 18	INDEPENDENT CLAIMS 2	
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance					
Verified and Acknowledged	Examiner's Signature	Initials			

ADDRESS

115222

TITLE

MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

<p>FILING FEE RECEIVED 1550</p>	<p>FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:</p>	<table border="1"> <tr> <td><input type="checkbox"/> All Fees</td> </tr> <tr> <td><input type="checkbox"/> 1.16 Fees (Filing)</td> </tr> <tr> <td><input type="checkbox"/> 1.17 Fees (Processing Ext. of time)</td> </tr> <tr> <td><input type="checkbox"/> 1.18 Fees (Issue)</td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> </tr> <tr> <td><input type="checkbox"/> Credit</td> </tr> </table>	<input type="checkbox"/> All Fees	<input type="checkbox"/> 1.16 Fees (Filing)	<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)	<input type="checkbox"/> 1.18 Fees (Issue)	<input type="checkbox"/> Other _____	<input type="checkbox"/> Credit
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CONFIRMATION NO. 4120

CORRECTED FILING RECEIPT

115222
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229



Date Mailed: 12/23/2013

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David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

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Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

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which is a CON of 11/370,114 03/07/2006 PAT 7613926
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Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/290,708**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Preliminary Class

726

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:

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this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**REQUEST FOR RECONSIDERATION OF THE DISMISSED RENEWED PETITION
TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF PRIORITY UNDER 35
U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-FILED APPLICATION
FILED UNDER 37 CFR § 1.78(a)(3)**

Mail Stop PETITIONS

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

In response to the December 3, 2013 dismissal of the Assignee's renewed petition for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application, the Assignee respectfully requests reconsideration of the petition dismissal in view of the revised priority language submitted in conjunction herewith as an Amendment to the Specification pursuant to 37 CFR 1.312.

In accordance with the Patent Office's suggestion in the December 3rd dismissal, the following amendment to the specification of the present application which adds a reference to prior-filed U.S. Patent Application No. 08/790,097, filed January 28, 1997, now U.S. Patent No. 6,167,520 which claims benefit of U.S. Provisional Patent Application No. 60/030,639, is submitted in conjunction with this Petition:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious

Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No.

6,167,520, entitled “System and Method For Protecting a Client From Hostile Downloadables” which claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled “System and Method For Protecting a Computer From Hostile Downloadables.”

This amendment has been submitted separately as an Amendment to the Specification under 37 CFR 1.312 and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Assignee understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Assignee understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by

- (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in 37 CFR §1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application is made to complete the priority claim to include a specific reference to prior-filed U.S. Patent Application No. 08/790,097, filed January 28, 1997, now U.S. Patent No. 6,167,520 which also claims benefit of U.S. Provisional Patent Application No. 60/030,639, filed November 8, 1996. This request is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

Assignee submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was originally filed was unintentional.

Payment of \$1,410 fee as required under 37 CFR §1.17(t) was provided electronically via EFS-Web with the petition filed on October 23, 2012 and no additional fees are believed to be due. The Commissioner is authorized to charge any additional fees determined to be due to Deposit Account No. 50-6099.

Assignee submits that this request and the amendment to the specification are diligently made to correct the record of the present application. Granting of this renewed petition and entrance of the Amendment to the Specification are respectfully requested.

Respectfully submitted,

Date: December 6, 2013

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442
Attorneys for Assignee
Finjan, Inc.

Bey & Cotropia PLLC
213 Bayly Court
Richmond, Virginia 23229
(w) 804-441-8530

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHOFDS

AMENDMENT TO THE SPECIFICATION UNDER 37 C.F.R. § 1.312

Commissioner for Patents
Mail Stop: **Issue Fee**
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In conjunction with the Request for Reconsideration of the Dismissed Renewed Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. §119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) entry of the following amendment to the specification and consideration of the remarks submitted herein is respectfully requested.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

Amendments to the Specification

Please replace Paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which is a

continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled “System and Method For Protecting a Client From Hostile Downloadables” which claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled “System and Method For Protecting a Computer From Hostile Downloadables.”

REMARKS

Assignee respectfully requests entry of the amendment to the specification of U.S. Patent Application No. 13/290,708 in conjunction with the Request for Reconsideration of the Dismissed Renewed Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. § 119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) filed herewith. The amendment introduces no new matter and corrects the priority claim of the application. Assignee notes that U.S. Patent Application Nos. 08/790,097, 60/030,639 and the present invention share the inventor Shlomo Touboul.

This submission is filed prior to payment of the issue fee and not fee is believed to be due. However, in the event additional fees are due, the Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-6099.

Respectfully submitted,

Date: December 6, 2013

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442
Attorneys for Assignee
Finjan, Inc.

Bey & Cotropia PLLC
213 Bayly Court
Richmond, Virginia 23229
(w) 804-441-8530

Electronic Acknowledgement Receipt

EFS ID:	17586129
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoella_Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	06-DEC-2013
Filing Date:	07-NOV-2011
Time Stamp:	11:48:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions.	fin0001con1cip1con4_RENEWEDpetitionunintentionallydelayedClaim.pdf	119394 <small>bf7c3e361486983d8350d7a5d15625cc00163124</small>	no	4

Warnings:

Information:

2	Amendment after Notice of Allowance (Rule 312)	fin0001con1cip1con4_Rule312 AmntSpecPriority.pdf	117009 114ffd2640c4d041d83233532accbbd5469 8f1ed	no	4
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Warnings:

Information:

Total Files Size (in bytes):	236403
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

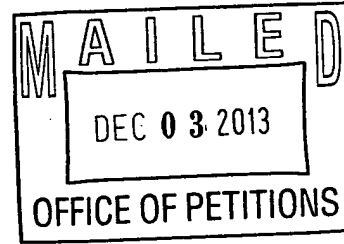
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond VA 23229



In re Application of	:	
Ederly et al.	:	
Application No. 13/290,708	:	DECISION DISMISSING PETITIONS
Filed: November 7, 2011	:	UNDER 37 CFR 1.78(a)(3) AND (a)(6)
Attorney Docket No. FIN0001-CON1-CIP1-CON4	:	

This is a decision on the renewed petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6), filed October 1, 2013, to accept an unintentionally delayed claim under 35 U.S.C. §§ 120 and 119(e) for the benefit of priority to the prior-filed nonprovisional and provisional applications set forth in the concurrently filed amendment.

The petition is **DISMISSED**

A petition for acceptance of a claim for late priority under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii). In addition, the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) must be accompanied by:

- (1) the reference required by 35 U.S.C. §§ 120 and 119(e) and 37 CFR §§ 1.78(a)(2)(i) and 1.78(a)(5)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in § 1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not comply with item (1).

The amendment is not acceptable as drafted.

The amendment asserts Application No. 09/551,203 is a continuation of Application No. 08/790,097 **and further** claims benefit of Application No. 60/030,639 (emphasis added).

Application No. 09/551,302, filed April 18, 2000, cannot directly claim benefit of Application No. 60/030,639, filed November 8, 1996 because it was filed more than 12 months after the filing date of the provisional application.

Application No. 08/790,097, filed January 29, 1997, claims benefit of Application No. 60/030,639, filed November 8, 1996.

Please submit another amendment that corrects the priority chain. Specifically, eliminate the phrase -“and further”- from the third line of the second page of the amendment and substitute the word“which”.

Before the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) can be granted, a renewed petition and either an Application Data Sheet or a substitute amendment (complying with the provisions of 37 CFR 1.121 and 37 CFR 1.76(b)(5)) to correct the above matters are required.

Further correspondence with respect to this matter should be addressed as follows:

By mail: Mail Stop PETITIONS
 Commissioner for Patents
 Post Office Box 1450
 Alexandria, VA 22313-1450

By hand: Customer Service Window
 Mail Stop Petitions
 Randolph Building
 401 Dulany Street
 Alexandria, VA 22314

By fax: (571) 273-8300
 ATTN: Office of Petitions

By internet: EFS-Web
 www.uspto.gov/ebc/efs_help.html
 (for help using EFS-Web call the
 Patent Electronic Business Center
 at (866) 217-9197)

Any questions concerning this matter may be directed to the undersigned at (571) 272-3230.

Shirene Willis Brantley

Shirene Willis Brantley

Attorney Advisor

Office of Petitions



NOTICE OF ALLOWANCE AND FEE(S) DUE

115222 7590 10/25/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

Table with 2 columns: EXAMINER (REVAK, CHRISTOPHER A), ART UNIT (2431), PAPER NUMBER

DATE MAILED: 10/25/2013

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/290,708 11/07/2011 Yigal Mordechai Edery FIN0001-CON1-CIP1-CON4 4120
TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.
If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.
If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".
For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

115222 7590 10/25/2013
Bey & Cotropia PLLC (Finjan Inc.)
 213 Bayly Court
 Richmond, VA 23229

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$0	\$0	\$1780	\$0	01/27/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2431	726-024000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
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5. **Change in Entity Status** (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Edery FIN0001-CON1-CIP1-CON4 4120

115222 7590 10/25/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

EXAMINER
REVAK, CHRISTOPHER A

ART UNIT 2431
PAPER NUMBER

DATE MAILED: 10/25/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and
December 31, 2013**

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to \$0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

Notice of Allowability	Application No. 13/290,708	Applicant(s) EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to the petition decision on 10/3/13.
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. The allowed claim(s) is/are 1-18. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/oph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) All b) Some *c) None of the:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input type="checkbox"/> Other _____. |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

? show files

File 2:INSPEC 1898-2013/Oct W1
(c) 2013 The IET

File 6:NTIS 1964-2013/Oct W1
(c) 2013 NTIS, Intl Cpyrght All Rights Res

File 8:EI Compendex(R) 1884-2013/Oct W2
(c) 2013 Elsevier Eng. Info. Inc.

File 34:SciSearch(R) Cited Ref Sci 1990-2013/Oct W2
(c) 2013 The Thomson Corp

File 35:Dissertation Abs Online 1861-2013/Jul
(c) 2013 ProQuest Info&Learning

File 56:Computer and Information Systems Abstracts 1966-2013/Sep
(c) 2013 CSA.

File 60:ANTE: Abstracts in New Tech & Engineer 1966-2013/Oct
(c) 2013 CSA.

File 65:Inside Conferences 1993-2013/Oct 17
(c) 2013 BLDSC all rts. reserv.

File 92:IHS Intl.Stds.& Specs. 1999/Nov
(c) 1999 Information Handling Services

File 95:TEMA-TECHNOLOGY & MANAGEMENT 1989-2010/OCTW3
(c) 2012 WTI-FRANKFURT

File 99:Wilson Appl. Sci & Tech Abs 1983-2011/Nov
(c) 2012 The HW Wilson Co.

File 103:Energy SciTec 1974-2013/Sep B2
(c) 2013 Contains copyrighted material

File 144:Pascal 1973-2013/Oct W2
(c) 2013 INIST/CNRS

File 275:Gale Group Computer DB(TM) 1983-2013/Oct 17
(c) 2013 Gale/Cengage

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 2006 The Thomson Corp

File 647:UBM Computer Fulltext 1988-2013/Oct W1
(c) 2013 UBM, LLC

File 674:Computer News Fulltext 1989-2006/Sep W1
(c) 2006 IDG Communications

File 9:Business & Industry(R) Jul/1994-2013/Oct 16
(c) 2013 Gale/Cengage

File 15:ABI/Inform(R) 1971-2013/Oct 16
(c) 2013 ProQuest Info&Learning

File 16:Gale Group PROMT(R) 1990-2013/Oct 17
(c) 2013 Gale/Cengage

File 18:Gale Group F&S Index(R) 1988-2013/Oct 17
(c) 2013 Gale/Cengage

File 20:Dialog Global Reporter 1997-2013/Oct 17
(c) 2013 Dialog

File 36:MetalBase 1965-20131017
(c) 2013 The Thomson Corporation

File 80:TGG Aerospace/Def.Mkts(R) 1982-2013/Oct 17
(c) 2013 Gale/Cengage

File 148:Gale Group Trade & Industry DB 1976-2013/Oct 17
(c) 2013 Gale/Cengage

File 160:Gale Group PROMT(R) 1972-1989
(c) 1999 The Gale Group

File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
(c) 2002 Gale/Cengage

File 621:Gale Group New Prod.Annou.(R) 1985-2013/Oct 17
(c) 2013 Gale/Cengage


File 624:McGraw-Hill Publications 1985-2013/Feb 28
(c) 2013 McGraw-Hill Co. Inc

File 635:Business Dateline(R) 1985-2013/Oct 17
(c) 2013 ProQuest Info&Learning

File 636:Gale Group Newsletter DB(TM) 1987-2013/Oct 17
(c) 2013 Gale/Cengage

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Set	Items	Description
S1	596246	(CODE OR EXECUTABLE OR DOWNLOAD????? OR APPLET OR JAVA OR JAVASCRIPT OR ACTIVE(X) (16N) (DETERMIN????? OR ASCERTAIN??? OR MONITOR??? OR ANALY????? OR INSPECT??? OR EXAMIN?????)
S2	45209	S1(16N) (OPERATION OR ACTION OR COMMAND OR INSTRUCTION OR STATE OR STATUS OR CONDITION OR CALL OR PROMPT)
S3	1052	S2(16N) (MALICIOUS OR SUSPICIOUS OR MALWARE OR ATTACK??? OR VIRUS OR VIRAL OR TROJAN OR WORM)
S4	104	S3(16N) (REPORT??? OR INSTRUMENT????? OR PROFILE OR LIST??? OR ITEMIZ?????)

Search Notes 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

CPC- SEARCHED		
Symbol	Date	Examiner


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
none	none	7/13/12	CR

SEARCH NOTES		
Search Notes	Date	Examiner
PALM Inventor Name Search	7/14/12	CR
BRS Text Search: USPAT, US PGPUB, USOCR, DERWENT, FPRS, IBM TDB, EPO, JPO (see attached search strategy)	7/14/12; 8/24/13; 10/17/13	CR
BRS Subclass Text Search: USPAT, US PGPUB (see attached search strategy)	7/14/12	CR
DIALOG Text Search: COMPSCI, ELECTRON, SOFTWARE (see attached search strategy)	8/24/13; 10/17/13	CR
Interference Search (see attached search strategy)	8/24/13; 10/17/13	CR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
726	22-25	8/24/13; 10/17/13	CR
713	168,175,176,179-181	8/24/13; 10/17/13	CR


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Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	

CPC			Type	Version
Symbol				


CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE (Assistant Examiner) _____ (Date) _____			Total Claims Allowed: 18	
/CHRISTOPHER REVAK/ Primary Examiner.Art Unit 2431 (Primary Examiner) _____ (Date) _____			O.G. Print Claim(s) 1	O.G. Print Figure 10B

Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION																	
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED												
726		24				H	0	4	L	29 / 06 (2006.01.01)					H	0	4	L	29 / 06 (2006.01.01)				
CROSS REFERENCE(S)						G	0	6	F	11 / 30 (2006.01.01)					G	0	6	F	11 / 30 (2006.01.01)				
						G	0	6	F	15 / 16 (2006.01.01)					G	0	6	F	15 / 16 (2006.01.01)				
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																						
713	175																						

NONE		Total Claims Allowed:	
		18	
(Assistant Examiner) /CHRISTOPHER REVAK/ Primary Examiner.Art Unit 2431	(Date)	10/17/2013	
(Primary Examiner)	(Date)		10B
		1	O.G. Print Figure
		O.G. Print Claim(s)	

Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant																<input type="checkbox"/> CPA		<input checked="" type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original						
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	16																				

NONE		Total Claims Allowed:	
		18	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/CHRISTOPHER REVAK/ Primary Examiner.Art Unit 2431	10/17/2013	1	10B
(Primary Examiner)	(Date)		

EAST Search History**EAST Search History (Prior Art)**

<This search history is empty>

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	22766	(726/22-25 or 713/168,175,176,179-181).ccls.	US-PGPUB; USPAT; UPAD	OR	ON	2013/10/17 14:52
L2	6	(downloadable with profile).clm. and 1	US-PGPUB; USPAT; UPAD	OR	ON	2013/10/17 14:52

10/ 17/ 2013 2:52:39 PM

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	515698	(code or executable or download\$5 or applet or java or script or javascript or activex)with(determin\$5 or ascertain\$3 or monitor\$3 or analy\$4 or inspect\$3 or examin\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:19
L2	171571	1 with(operation or action or command or instruction or state or status or condition or call or prompt)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:20
L3	1869	2 with(malicious or suspicious or malware or attack\$3 or virus or viral or trojan or worm)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:20
L4	200	3 with(report\$3 or instrument\$5 or profile or list\$3 or itemiz\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:21
L5	9	4 with(append\$3 or attach\$4 or add or addon or addition)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:21
L6	531258	(report\$3 or instrument\$3 or profile or list\$3 or itemiz\$5)with(append\$3 or attach\$4 or add or addon or addition)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:23
L7	15	4 same 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:23
L8	99	4 and 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/10/17 13:23

EAST Search History (Interference)

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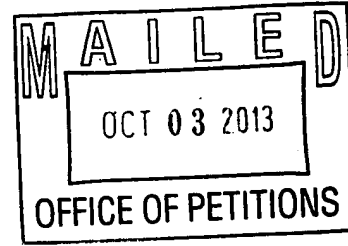
10/ 17/ 2013 1:23:55 PM



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond VA 23229



In re Application of :
Yigal Mordechai Ederly, et al. :
Application No. 13/290,708 :
Filed: November 7, 2011 :
Attorney Docket No. FIN0001-CON1-CIP1- :
CON4 :

DECISION GRANTING PETITION
UNDER 37 CFR 1.313(c)(2)

This is a decision on the petition under 37 CFR 1.313(c)(2), filed, October 1, 2013 to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid on September 19, 2013 cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.¹

Telephone inquiries should be directed to Terri Johnson at (571) 272-2991.

This application is being referred to Technology Center AU 2431 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the concurrently filed renewed petition to accept unintentionally delayed claim of priority.

/Terri Johnson/
Terri Johnson
Paralegal Specialist
Office of Petitions

¹ The request to apply the issue fee to the new Notice may be satisfied by completing and returning the new Part B – Fee(s) Transmittal Form (along with any balance due at the time of submission). Petitioner is advised that the Issue Fee Transmittal Form must be completed and timely submitted to avoid abandonment of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**RENEWED PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF
PRIORITY UNDER 35 U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-
FILED APPLICATION FILED UNDER 37 CFR § 1.78(a)(3)**

Mail Stop PETITIONS

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

Assignee respectfully submits this renewed petition for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application. In conjunction with this Petition, Assignee re-submits an Amendment to the Specification, and provides for payment of the additional \$10 for required fees over the originally paid \$1410 under 37 CFR 1.17(t) (which is now \$1420). The original petition was dismissed by the Patent Office on November 27, 2012. In the petition filed October 23, 2013, the undersigned submits that although the language recited in the petition document was missing a reference to the intervening U.S. Application No. 08/790,097 as pointed out by the Patent Office, that the amendment to the priority paragraph of the Specification that was submitted therewith did include the proper reference. *See Amendment to Specification* Filed October 23, 2013. Indeed the *de facto* same amendments to the priority paragraph of the Specification that are being re-submitted along with this renewed petition were included in the October 23, 2012 amendments to paragraph [0001] of the Specification.

Assignee understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and

after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Assignee understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by

- (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in 37 CFR §1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application is made to complete the priority claim to include a specific reference to benefit of priority to U.S. Provisional Patent Application No. 60/030,639, filed November 8, 1996 (benefit directly claimed by prior-filed U.S. Patent Application No. 08/964,388, filed November 6, 1997, now U.S. Patent No. 6,092,194) and to separately include reference to prior-filed U.S. Patent Application No. 08/790,097, filed January 28, 1997, now U.S. Patent No. 6,167,520 which also claims benefit of U.S. Provisional Patent Application No. 60/030,639, filed November 8, 1996. This request is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

In accordance with 35 U.S.C. §119(e), §120, and 37 CFR §1.78(a)(2)(i), the following amendment to the specification of the present application which adds a reference to the benefit of priority to U.S. Provisional Patent Application No. 60/030,639 and to prior-filed U.S. Patent Application No. 08/790,097, filed January 28, 1997, now U.S. Patent No. 6,167,520 which claims benefit of U.S. Provisional Patent Application No. 60/030,639, is submitted in conjunction with this Petition:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code

Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled "System and Method For Protecting a Client From Hostile Downloadables" and further claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables."

This amendment has been submitted separately as an Amendment to the Specification and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Assignee submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was originally filed was unintentional.

Payment of \$1,410 fee as required under 37 CFR §1.17(t) was provided electronically via EFS-Web with the petition filed on October 23, 2012. It is believe that the only additional fee due is \$10. The Commissioner is authorized to charge the additional \$10 due to Deposit Account No. 50-6099.

Assignee submits that this request and the amendment to the specification are diligently made to correct the record of the present application. Granting of this renewed petition is respectfully requested.

Respectfully submitted,

Date: October 1, 2013

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442
Attorneys for Assignee
Finjan, Inc.

Bey & Cotropia PLLC
213 Bayly Court
Richmond, Virginia 23229
(w) 804-441-8530

FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHOFDS

**SUBMISSION WITH REQUEST FOR CONTINUED EXAMINATION: AMENDMENT
TO THE SPECIFICATION**

Commissioner for Patents
Mail Stop: **RCE**
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In conjunction with a Petition to Withdraw Application from Issue Under 37 C.F.R. § 1.313, Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. §119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) and the accompanying Request for Continued Examination, entry of the amendments and consideration of the remarks submitted herein is respectfully requested.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

Amendments to the Specification

Please replace Paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which is a

continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled “System and Method For Protecting a Client From Hostile Downloadables” and further claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled “System and Method For Protecting a Computer From Hostile Downloadables.”

REMARKS

Assignee respectfully requests entry of the amendment to the specification of U.S. Patent Application No. 13/290,708 in conjunction with the Petition to Withdraw Application from Issue Under 37 C.F.R. § 1.313 and Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. § 119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) filed herewith. The amendment introduces no new matter and corrects the priority claim of the application. Assignee notes that U.S. Patent Application Nos. 08/790,097, and 60/030,639 and the present invention share the inventor Shlomo Touboul.

This submission is filed with a Request for Continuation Examination, including the appropriate fee. However, in the event additional fees are due, the Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-6099.

Respectfully submitted,

Date: October 1, 2013

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442
Attorneys for Assignee
Finjan, Inc.

Bey & Cotropia PLLC
213 Bayly Court
Richmond, Virginia 23229
(w) 804-441-8530

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	13/290,708
Filing Date	November 7, 2011
First Named Inventor	Yigal Mordechai EDERY, et al.
Art Unit	2431
Examiner Name	Christopher A. Revak
Attorney Docket Number	FIN0001-CON1-CIP1-CON4

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).
- a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
- i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ii. Other _____
- b. Enclosed
- i. Amendment/Reply
- ii. Affidavit(s)/ Declaration(s)
- iii. Information Disclosure Statement (IDS)
- iv. Other Submission with Request for Continued Examination: Amendment to Specification; Renewed Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. 119(e) and 120 For the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. 1.78(a)(3)
2. **Miscellaneous**
- a. Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)
- b. Other _____
3. **Fees** The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed. The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to
- a. Deposit Account No. _____
- i. RCE fee required under 37 CFR 1.17(e)
- ii. Extension of time fee (37 CFR 1.136 and 1.17)
- iii. Other _____
- b. Check in the amount of \$ 1,700 enclosed
- c. Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/Dawn-Marie Bey/	Date	October 1, 2013
Name (Print/Type)	Dawn-Marie Bey	Registration No.	44,442

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature		Date	
Name (Print/Type)			

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	13290708
Filing Date:	07-Nov-2011
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Petition fee- 37 CFR 1.17(h) (Group III)	1464	1	140	140

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Blue Coat Systems - Exhibit 1004

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
RCE - 2nd and Subsequent Request	1820	1	1700	1700
Total in USD (\$)				1840

Electronic Acknowledgement Receipt

EFS ID:	17004348
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoletta-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	01-OCT-2013
Filing Date:	07-NOV-2011
Time Stamp:	11:32:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1840
RAM confirmation Number	16637
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part	Pages (if any)

1	Petition to Withdraw from Issue	fin0001con1cip1con4_petforwithdrawalfromissue.pdf	123927 d0a91cc6294f2254f398b1d90ad571cc64143c28	no	1
Warnings:					
Information:					
2	Petition for review by the Office of Petitions.	fin0001con1cip1con4_renewedpet_clmofpriority.pdf	136551 51b09035185ba41637487d6f647ff8b74c7e9bc3	no	4
Warnings:					
Information:					
3	Amendment Submitted/Entered with Filing of CPA/RCE	fin0001con1cip1con4_subwrce.pdf	129998 ae49fa492646ff8ac18074f220501eeb840a3d14	no	4
Warnings:					
Information:					
4	Request for Continued Examination (RCE)	fin0001con1cip1con4_rcetrans.pdf	1645534 98394286115002c3697a5018d2a33cde9281147e	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32460 9e948cf0ce29f635c5fe92ef153d2d4204e91f1e2	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			2068470		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Yigal Mordechai EDERY, et al.

Serial No.: 13/290,708

Group Art Unit: 2431

Filed: November 7, 2011

Examiner: Christopher A. Revak

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHODS

U.S. Patent and Trademark Office

Mail Stop **PETITIONS**

Randolph Building

401 Dulany Street

Alexandria, VA 22314

PETITION UNDER 37 C.F.R. § 1.313(c) FOR WITHDRAWAL FROM ISSUE

Dear Sir:

The undersigned requests withdrawal of the above application from issue, under 37 C.F.R. § 1.313(c)(2), so as to file a Request for Continued Examination along with a renewed Petition to Accept Unintentionally Delayed Claim of Priority and Amendment to the Specification.

The petition fee of \$140 set forth in 37 C.F.R. § 1.17(h) is submitted herewith. In addition, if any additional fees are required in connection with the filing of this Petition, the Commissioner is hereby authorized to charge the same to Deposit Account 50-6099.

Respectfully submitted,

Date: October 1, 2013

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey (Reg. No. 44,442)
Attorneys for Assignee
Finjan, Inc.**Bey & Cotropia PLLC**
213 Bayly Court
Richmond, VA 23229
(804) 441-8530

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/290,708	Filing Date 11/07/2011	<input type="checkbox"/> To be Mailed
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ENTITY: LARGE SMALL MICRO

APPLICATION AS FILED – PART I

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	10/01/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X \$80 = 0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
 /PARTHENIA D. MERRILL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address):

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

115222 7990 08/29/2013
Bey & Cotropia PLLC (Finjan Inc.)
 213 Bayly Court
 Richmond, VA 23229

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

APPL. TYPE	ENTRY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	11/29/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2431	726-024000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.303).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication Form PTO/SB/47, Rev. 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1. <u>Bey & Cotropia PLLC</u></p> <p>2. _____</p> <p>3. _____</p>
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3. ASSIGNEE: NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **Finjan, Inc.**

(B) RESIDENCE: (CITY and STATE OR COUNTRY) **New York, New York**

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input checked="" type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s). (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
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5. Change in Entity Status (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Dawn-Marie Bey/

Date September 19, 2013

Typed or printed name Dawn-Marie Bey

Registration No. 44,442

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal

Application Number:	13290708
Filing Date:	07-Nov-2011
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2080

Electronic Acknowledgement Receipt

EFS ID:	16902795
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	115222
Filer:	Dawn-Marie Bey./Jeanne Paoletta-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	19-SEP-2013
Filing Date:	07-NOV-2011
Time Stamp:	15:56:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2080
RAM confirmation Number	2867
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part	Pages (if any)

1	Issue Fee Payment (PTO-85B)	fin0001con1cip1con4_execute dpartb.pdf	1882708	no	2
			d1451bad472566b3da1b6e5a4239023754 4d6911		

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32225	no	2
			1ea891eb41a9a17e6c466dff23db3c0709dc b19e		

Warnings:

Information:

Total Files Size (in bytes):			1914933		
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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NOTICE OF ALLOWANCE AND FEE(S) DUE

115222 7590 08/29/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

Table with 2 columns: EXAMINER (REVAK, CHRISTOPHER A), ART UNIT (2431), PAPER NUMBER

DATE MAILED: 08/29/2013

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies. If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above. If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)". For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

115222 7590 08/29/2013
Bey & Cotropia PLLC (Finjan Inc.)
 213 Bayly Court
 Richmond, VA 23229

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4	4120

TITLE OF INVENTION: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	11/29/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2431	726-024000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. **Change in Entity Status** (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Edery FIN0001-CON1-CIP1-CON4 4120

115222 7590 08/29/2013
Bey & Cotropia PLLC (Finjan Inc.)
213 Bayly Court
Richmond, VA 23229

EXAMINER
REVAK, CHRISTOPHER A

ART UNIT 2431
PAPER NUMBER

DATE MAILED: 08/29/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/290,708	Applicant(s) EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to the response filed on 5/7/13.
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. The allowed claim(s) is/are 1-18. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/oph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) All b) Some *c) None of the:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>See Continuation Sheet</u> | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input checked="" type="checkbox"/> Other <u>Examiner's Comments</u> . |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

Continuation of Attachment(s) 2. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 5/7/13;5/7/13;5/7/13;5/7/13;5/7/13.

NOTICE OF ALLOWANCE

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 7, 2013 has been entered.

Response to Arguments

2. The Declaration filed on May 7, 2013 under 37 CFR 1.131(a) is sufficient to overcome the Ji, U.S. Patent 5,983,348 reference wherein the submitted Exhibit A Surfingate™ product press release titled “Gateway Level Corporate Security for the New World of Java™ and Downloadables” shows a publication date of October 31, 1996 which is prior to September 10, 1997. The rejection is hereby withdrawn and the claims are in conditions for allowance.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Allowable Subject Matter

4. Claims 1-18 are allowed.
5. The following is an examiner's statement of reasons for allowance:

It was not found to be taught in the prior art of receiving an incoming Downloadable; deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable, and storing the Downloadable security profile data in a database.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER REVAK whose telephone number is (571)272-3794. The examiner can normally be reached on Monday-Thursday, 9:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 517-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2431

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

? show files

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File 6:NTIS 1964-2013/Aug W2
(c) 2013 NTIS, Intl Cpyrght All Rights Res

File 8:EI Compendex(R) 1884-2013/Aug W3
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File 34:SciSearch(R) Cited Ref Sci 1990-2013/Aug W3
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File 35:Dissertation Abs Online 1861-2013/Jun
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File 95:TEMA-TECHNOLOGY & MANAGEMENT 1989-2010/OCTW3
(c) 2012 WTI-FRANKFURT

File 99:Wilson Appl. Sci & Tech Abs 1983-2011/Nov
(c) 2012 The HW Wilson Co.

File 103:Energy SciTec 1974-2013/Aug B1
(c) 2013 Contains copyrighted material

File 144:Pascal 1973-2013/Aug W3
(c) 2013 INIST/CNRS

File 275:Gale Group Computer DB(TM) 1983-2013/Aug 23
(c) 2013 Gale/Cengage

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 2006 The Thomson Corp

File 647:UBM Computer Fulltext 1988-2013/Aug W3
(c) 2013 UBM, LLC

File 674:Computer News Fulltext 1989-2006/Sep W1
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File 9:Business & Industry(R) Jul/1994-2013/Aug 23
(c) 2013 Gale/Cengage

File 15:ABI/Inform(R) 1971-2013/Aug 23
(c) 2013 ProQuest Info&Learning

File 16:Gale Group PROMT(R) 1990-2013/Aug 23
(c) 2013 Gale/Cengage

File 18:Gale Group F&S Index(R) 1988-2013/Aug 23
(c) 2013 Gale/Cengage

File 20:Dialog Global Reporter 1997-2013/Aug 24
(c) 2013 Dialog

File 36:MetalBase 1965-20130823
(c) 2013 The Thomson Corporation

File 80:TGG Aerospace/Def.Mkts(R) 1982-2013/Aug 23
(c) 2013 Gale/Cengage

File 148:Gale Group Trade & Industry DB 1976-2013/Aug 23
(c) 2013 Gale/Cengage

File 160:Gale Group PROMT(R) 1972-1989
(c) 1999 The Gale Group

File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
(c) 2002 Gale/Cengage

File 621:Gale Group New Prod.Annou.(R) 1985-2013/Aug 23
(c) 2013 Gale/Cengage

File 624:McGraw-Hill Publications 1985-2013/Feb 28
(c) 2013 McGraw-Hill Co. Inc

File 635:Business Dateline(R) 1985-2013/Aug 24
(c) 2013 ProQuest Info&Learning

File 636:Gale Group Newsletter DB(TM) 1987-2013/Aug 23
(c) 2013 Gale/Cengage

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Set	Items	Description
S1	588653	(CODE OR EXECUTABLE OR DOWNLOAD????? OR APPLET OR JAVA OR - JAVASCRIPT OR ACTIVEX) (16N) (DETERMIN????? OR ASCERTAIN??? OR - MONITOR??? OR ANALY????? OR INSPECT??? OR EXAMIN?????)
S2	44659	S1(16N) (OPERATION OR ACTION OR COMMAND OR INSTRUCTION OR S-TATE OR STATUS OR CONDITION OR CALL OR PROMPT)
S3	1010	S2(16N) (MALICIOUS OR SUSPICIOUS OR MALWARE OR ATTACK??? OR - VIRUS OR VIRAL OR TROJAN OR WORM)
S4	65	S3(16N) (REPORT OR INSTRUMENT????? OR PROFILE OR LIST??? OR ITEMIZ?????)

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	506715	(code or executable or download\$5 or applet or java or script or javascript oractivex)with(determin\$5 or ascertain\$3 or monitor\$3 or analy\$4 or inspect\$3 or examin\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:47
L2	167946	1 with(operation or action or command or instruction or state or status or condition or call or prompt)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:48
L3	1802	2 with(malicious or suspicious or malware or attack\$3 or virus or viral or trojan or worm)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:49
L4	197	3 with(report\$3 or instrument\$5 or profile or list\$3 or itemiz\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:50
L5	8	4 with(append\$3 or attach\$4 or add or addon or addition)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:50
L6	531306	(append\$3 or attach\$4 or add or addon or addition)with(report\$3 or instrument\$5 or profile or list\$3 or itemiz\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:51
L7	14	4 same 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:51
L8	97	4 and 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/08/24 10:51

EAST Search History (Interference)

< This search history is empty >

8/ 24/ 2013 10:51:48 AM

Receipt date: 05/07/2013

13290708 - GAI: 2431

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

U.S.PATENTS						
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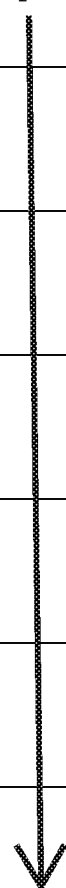
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

1	ThunderByte Antivirus for Windows	no date provided	<input type="checkbox"/>
2	InterScan VirusWall from Trend Micro		<input type="checkbox"/>
3	VirusSafe from Eliashim		<input type="checkbox"/>
4	Intel LANProtect from Intel		<input type="checkbox"/>
5	The Java Security Manager from Sun Microsystems		<input type="checkbox"/>
6	McAfee Web Shield		<input type="checkbox"/>
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9	McAfee NetShield		<input type="checkbox"/>
10	Dr. Solomon's Antivirus Toolkit for Windows 95		<input type="checkbox"/>
11	Dr. Solomon's Antivirus Toolkit for Windows NT		<input type="checkbox"/>



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	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

12	Dr. Solomon's WinGuard	no date provided	<input type="checkbox"/>
13	Dr. Solomon's Virus Guard		<input type="checkbox"/>
14	Dr. Solomon's Virus Shield		<input type="checkbox"/>
15	Dr. Solomon's Virex		<input type="checkbox"/>
16	Dr. Solomon's "Merlin" Anti-Virus Engine		<input type="checkbox"/>
17	Dr. Solomon's McAfee "Olympus" Anti-Virus Engine		<input type="checkbox"/>
18	ActiveX Web Tutorial		<input type="checkbox"/>
19	Java FAQ (1995-1998)		<input type="checkbox"/>
20	Norton AntiVirus TUfor Windows@95 User's Guide. Published by Symantec in 1995. (179 pages)		<input type="checkbox"/>
21	JAEGER, at al., "Building Systems that Flexibly Control Downloadable Executable Content," Proceedings of the Sixth USENIX UNIX Security Symposium, July 1996. (19 pages)		<input type="checkbox"/>
22	RASMUSSEN, Andreas and JANSSON, Sverker, "Personal Security Assistance for Secure Internet Commerce," Sept. 16, 1996. (12 pages)		<input type="checkbox"/>



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23	BHARAT et al. "Migratory Applications" November 15, 1995. (10 pages)	<input type="checkbox"/>
24	DEAN, Drew, et al., "Java Security: From HotJava to Netscape and Beyond," 1996 IEEE Symposium on Security and Privacy, May 6, 1996. (11 pages)	<input type="checkbox"/>
25	STERBENZ, Andreas, "An Evaluation of the Java Security Model," IEEE, December 1996. (13 pages)	<input type="checkbox"/>
26	FRITZINGER, J. Steven, et al., "Java Security," Sun Microsystems, December 1996 (7 pages)	<input type="checkbox"/>
27	BANK Joseph A. "Java Security," December 8 1995. (14 pages)	<input type="checkbox"/>
28	CLAUNCH, "Java Blocking," http://groups.google.com/group/muc.lists.firewalls/msg/2a5ec02e00a37071 . September 25 1996. Accessed date: May 10 2011. (2 pages).	<input type="checkbox"/>
29	CHAPPELL, "Understanding ActiveX and OLE: A Guide for Developers and Managers (Strategic Technology)," September 1, 1996, Microsoft Press. (91 pages)	<input type="checkbox"/>
30	CROSBIE, et al., "Active Defense of a Computer System Using Autonomous Agents". February 15, 1995. (14 pages)	<input type="checkbox"/>

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- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

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	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
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1	"Trend Micro's Virus Protection Added to Sun Microsystems Netra Internet Servers," Business Wire, October 1, 1996, available at http://www.cs.indiana.edu/~kinzler/pubs/viruswall.html	<input type="checkbox"/>
2	"Symantec Announces Norton Antivirus 2.0 for Windows NT," Symantec Corporation press release, September 16, 1996, available at http://www.symantec.com/about/news/release/article.jsp?prid=19960916_01	<input type="checkbox"/>
3	"Dark Avenger Mutation Engine No Threat to Protected PCs," McAfee, Inc. press release, May 11, 1992, available at http://securitydigest.org/virus/mirror/www.phreak.orgvirus/1/1992/vinl05.191	<input type="checkbox"/>
4	"Dark Avenger Mutation Engine No Threat to Protected PCs," McAfee, Inc. press release, May 11, 1992, available at http://securitydigest.org/virus/mirror/www.phreak.orgvirus/1/1992/vinl05.191	<input type="checkbox"/>
5	Gryaznov, D.O., "Scanners of the Year 2000: Heuristics," Proceedings of the Fifth International Virus Bulletin Conference, pp. 225-234 (1995), available at http://vxheavens.com/lib/adgOO.html	<input type="checkbox"/>
6	"Symantec Announces Norton Internet Email Gateway at Internet World - Booth # 369 on December 11, 12, and 13," Symantec Corporation press release, December 11, 1996, available at http://www.symantec.com/about/news/release/article.jsp?prid=19961211_03	<input type="checkbox"/>
7	"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point Firewall-Ion Single NT Server; E-mail Virus Detection and Content Management Can Reside on Firewall Server, Saving Money and Support Costs," Business Wire, September 16, 1996, available at http://www.thefreelibrary.com/Internet+Security+Gets+Less+Costly+and	<input type="checkbox"/>
8	"Presenting Java," by John December (1995)	<input type="checkbox"/>
9	"The Java Language Specification" by Gosling, et al. (1996)	<input type="checkbox"/>
10	"The Java Programming Language," by Ken Arnold and James Gosling (1996)	<input type="checkbox"/>
11	"The Java Virtual Machine Specification," by Tim Lindholm and Frank Yellin (1997)	<input type="checkbox"/>

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	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

12	"Computer Viruses and Artificial Intelligence," by David Stang (September, 1995)	<input type="checkbox"/>
13	"Java Security and a Firewall Extension for Authenticity Control of Java Applets," by Magnus Johansson (January 29, 1997)	<input type="checkbox"/>
14	"Static Analysis of Programs With Application to Malicious Code Detection," by Raymond Lo (1992)	<input type="checkbox"/>
15	File History for U.S. Patent No. 6,804,780	<input type="checkbox"/>
16	"Virus Detection Alternatives," by Patrick Min (July, 1992)	<input type="checkbox"/>
17	"Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns," by LeCharlier, et al. (September, 1995)	<input type="checkbox"/>
18	The Giant Black Book of Computer Viruses by Mark Ludwig (1995)	<input type="checkbox"/>
19	HotJava: The Security Story	no date provided <input type="checkbox"/>
20	The Java Filter	no date provided <input type="checkbox"/>
21	"A Java Filter," by Balfanz, et al.	no date provided <input type="checkbox"/>
22	"Improved JavaScript and Java Screening Function," by Claunch (May 4, 1996)	<input type="checkbox"/>

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23	"New Version of Java, JavaScript, ActiveX Screening," by Claunch (July 3, 1996)	<input type="checkbox"/>
24	"A Toolkit and Methods for Internet Firewalls," by Ranum, et al. no date provided	<input type="checkbox"/>
25	"Identifying and Controlling Undesirable Program Behaviors," by Maria King no date provided	<input type="checkbox"/>
26	"PACL's: An Access Control List Approach to Anti-Viral Security," by Wichers, et al. no date provided	<input type="checkbox"/>
27	ENDRIJONAS, Janet, Rx PC The Anti-Virus Handbook. Published in the U.S. in 1993 by TAB Books, a division of McGraw-Hill, Inc. (201 paQes)	<input type="checkbox"/>
28	"Secure Code Distribution," by X. Nick Zhang (June, 1997)	<input type="checkbox"/>
29	IBM AntiVirus User's Guide (November 15, 1995)	<input type="checkbox"/>
30	"Breadth of Runtime Environments and Security Make Java a Good Choice for the Internet" (1996)	<input type="checkbox"/>
31	Omura, Jim K., "Novel Applications of Cryptography in Digital Communications," IEEE Communications Magazine, pp. 21-29, May, 1990	<input type="checkbox"/>
32	Okamoto, E., et al., "ID-Based Authentication System For Computer Virus Detection," IEEE/IEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19,1990, Abstract and pages 1169-1170, URL: http://iel.ihs.com:80/cgi-bin/iel.cgi?se ... 2ehts%26ViewTemplate%3ddocview%5fb%2ehts	<input type="checkbox"/>
33	IBM AntiVirus User's Guide Version 2.4, International Business Machines Corporation, pp. 6-7, November 15, 1995	<input type="checkbox"/>

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34	Leach, Norvin, et al., "IE 3.0 Applets Will Earn Certification," PC Week, Vol. 13, No. 29,2 pp., July 22, 1996	<input type="checkbox"/>
35	"Finjan Software Releases SurfinBoard, Industry's First JAVA Security product For the World Wide Web," Article published on the Internet by Finjan Software Ltd., 1 p., July 29, 1996	<input type="checkbox"/>
36	"Powerful PC Security for the New World of JAVATM and Downloadables, Surfin Shield™," Article published on the Internet by Finjan Software Ltd., 2 pp. 1996	<input type="checkbox"/>
37	Microsoft® Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet," Microsoft Corporation, including Abstract, Contents, Introduction, and pp. 1-10, October, 1996	<input type="checkbox"/>
38	Finjan Announces a Personal Java™ Firewall for Web Browsers - the SurfinShield™ 1.6 (formerly known as SurfinBoard)," Press Release of Finjan Releases SurfinShield 1.6, 2 pp., October 21, 1996	<input type="checkbox"/>
39	Company Profile, "Finjan-Safe Surfing. The Java Security Solutions Provider," Article published on the Internet by Finjan Software Ltd., 3 pp., October 31,1996	<input type="checkbox"/>
40	"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0," Las Vegas Convention Center/Pavilion 5 P5551, 3 pp., November 18, 1996	<input type="checkbox"/>
41	"Java Security: Issues & Solutions," Article published on the Internet by Finjan Software Ltd., 8 pp., 1996	<input type="checkbox"/>
42	"Products," Article published on the Internet, 7 pp. no date provided	<input type="checkbox"/>
43	Mark LaDue, "Online Business Consultant: Java Security: Whose Business Is It?," Article published on the Internet, Home Page Press, Inc., 4 pp., 1996	<input type="checkbox"/>
44	Web Page Article, "Frequently Asked Questions About Authenticode," Microsoft Corporation, last updated February 17, 1997, printed December 23, 1998, URL: http://www.microsoft.com/workshop/security/authcodee/signfaq.asp#9 , pp. 1-13	<input type="checkbox"/>

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45	Zhang, X.N., "Secure Code Distribution," IEEE/IEE Electronic Library online, Computer Vol. 30, Issue 6, pp. 76-79, June, 1997		<input type="checkbox"/>
46	Binstock, Andrew, "Multithreading, Hyper-Threading, Multiprocessing: Now, What's the Difference?," http://hiv\w-intel.com/cd/ids!dcvdoQcr!asmo-na/enfl/20456.htm , Pacific Data Works, LLC, downloaded 7/7/2008, 7 pp.		<input type="checkbox"/>
47	VirexPC Version 2.0 or later from Microcom	no date provided	<input type="checkbox"/>
48	AntiVirus Kit From 1 stAide Software	no date provided	<input type="checkbox"/>
49	FluShot+ Series of Products by Ross Greenberg	no date provided	<input type="checkbox"/>
50	Symantec Antivirus ofthe Mac version 3.0 or later	no date provided	<input type="checkbox"/>

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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13290708 - GAI: 2431

Doc code: IDS

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	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

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	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

1	"Synthesizing Fast Intrusion Prevention/Detection Systems From High-Level Specifications," by Sekar, et al. (1999)	<input type="checkbox"/>
2	Art of Computer Virus Research and Defense b Peter Szor (February, 2005)	<input type="checkbox"/>
3	"Process Execution Controls as a Mechanism to Ensure Consistency," by Eugen Bacic (1990)	<input type="checkbox"/>
4	"Process Execution Controls: Revisited," by Bacic (1990)	<input type="checkbox"/>
5	"A Flexible Access Control Service for Java Mobile Code," by Corradi, et al. (2000)	<input type="checkbox"/>
6	"Java Security: Issues & Solutions" (1996)	<input type="checkbox"/>
7	"Microsoft Authenticode analyzed," by Rohit Khare (July 22, 1996)	<input type="checkbox"/>
8	"Java Security: Whose Business Is It?" by Mark LaDue (1996)	<input type="checkbox"/>
9	Microsoft Authenticode Technology (October, 1996)	<input type="checkbox"/>
10	"Mobile Code Security," by Rubin, et al.	no date provided <input type="checkbox"/>
11	"Protecting Data From Malicious Software," by Schmid, et al.	no date provided <input type="checkbox"/>

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12	"Security in the Large: Is Java's Sandbox Scalable?" by Zhong, et al. (April, 1998)	<input type="checkbox"/>
13	"A Domain and type Enforcement UNIX Prototype," by Badger, et al. (June, 1995)	<input type="checkbox"/>
14	"Heuristic Anti-Virus Technology," by Frans Veldman no date provided	<input type="checkbox"/>
15	"Standards for Security in Open Systems," by Warwick Ford (1989)	<input type="checkbox"/>
16	"Secure File Transfer Over TCP/IP," by Brown, et al. (November, 1992)	<input type="checkbox"/>
17	"Standards in Commercial Security," by Nick Pope no date provided	<input type="checkbox"/>
18	"X.400 Security Features," by Tony Whyman no date provided	<input type="checkbox"/>
19	"Using CASE Tools to Improve the Security of Applications Systems," by Hosmer, et al. (1988)	<input type="checkbox"/>
20	"Miro: Visual Specification of Security," by Heydon, et al. (October, 1990)	<input type="checkbox"/>
21	"An Evaluation of Object-Based Programming with Visual Basic," by Dukovic, et al. (1995)	<input type="checkbox"/>
22	"Visual Basic 5.0 Significantly Improved," by W. Dennis Swift (June, 1997)	<input type="checkbox"/>

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23	"Development of an Object Oriented Framework for Design and Implementation of Database Powered Distributed Web Applications With the DEMETER Project as a Real-Life Example," by Goschka, et al. (1997)	<input type="checkbox"/>
24	"Detecting Unusual Program Behavior Using the Statistical Component of the Nextgeneration Intrusion Detection Expert System (NIDES), by Anderson, et al. (May, 1995)	<input type="checkbox"/>
25	"A Generic Virus Scanner in C++," by Kumar, et al. (September 17, 1992)	<input type="checkbox"/>
26	"A Model For Detecting the Existence of Software Corruption in Real Time," by Voas, et al. (1993)	<input type="checkbox"/>
27	"Protection Against Trojan Horses by Source Code Analysis," by Saito, et al. (March, 1993)	<input type="checkbox"/>
28	"Information Agents for Automated Browsing," by Dharap, et al. (1996)	<input type="checkbox"/>
29	"Static Analysis Virus Detection Tools for Unix Systems," by Kerchen, et al. (1990)	<input type="checkbox"/>
30	"Managing Trust in an Information-Labeling System," by Blaze, et al. (November 4, 1996)	<input type="checkbox"/>
31	List of Secure Internet Programming Publications from www.cs.princeton.edu	no date provided <input type="checkbox"/>
32	"A Guide to the Selection of Anti-Virus Tools and Techniques," by Polk, et al. (December 2, 1992)	<input type="checkbox"/>
33	"An Integrated Toolkit for Operating System Security," by Rabin, et al. (August, 1988)	<input type="checkbox"/>

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34	"A Web Navigator With Applets in Caml," by Francois Ronaix (May, 1996)	<input type="checkbox"/>	
35	"Intel Launches Virus Counterattack," by Charles Bruno (August, 1992)	<input type="checkbox"/>	
36	Intel LANProtect Software User's Guide (1992)	<input type="checkbox"/>	
37	"Parents Can Get PC Cruise Control," by George Mannes (July, 1996)	<input type="checkbox"/>	
38	"A New Techniques for Detecting Polymorphic Computer Viruses," by Carey Nachenberg (1995)	<input type="checkbox"/>	
39	"Heuristic Scanners: Artificial Intelligence," by Righard Zwienenberg (September, 1995)	<input type="checkbox"/>	
40	Intel LANProtect, 30-Day Test Drive Version User's Manual	no date provided	<input type="checkbox"/>
41	Slade, Robert, "Guide to Computer Viruses: How to A void Them, How to Get Rid of Them, and How to Get Help" (April, 1996)	<input type="checkbox"/>	
42	A Pathology of Computer Viruses by David Ferbranche (November, 1994)	<input type="checkbox"/>	
43	Earl Boebert's post to the greatcircle firewalls mailing list. Taken from http://www.greatcircle.com/lists/firewalls/archive/firewalls.199410 (October, 16, 1994)	<input type="checkbox"/>	
44	CSL Bulletin: Connecting to the Internet: Security Considerations. Taken from http://csrc.nist.gov/publications/nistbul/cs193-07.txt (July 1993)	<input type="checkbox"/>	

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45	FAQ: Interscan Viruswall Taken from http://\veb.archive.org/web/19970605050331/www..antivirus.com/faq/finterscanfaq.html (last updated August 8, 1996)	<input type="checkbox"/>
46	Network Security and SunScreen SPF-IOO: Technical White Paper, Sun Microsystems, 1995	<input type="checkbox"/>
47	"Why Do We Need Heuristics?" by Frans Veldman (September, 1995)	<input type="checkbox"/>
48	"Leading Content Security Vendors Announce Support for Check Point Firewall- 1.3.0; New Partners for Anti-Virus Protection, URL Screening and Java Security," Business Wire, October 7, 1996, available at http://www.allbusiness.com/technology/computer-networks-computer-networksecurity17274315-1.html#ixzz1gkbKf4g1	<input type="checkbox"/>
49	"McAfee Introduces Web shield; Industry's First Secure Anti-Virus Solution for Network Firewalls; Border Network Technologies and Secure Computing to Enter into Web Shield OEM Agreements," Business Wire, May 14, 1996, available at http://findarticles.com/p/articles/mi_mOEINlis_1996_May_14/ai_182834561	<input type="checkbox"/>
50	"Trend Micro Announces Virus and Security Protection For Microsoft Proxy Server; Also Blocks Java Applets, ActiveX," Business Wire, October 29, 1996, available at http://www.thefreelibrary.com/Trend+Micro+announces+virus+and+security+protection+for+MicrosoftL.-aO18810512	<input type="checkbox"/>

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Examiner Signature	/Christopher Revak/	Date Considered	08/21/2013
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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1	Finjan's Opposition to Websense's Renewed Motion For Judgment as a Matter of Law, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS)	<input type="checkbox"/>
2	Declaration of Paul Batcher Re Websense, Inc.s' Proffer of Evidence Re Laches, dated December 19,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS) (Redacted 12/26/12)	<input type="checkbox"/>
3	Opposition to Symantec's Motion For JMOL, dated December 17, 2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS) (Redacted 12/27/12)	<input type="checkbox"/>
4	Omura, Jim K., "Novel Applications of Cryptography in Digital Communications," IEEE Communications Magazine, pp. 21-29, May, 1990	<input type="checkbox"/>
5	Okamoto, E., et al., "ID-Based Authentication System For Computer Virus Detection," IEEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19,1990, Abstract and pages 1169-1170, URL: http://iel.ihs.com:80/cgi-bin/iel.cgi?se...2ehts%26ViewTemplate%3ddocview%5fb%2ehts	<input type="checkbox"/>
6	IBM AntiVirus User's Ouide Version 2.4, International Business Machines Corporation, pp. 6-7, November 15,1995	<input type="checkbox"/>
7	Leach, Norvin, et al., "IE 3.0 Applets Will Earn Certification," PC Week, Vol. 13, No. 29, 2 pp., July 22, 1996	<input type="checkbox"/>
8	"Finjan Software Releases SurfinBoard, Industry's First JAVA Security product For the World Wide Web," Article published on the Internet by Finjan Software Ltd., 1 p., July 29, 1996	<input type="checkbox"/>
9	"Powerful PC Security for the New World of JAVATM and Downloadables, Surfin Shield™," Article published on the Internet by Finjan Software Ltd., 2 pp. 1996	<input type="checkbox"/>
10	Microsoft® Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet," Microsoft Corporation, including Abstract, Contents, Introduction, and pp. 1-10, October, 1996	<input type="checkbox"/>
11	Finjan Announces a Personal Java™ Firewall for Web Browsers - the SurfinShield™ 1.6 (fonnerly known as SurfinBoard)," Press Release of Finjan Releases SurfinShield 1.6,2 pp., October 21, 1996	<input type="checkbox"/>

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12	Company Profile, "Finjan-Safe Surfing. The Java Security Solutions Provider," Article published on the Internet by Finjan Software Ltd., 3 pp., October 31, 1996	<input type="checkbox"/>
13	"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0," Las Vegas Convention Center/Pavilion 5 P5551, 3 pp., November 18, 1996	<input type="checkbox"/>
14	"Java Security: Issues & Solutions," Article published on the Internet by Finjan Software Ltd., 8 pp., 1996	<input type="checkbox"/>
15	"Products," Article published on the Internet, 7 pp. no date provided	<input type="checkbox"/>
16	Mark LaDue, "Online Business Consultant: Java Security: Whose Business Is It?," Article published on the Internet, Home Page Press, Inc., 4 pp., 1996	<input type="checkbox"/>
17	Web Page Article, "Frequently Asked Questions About Authenticode," Microsoft Corporation, last updated February 17, 1997, printed December 23, 1998, URL: http://www.microsoft.com/workshop/security/authcode/signfaq.asp#9 , pp. 1-13	<input type="checkbox"/>
18	Zhang, X.N., "Secure Code Distribution," IEEE/IEE Electronic Library online, Computer Vol. 30, Issue 6, pp. 76-79, June, 1997	<input type="checkbox"/>
19	Binstock, Andrew, "Multithreading, Hyper-Threading, Multiprocessing: Now, What's the Difference?," http://www.intel.com/cd/ids/developer/asmo-na/eng/20456.htm , Pacific Data Works, LLC, downloaded 7/7/2008, 7 pp.	<input type="checkbox"/>
20	"Frequently Asked Questions About Authenticode," Microsoft Corporation, updated February 17, 1997	<input type="checkbox"/>
21	"WWWProxyto Cut Off Java," by Carl Claunch (April 12, 1996)	<input type="checkbox"/>
22	"Combating Viruses Heuristically," by Frans Veldman (September, 1993)	<input type="checkbox"/>

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24	Anti-Virus Tools and Techniques for Computer Systems by Polk, et al. (1995)	<input type="checkbox"/>
25	"Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns," by LeCharlier, et al. (July 2, 1995)	<input type="checkbox"/>
26	"Towards a Testbed for Malicious Code Detection," by Lo, et al. (1991)	<input type="checkbox"/>
27	"Blocking Java Applets at the Firewall," by Martin, et al. no date provided	<input type="checkbox"/>
28	Virus Detection and Elimination by Rune Skardhamar (1996)	<input type="checkbox"/>
29	Computer Viruses and Anti-Virus Warfare by Jan Hruska (1992)	<input type="checkbox"/>
30	"Active Content Security," by Brady, et al. (December 13, 1999)	<input type="checkbox"/>
31	"Low Level Security in Java," by Frank Yellin no date provided	<input type="checkbox"/>
32	"Email With a Mind of Its Own: The Safe-Tcl Language for Enabled Mail," by Nathaniel Borenstein no date provided	<input type="checkbox"/>
33	"Mobile Agents: Are They a Good Idea?" by Chess, et al. (December 21, 1994)	<input type="checkbox"/>

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	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

34	"Remote Evaluation," by Stamos, et al. (October, 1990)	<input type="checkbox"/>
35	"Active Message Processing: Messages as Messengers," by John Vittal (1981)	<input type="checkbox"/>
36	"Programming Languages for Distributed Computing Systems," by Bal, et al. (September, 1989)	<input type="checkbox"/>
37	"Scripts and Agents: The New Software High Ground," by John Ousterhout (October 20, 1995)	<input type="checkbox"/>
38	"The HotJava Browser: A White Paper" no date provided	<input type="checkbox"/>
39	The Java Virtual Machine Specification, Sun Microsystems (August 21, 1995)	<input type="checkbox"/>
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41	"ActiveX and Java: The Next Virus Carriers?" no date provided	<input type="checkbox"/>
42	"Gateway Level Corporate Security for the New World of Java and Downloadables" (1996)	<input type="checkbox"/>
43	"Practical Domain and Type Enforcement for UNIX," by Badger, et al. (1995)	<input type="checkbox"/>
44	"A Sense of Self for Unix Processes," by Forrest, et al. (1996)	<input type="checkbox"/>

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45	"Antivirus Scanner Analysis 1995," by Marko Helenius (1995)	<input type="checkbox"/>
46	"State Transition Analysis: A Rule-Based Intrusion Detection Approach," by Ilgun, et al. (March, 1995)	<input type="checkbox"/>
47	"Automated Detection of Vulnerabilities in Privileged Programs by Execution Monitoring," by Ko, et al. (1994)	<input type="checkbox"/>
48	"Execution Monitoring of Security-Critical Programs in Distributed Systems: A Specification-Based Approach," by Ko, et al. (1997)	<input type="checkbox"/>
49	"Classification and Detection of Computer Intrusions," by Sandeep Kumar (August, 1995)	<input type="checkbox"/>
50	ThunderBYTE Anti-Virus Utilities User Manual (1995)	<input type="checkbox"/>

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Examiner Signature	/Christopher Revak/	Date Considered	08/21/2013
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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13290708 - GAI: 2431

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410/0001 (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	2	4562305		1995-12-31	Ji, et al.	
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9	5361359		1992-08-31	Tajalli, et al.	
10	5398196		1995-03-14	Chambers	
11	5412717		1995-05-02	Fischer	
12	5414833		1995-05-09	Hershey, et al.	
13	5440723		1995-08-08	Arnold, et al.	
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	20	5606668		1997-02-25	Shwed	
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	31	5740248		1998-04-14	Fieres, et al.	
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	42	5832274		1998-11-03	Cutler, et al.	
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	44	5854916		1998-12-29	Nachenberg	
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	46	5864683		1999-01-26	Boebert, et al.	
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	65	6088803		2000-07-11	Tso, et al.	
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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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3	20030074190		2003-04-17	Allison	
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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2	1132796	EP		2001-09-12	University of Louvain		<input type="checkbox"/>
3	0636977	EP		1994-07-27	Chambers		<input type="checkbox"/>
4	04/063948	WO		2004-07-29	Vihana, Inc.		<input type="checkbox"/>
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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Doyle, et al., "Microsoft Press Computer Dictionary," Microsoft Press, 2nd Edition, pp. 137-138,1993	<input type="checkbox"/>

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4	Supplementary European Search Report for Application No. EP 97 950351, dated November 17, 2004, 2 pp.	<input type="checkbox"/>
5	File History for Canadian Application No. 2,275,771, 84 pp. no date provided	<input type="checkbox"/>
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7	File History for Japanese Application No. 10-522345, 48 pp. no date provided	<input type="checkbox"/>
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11	Defendant Secure Computing Corporation's Opening Claim Construction Brief, 46 pp., September 7, 2007	<input type="checkbox"/>
12	Plaintiff Finjan Software, Ltd. 's Answering Claim Construction Brief (Public Version), 45 pp., September 28, 2007	<input type="checkbox"/>

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13	Defendant Secure Computing Corporation's Responsive Claim Construction Brief (Public Version), 37 pp., September 28,2007	<input type="checkbox"/>
14	Secure Computing Corporation's Disclosure of Prior Art Pursuant to 35 U.S.c. § 282, 6 pp., February 1,2008	<input type="checkbox"/>
15	Stang, David J., "Computer Viruses and Artificial Intelligence," Virus Bulletin Conference, pp. 235-257, September, 1995	<input type="checkbox"/>
16	Johannsen, Magnus, "Java Security and a Firewall Extension for Authenticity Control of Java Applets," Thesis Proposal, Computer Science Department, University of Colorado at Colorado Springs, 5 pp., January 29, 1997	<input type="checkbox"/>
17	Joint Appendix of Intrinsic and Extrinsic Evidence Regarding Claim Construction Briefing, Volume 1, October 4, 2007	<input type="checkbox"/>
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19	Final Joint Claim Construction Chart, August 24,2007	<input type="checkbox"/>
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21	Plaintiffs Trial Brief (Public Version), January 14,2008	<input type="checkbox"/>
22	Marcionek, David, "A Complete ActiveX Web Control Tutorial," Available at http://www.codeproject.com/KB/COM/CompleteActiveX.aspx (2006)	<input type="checkbox"/>
23	Docket for Finjan Software Ltd. v. Secure Computing Corporation, et al., U.S. District Court, District of Delaware (Wilmington), Civil Docket No.1 :06-cv-00369-GMS, 52 pp., retrieved on October 24, 2008 from https://lecf.ded.uscourts.gov/cgibinIDktRpt.pl?6532182820 13655-L 567 0-1	<input type="checkbox"/>

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

24	Docket for Finjan Software Ltd. v. Aladdin Knowledge Systems, Inc., et al., U.S. District Court, District of Delaware (Wilmington), Civil Docket No.1 :08-cv-00300-GMS, 5 pp., retrieved on October 24, 2008 from https://lecf.ded.uscourts.gov/cgi-bin-DktRpt.pl?994267838982431-L 567 0-1	<input type="checkbox"/>
25	Firewall Toolkit (FWTK) 2.0 Beta Release, 1996	<input type="checkbox"/>
26	International Search Report for Application No. PCT/ILOSI0091S, 2 pp., dated March 3, 2006	<input type="checkbox"/>
27	Written Opinion for Application No. PCT/ILOSI0091S, 5 pp., dated March 3, 2006 (mailing date)	<input type="checkbox"/>
28	International Search Report for Application No. PCT/IBO/01138, 3 pp., September 20, 2002 (mailing date)	<input type="checkbox"/>
29	International Preliminary Examination Report for Application No. PCT/IBO/01138, 2 pp., dated December 19, 2002	<input type="checkbox"/>
30	Gerzic, Amer, "Write Your Own Regular Expression Parser," November 17, 2003, 18 pp., Retrieved from the Internet: http://www.codeguru.com/Cpp/Cpp/cpp_mfc/parsing/article.php/c4093/	<input type="checkbox"/>
31	Power, James, "Lexical Analysis," 4 pp., May 14, 2006, Retrieved from the Internet: http://www.cs.may.ie/~jpower/Courses/compilers/notes/lexical.pdf	<input type="checkbox"/>
32	Sitaker, Kragen, "Rapid Genetic Evolution of Regular Expressions" [online], The Mial Archive, April 24, 2004 (retrieved on December 7, 2004), 5 pp., Retrieved from the Internet: http://www.mail-archive.com/kragen-tol@canonical.org/msg00097.html	<input type="checkbox"/>
33	"Lexical Analysis: DF A Minimization & Wrap Up" [online], Fall, 2004 [retrieved on March 2, 2005], 8 pp., Retrieved from the Internet: http://www.owl.net.rice.edu/~comp412/Lectures/L06LexWrapup4.pdf	<input type="checkbox"/>
34	"Minimization of DFA" [online], [retrieved on December 7, 2004], 7 pp., Retrieved from the Internet: http://www.cs.odu.edu/~toida/nerzic/390teched/regular/fa/min-fa.html	<input type="checkbox"/>

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

35	"Algorithm: NFS -> DFA" [online], Copyright 1999-2001 [retrieved on December 7, 2004],4 pp., Retrieved from the Internet: http://rw4.cs.uni-sb.de/~ganimal/GANIFA/page16_e.htm	<input type="checkbox"/>
36	"CS 3813: Introduction to Formal Languages and Automata - State Minimization and Other Algorithms for Finite Automata," 3 pp., May 11,2003, Retrieved from the Internet: http://www.cs.msstate.edu/~hansenclasses/3813fall01/slides/06Minimize.pdf	<input type="checkbox"/>
37	Watson, Bruce W., "Constructing Minimal Acyclic Deterministic Finite Automata," [retrieved on March 20,2005],38 pp., Retrieved from the Internet: http://www.win.tue.nl/~watson/2R870/downloads/madfa_algs.pdf	<input type="checkbox"/>
38	Chang, Chia-Hsiang, "From Regular Expressions to DFA's Using Compressed NF A's," October, 1992, 112 pp., http://www.cs.nyu.edu/web/Research/Theses/chang_chi-hsiang.pdf	<input type="checkbox"/>
39	Khare, R., "Microsoft Authenticode Analyzed" [online], July 22, 1996 [retrieved on June 25,2003],2 pp., Retrieved from the Internet: http://www.xent.com/IFoRKarchive/smmer96/0338.html	<input type="checkbox"/>
40	Moritz, R., "Why We Shouldn't Fear Java," Java Report, pp. 51-56, February, 1997	<input type="checkbox"/>
41	Microsoft, "Microsoft ActiveX Software Development Kit" [online], August 12, 1996 [retrieved on June 25,2003], pp. 1-6, Retrieved from the Internet: activex.adsp.or.jp/inetsdklhelp/overview.htm	<input type="checkbox"/>
42	D. Grune, et al., "Parsing Techniques: A Practical Guide," John Wiley & Sons, Inc., New York, New York, USA, pp. 1-326,2000	<input type="checkbox"/>
43	Power, James, "Notes on Formal Language Theory and Parsing," National University of Ireland, pp. 1-40, 1999	<input type="checkbox"/>
44	Scott, et al., "Abstracting Application-Level Web Security," ACM, pp. 396-407,2002	<input type="checkbox"/>
45	Non-Final Office Action, dated July 23,2012, for Application Serial No. 13/290,708, 10 pp.	<input type="checkbox"/>

Receipt date: 05/07/2013 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

46	Amendment and Response to Office Action (Dated July 23,2012) Under 37 C.F.R. 1.111 filed October 23,2012 for Application Serial No. 13/290,708,9 pp.	<input type="checkbox"/>
47	Final Office Action, dated January 7,2013, for Application Serial No. 13/290,708, 7 pp.	<input type="checkbox"/>
48	Judgment, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., C.A. No. 10-cv-593 (GMS)	<input type="checkbox"/>
49	Finjan's Opposition to Sophos' Renewed Motion For Judgment as a Matter of Law, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., C.A. No. 10-cv-593 (GMS)	<input type="checkbox"/>
50	Finjan's Opposition to Symantec's Motion For Judgment as a Matter of Law at the Close of Evidence, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS)	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/Christopher Revak/	Date Considered	08/21/2013
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

Receipt date: 05/07/2013 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708	13290708 - GAU: 2431
	Filing Date	2011-11-07	
	First Named Inventor	EDERY, Yigal	
	Art Unit	2431	
	Examiner Name	REVAK, Christopher A	
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442


This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Search Notes 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

CPC- SEARCHED		
Symbol	Date	Examiner


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
none	none	7/13/12	CR

SEARCH NOTES		
Search Notes	Date	Examiner
PALM Inventor Name Search	7/14/12	CR
BRS Text Search: USPAT, US PGPUB, USOCR, DERWENT, FPRS, IBM TDB, EPO, JPO (see attached search strategy)	7/14/12; 8/24/13	CR
BRS Subclass Text Search: USPAT, US PGPUB (see attached search strategy)	7/14/12	CR
DIALOG Text Search: COMPSCI, ELECTRON, SOFTWARE (see attached search strategy)	8/24/13	CR
Interference Search (see attached search strategy)	8/24/13	CR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
726	22-25	8/24/13	CR
713	168,175,176,179-181	8/24/13	CR


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Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	

CPC			
Symbol		Type	Version


CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
		18	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/CHRISTOPHER REVAK/ Primary Examiner. Art Unit 2431	08/24/2013	1	10B
(Primary Examiner)	(Date)		

Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

US ORIGINAL CLASSIFICATION				INTERNATIONAL CLASSIFICATION													
CLASS		SUBCLASS		CLAIMED				NON-CLAIMED									
726		24		H	0	4	L	29 / 06 (2006.01.01)				H	0	4	L	29 / 06 (2006.01.01)	
CROSS REFERENCE(S)				G	0	6	F	11 / 30 (2006.01.01)				G	0	6	F	11 / 30 (2006.01.01)	
				G	0	6	F	15 / 16 (2006.01.01)				G	0	6	F	15 / 16 (2006.01.01)	
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																
713	175																

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	18	
/CHRISTOPHER REVAK/ Primary Examiner. Art Unit 2431	08/24/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	10B

Issue Classification 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant																<input type="checkbox"/> CPA		<input checked="" type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original						
	1		17																		
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NONE		Total Claims Allowed:	
		18	
(Assistant Examiner)	(Date)	O.G. Print Claim(s)	O.G. Print Figure
/CHRISTOPHER REVAK/ Primary Examiner. Art Unit 2431	08/24/2013	1	10B
(Primary Examiner)	(Date)		

EAST Search History**EAST Search History (Prior Art)**

<This search history is empty>

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	22121	(726/22-25 or 713/168,175,176,179-181).ccls.	US-PGPUB; USPAT; UPAD	OR	ON	2013/08/24 13:18
L2	6	(downloadable with profile).clm. and 1	US-PGPUB; USPAT; UPAD	OR	ON	2013/08/24 13:18

8/ 24/ 2013 1:19:08 PM



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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
13/290,708		2431	



Correspondence Address/Fee Address Change

The following fields have been set to Customer Number 115222 on 05/20/2013

- Correspondence Address
- Maintenance Fee Address

The address of record for Customer Number 115222 is:

115222
Bey & Cotropia PLLC
213 Bayly Court
Richmond, VA 23229

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)	
)	Examiner: Christopher A. Revak
Yigal Mordechai Eder)	
Nimrod Itzhak Vered)	Art Unit: 2431
David R. Kroll)	
Shlomo Touboul)	
)	
Application No: 13/290,708)	
)	
Filed: November 7, 2011)	
)	
For: METHOD AND SYSTEM FOR)	
PROTECTING A COMPUTER)	
AND A NETWORK FROM)	
HOSTILE DOWNLOADABLES)	
)	

Mail Stop AMENDMENT
 Commissioner for Patents
 P. O. Box 1450
 Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO OFFICE ACTION
UNDER 37 C.F.R. §1.114

In response to the final office action dated January 7, 2013 (the "Office Action") and pursuant to 37 C.F.R. §1.114, applicant respectfully requests that the above-identified application be amended as follows. A Request for Continued Examination (RCE) is being filed herewith, and the requisite fee for the RCE and for a one-month extension of time is being paid herewith.

IN THE CLAIMS:

Please substitute the following claims for the pending claims with the same number:

- 1.** (original) A computer-based method, comprising the steps of:
 receiving an incoming Downloadable;
 deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 storing the Downloadable security profile data in a database.
- 2.** (original) The computer-based method of claim **1** further comprising storing a date & time when the Downloadable security profile data was derived, in the database.
- 3.** (original) The computer-based method of claim **1** wherein the Downloadable includes an applet.
- 4.** (original) The computer-based method of claim **1** wherein the Downloadable includes an active control.
- 5.** (original) The computer-based method of claim **1** wherein the Downloadable includes program script.
- 6.** (original) The computer-based method of claim **1** wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

- 7.** (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.
- 8.** (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a digital certificate.
- 9.** (original) The computer-based method of claim **1** wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable.
- 10.** (original) A system for managing Downloadables, comprising:
a receiver for receiving an incoming Downloadable;
a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.
- 11.** (currently amended) The system of claim **[[86]] 10** wherein said database manager also stores a date & time when the Downloadable security profile data was derived by said Downloadable scanner, in the database.
- 12.** (currently amended) The system of claim **[[86]] 10** wherein the Downloadable includes an applet.
- 13.** (currently amended) The system of claim **[[86]] 10** wherein the Downloadable includes an active control.

14. (currently amended)The system of claim **[[86]] 10** wherein the Downloadable includes program script.

15. (currently amended)The system of claim **[[86]] 10** wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

16. (currently amended)The system of claim **[[86]] 10** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.

17. (currently amended)The system of claim **[[86]] 10** wherein the Downloadable security profile data includes a digital certificate.

18. (currently amended)The system of claim **[[86]] 10** wherein said Downloadable scanner comprises a disassembler for disassembling the incoming Downloadable.

REMARKS

Applicant has amended claims **11 – 18**. Claims **1 – 18** are presented for examination.

In paragraphs 4 and 5, the Office Action has rejected claims **1 – 18** under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent No. 5,983,348 ("Ji").

Applicants are submitting herewith a declaration pursuant to 37 C.F.R. §131 establishing invention of the subject matter prior to the effective date of Ji; namely, September 10, 1997. Hence, Ji is not prior art, and the rejection fails to establish a prima facie case for anticipation.

In applicants' response filed on October 23, 2012, applicants established support for claims **1, 3, 4, 6, 9, 10, 12, 13, 15** and **18** in the disclosure of US Provisional Patent Application No. 60/030,639 ("Touboul").

Applicants wish to address the remaining claims **2, 5, 7, 8, 11, 14, 16** and **17** in this supplemental response. Before addressing the individual claims specifically, applicants wish to point out that fundamentally, Ji does not store security profile data in a database altogether. Instead, Ji instruments suspicious functions by altering them to include a pre-filter and post-filter function, as described in the pseudo-code provided at Ji, col. 5, line 46 – col. 6, line 37.

In rejecting claims **2** and **11**, the Office Action cites Ji, col. 3, lines 32 – 44, as disclosing storing a date & time when the Downloadable security profile data was derived, in the database. Applicants respectfully submit that Ji fails to show or suggest this feature. Instead, the cited location describes monitoring instructions of an applet code that is executing, and applying security checks.

Claims **5** and **14** are supported in Touboul at least by page 2, lines 4 – 7: *"Examples of Downloadables include applets designed for use in the Java™ distributing environment produced by Sun Microsystems or for use in the Active X distributing environment produced by Microsoft Corporation"*

In rejecting claims **7** and **16**, the Office Action cites Ji, col. 4, lines 55 – 65, as disclosing wherein the Downloadable security profile data includes a URL from where the Downloadable originated. Applicants respectfully submit that Ji fails to show or suggest this feature. Instead, the cited location simply mentions that the Internet is shown generally at element 10 of FIG. 1.

In rejecting claims **8** and **17**, the Office Action cites Ji, col. 8, lines 6 – 15, as disclosing wherein the Downloadable security profile data includes a digital certificate. Applicants respectfully submit that Ji fails to show or suggest this feature. Instead, the cited location describes an applet that includes a digital certificate. See also Ji, col. 5, lines 4 – 8; col. 7, lines 1 – 4; and claims 14 and 29.

For the foregoing reasons, applicants respectfully submit that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

Respectfully submitted,

Date: May 6, 13
Bey & Cotropia PLLC
Richmond, VA 23229
(804) 441-8530

By: Dawn-Marie Bey – 44,442
Dawn-Marie Bey
Reg. No.: 44,442

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)
)
) Yigal Mordechai Edery)
) Nimrod Itzhak Vered)
) David R. Kroll)
) Shlomo Touboul)
)
) Application No: 13/290,708)
)
) Filed: November 7, 2011)
)
) For: METHOD AND SYSTEM FOR)
) PROTECTING A COMPUTER)
) AND A NETWORK FROM)
) HOSTILE DOWNLOADABLES)
)

Examiner: Christopher A. Revak
Art Unit: 2431

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

**DECLARATION OF PRIOR INVENTION IN THE UNITED STATES TO
OVERCOME CITED PATENT OR PUBLICATION (37 C.F.R. 6131)**

Sir:

My name is Shlomo Touboul. I was employed by Finjan Software, Ltd. of Netanya, Israel.

I am an inventor of the above identified patent application which is assigned to Finjan, Inc. I have reviewed the application including the claims of the application.

The declaration made herein is to establish that I had the ideas described in the patent application, and first developed a working system that is described in the patent application and in claims 1, 3, 4-6, 9, 10, 12-15 and 18 pending as of the signing of this declaration

(hereafter sole invention) prior to September 10, 1997, which is the filing date of U.S. Patent No. 5,983,348 to Ji ("the '348 patent"). I hereby declare that my sole invention was in my mind and developed by at least November 18, 1996. The remaining pending dependent claims were co-invented by or with one or more of the other listed inventors.

Below stated are activities of myself and Finjan Software, Ltd. regarding the date on which I developed my sole invention.

My sole invention was embodied in a Finjan Software, Ltd. computer software product entitled SURFINGATE™, which was released to the public before September 10, 1997 (but less than one year before the filing date of the parent application, US Serial No. 08/964,388). SURFINGATE™ contained a fully functional implementation of the technology described and claimed in the above identified patent application.

Exhibit A attached herewith includes a press release and product marketing materials explicitly establishing that SURFINGATE™ performed my sole invention. All of the functionality shown in the documents of Exhibit A was available in SURFINGATE™'s product which was released before September 10, 1997. Hence, my sole claimed invention was developed and released to the public before September 10, 1997 by its incorporation into this product.

Additionally, the '348 patent explicitly references the SURFINGATE™ product and various claimed functionality thereof in Column 2 as follows:

SufinGate is a server solution that is installed on an HTTP proxy server.... . If it detects that one or more insecure functions might be called during the execution of the applet, it blocks the applet. ... , SurfinGate maintains an applet profile database. Each applet is given an ID which is its URL. Once an


applet is scanned, an entry is added to the database with its applet ID and the insecure functions it might try to access. When this applet is downloaded again, the security profile is taken from the database to determine the behavior of the applet. No analysis is redone.

Accordingly, since the '348 Patent references the Surfingate product - which embodies my sole invention - this is further evidence that the Surfingate product existed at the time the '348 Patent was filed and that the sole invention was clearly developed and released to the public prior to September 10, 1997, which is the filing date of the '348 Patent (Ji).

As the below-signed inventor, I, Shlomo Touboul, hereby declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made knowing that willful false statements and the like are punishable by fine or imprisonment, or both under 1001 of Title 18 of United States Code, and such willful or false statements may jeopardize the validity of the application or any patent issuing therefrom.

Very truly yours,

Dated: APR-17-2013



Signature

Full Legal Name: Shlomo Touboul

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

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Application Number	13290708
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Art Unit	2431
Examiner Name	REVAK, Christopher A
Attorney Docket Number	FIN0001-CON1-CIP1-CON4

1	ThunderByte Antivirus for Windows	<input type="checkbox"/>
2	InterScan VirusWall from Trend Micro	<input type="checkbox"/>
3	VirusSafe from Eliashim	<input type="checkbox"/>
4	Intel LANProtect from Intel	<input type="checkbox"/>
5	The Java Security Manager from Sun Microsystems	<input type="checkbox"/>
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7	McAfee WebScan	<input type="checkbox"/>
8	McAfee VirusScan	<input type="checkbox"/>
9	McAfee NetShield	<input type="checkbox"/>
10	Dr. Solomon's Antivirus Toolkit for Windows 95	<input type="checkbox"/>
11	Dr. Solomon's Antivirus Toolkit for Windows NT	<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13290708
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Examiner Name	REVAK, Christopher A
Attorney Docket Number	FIN0001-CON1-CIP1-CON4

12	Dr. Solomon's WinGuard	<input type="checkbox"/>
13	Dr. Solomon's Virus Guard	<input type="checkbox"/>
14	Dr. Solomon's Virus Shield	<input type="checkbox"/>
15	Dr. Solomon's Virex	<input type="checkbox"/>
16	Dr. Solomon's "Merlin" Anti-Virus Engine	<input type="checkbox"/>
17	Dr. Solomon's iMcAfee "Olympus" Anti-Virus Engine	<input type="checkbox"/>
18	ActiveX Web Tutorial	<input type="checkbox"/>
19	Java FAQ (1995-1998)	<input type="checkbox"/>
20	Norton AntiVirus TUfor Windows@95 User's Guide. Published by Symantec in 1995. (179 pages)	<input type="checkbox"/>
21	JAEGER, at al., "Building Systems that Flexibly Control Downloadable Executable Content," Proceedings of the Sixth USENIX UNIX Security Symposium, July 1996. (19 pages)	<input type="checkbox"/>
22	RASMUSSEN, Andreas and JANSSON, Sverker, "Personal Security Assistance for Secure Internet Commerce," Sept. 16, 1996. (12 pages)	<input type="checkbox"/>

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	Art Unit	2431
	Examiner Name	REVAK, Christopher A
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4

23	BHARAT et al. "Migratory Applications" November 15, 1995. (10 pages)	<input type="checkbox"/>
24	DEAN, Drew, et al., "Java Security: From HotJava to Netscape and Beyond," 1996 IEEE Symposium on Security and Privacy, May 6, 1996. (11 pages)	<input type="checkbox"/>
25	STERBENZ, Andreas, "An Evaluation of the Java Security Model," IEEE, December 1996. (13 pages)	<input type="checkbox"/>
26	FRITZINGER, J. Steven, et al., "Java Security," Sun Microsystems, December 1996 (7 pages)	<input type="checkbox"/>
27	BANK Joseph A. "Java Security," December 8 1995. (14 pages)	<input type="checkbox"/>
28	CLAUNCH, "Java Blocking," http://groups.google.com/group/muc.lists.firewalls/msg/2a5ec02e00a37071. September 25 1996. Accessed date: May 10 2011. (2 pages).	<input type="checkbox"/>
29	CHAPPELL, "Understanding ActiveX and OLE: A Guide for Developers and Managers (Strategic Technology)," September 1, 1996, Microsoft Press. (91 pages)	<input type="checkbox"/>
30	CROSBIE, et al., "Active Defense of a Computer System Using Autonomous Agents". February 15, 1995. (14 pages)	<input type="checkbox"/>

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

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The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

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Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

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(54) **Authentication of hypertext kind of resources through signature handling protocol**

(57) Method of receiving a resource out of an application stored by a service provider on a site at a client terminal, both being interconnected. The method is advantageously implemented into the browser of the client. It comprises the steps of:

- requesting the resource within the application on the site from the client terminal;
- receiving a signed archive file containing the requested resource by the client terminal;
- authenticating the received signed archive file;
- retrieving the requested resource out of the received archive file if that was undoubtedly authenticated.

Description

[0001] This invention relates to a method of receiving a resource as set forth in the preamble of claim 1, to a computer readable medium having a program recorded thereon and to a trustable disposal of a resource as set forth in the preamble of claim 10.

[0002] In the last ten years, networks of computerized terminals are more and more interconnected over the world. The set of those networks are called internet. They allow a transfer of data from one terminal to another almost everywhere as long as the terminals are connected to the same internet. The popularity of such "communication" was boosted by the introduction in the middle of the ninetieth of the so called World Wide Web (the "Web"). It is a decentralized, electronic database service offering an ensemble (universe) of dynamically connected information on the internet which win through and is called the Internet. Such information can be in any of various media and is relatively easily found by and made accessible to individuals exploring ("surfing") that universe ("Webspace"). More specifically, the Web is a distributed, hypertext system comprising hypermedia documents, Web servers and Web clients.

[0003] Web clients include software programs commonly known as browsers. Browsers typically reside on an individual's electronic terminal (e.g. personal computer, laptop and in the near future even phone terminal) and, among other things, provide for exploring the Web so as to find and access Web documents.

[0004] Web servers are server processes running at a Web site i.e. a terminal connected to the Internet. The Web servers support various features, including being compatible with one or more standard protocols, e.g., the HyperText Transfer Protocol ("HTTP"), the well-known, native protocol of the Web generally unifying its information. With that programs hypermedia documents are put on the Web and resources associated with applications stored by the server on the site are let available to clients. The Web servers do not only make documents and resources accessible to clients, but also direct specific documents to clients and complete transactions responsive to each client's request which were activated through their browsers.

[0005] Web documents ("pages") are constructed in conformity with one of various accepted formats or languages, e.g., HyperText Markup Language ("HTML"). The formats support, among other things, the Web's hypermedia and hypertext characteristic. As to the hypermedia characteristic, Web documents can, and generally do, combine content from one or more of the various media including text, graphics, audio and video. As to the hypertext characteristic, Web documents can, and generally do, contain electronic links to related Web documents. Selecting the link causes the browser to (i) connect to a server associated with that link, (ii) request the linked document and (iii) if the client satisfies the server's security requirements, receive and

display the document.

[0006] The security of information and transaction transferred under that way has been identified as a significant problem. At the center of the problem are so-called crackers: individuals who seek to access computers, such as sites (servers), so as to conduct pranks, vandalism, espionage or other illegitimate activities. A way to respond to these activities, among other things is to strive to maintain the confidentiality and integrity of information, both as resident on servers and as communicated in Web transaction. Increasing the vulnerability to crackers is that the Web is an open system available to anyone in possession of readily available, affordable technology.

[0007] One important Web security issue is authentication. An example of an authentication on the Web is given by the SSL (Secure Sockets Layer) Handshake Protocol which was developed by Netscape Communications Corporation. The protocol supports server and client authentication. The SSL protocol is application independent, allowing protocols like HTTP, FTP (File Transfer Protocol), and Telnet to be layered on top of it transparently. The SSL protocol is able to negotiate encryption keys as well as authenticate the server before data is exchanged by the higher-level application. But the SSL protocol maintains the security and integrity only of the transmission channel. It uses encryption, authentication and message authentication codes only to authenticate the sites of the Web server as well as the Web client. The trust is then granted on a site by site basis.

[0008] That protocol does not authenticate the whole data itself which will be exchanged through the Internet and thus does not work against software virus like "Trojan horses". The later denominates some code put somewhere but mainly at the end of a data by an illegitimate one. Once the data is downloaded, the Trojan horse can be activated by the client unintentionally. Some special and very feared cases of Trojan horses are the so called "mockingbirds". They permit to intercept communication (especially login transactions) between the client and the server. When activated, the code will provide system-like responses to the client while saving their responses (especially account IDs, passwords and PINs).

[0009] An object of the invention is to ensure that any transaction between a trusted site and a client both interconnected is free of any kind of software virus, and to provide methods to implement such measures without losing the comfort of a service like the Web.

[0010] These objects are attained by a method of receiving a resource as claimed in claim 1, a computer readable medium as claimed in claim 9 and a trustable disposal of resources as claimed in claim 10.

[0011] It is extremely hard to ensure that platforms like Web servers are visited only by trusted clients. A site manager, the one responsible for the maintenance of a site, can never be completely sure that none imper-

sonator will achieve to penetrate a protected Web server. It is also difficult to protect a single application (Web page) with all the resources embedded in it. This explains the interest to protect the whole content of the resources which may be downloaded during a critical transaction e.g. like a banking transaction or an electronic commerce application.

[0012] The basic idea of the invention consists of assembling resources which shall be downloaded together with their respective application into a single file, "an archive file". To sign these files in their entire content ensures then that nowhere in the data's of one resource is hidden some virus. These signed files are stored on a site and let to the disposal of some potential clients able to authenticate the signature.

[0013] When a client surfing on the Web will come across one of such a resource, he may be interested to open it. This will necessarily means that before being activated on its terminal, it must be downloaded. Using its browser on its terminal on which advantageously a protocol according to the invention is running, he will request the chosen resource. This will start the protocol which will look after the corresponding archive file of that resource onto the site where the resource was found. After a download of the entire signed archive file onto the client terminal, the protocol will have to authenticate the signature of that file. Only in the positive case that it was entirely authenticated, the protocol will retrieve the requested resource out of the archive file, to active it on client terminal.

[0014] With that protocol, the client can trust not only the site itself, like it would be the case if its browser would use only a SSL protocol, but will be sure that the activation of that resource on its own terminal will not activate a virus hidden somewhere into the data's of that resource. The solution obtained with that invention permits to combine the flexibility of a service like the Web with a communication between client terminal and sites free of any transfer of virus specially of the feared mockingbirds.

[0015] Further advantageous features of the invention are defined in the dependent claims and will become apparent from the following description and the drawing.

[0016] One embodiment of the invention will now be explained in more detail with reference to the accompanying drawing, in which:

Fig.1 is a flow chart showing steps associated with the method of receiving a resource of a resource according to the invention.

[0017] The present invention concerns a trustable activation of some resources downloaded out of some site and methods therefore. A service provider who wants to let on a site resources all trustfully free of any virus to the disposal of some clients, will have to apply the following procedure. The codes of these resources

must be assembled in an archive file...Some times, it is of advantage to include also the codes of the corresponding application into the archive file. To build that archive file, already existing archive formats like tar, zip or jar can be used. The later is applied specifically for an ensemble of files written in an objected oriented syntax like "java", the one used for most of the resources of applications on the Web.

[0018] In some header of the archive file may be stored the information of their content. Afterwards, the archive file must be protected from the illegitimate implementation of subsidiary codes like the one of a mockingbird. This is achieved by signing the entire content of the archive file.

[0019] There exists several possibilities to perform a signature of a file. One way which would be quite advantageous in the context of this invention is the use of an encryption scheme. A particular popular one due to the ease of its utilization, is the so called public-key encryption.

[0020] This encryption scheme is based on a pair of "keys". One of them is called a public key and the other one a private key. The public key is published, while the private key is kept secret. The need for the signer (e.g. some service provider like e.g. the some credit card company) and the receiver (e.g. the browser of some client) to share secret information is eliminated; all communications involve only public keys, and no private key is ever transmitted or shared. In this system, it is no longer necessary to trust the security of some means of communications. The only requirement is that public keys be associated with their users in a trusted (authenticated) manner (for instance, in a trusted directory).

[0021] For the purpose of the invention, the archive files are encrypted using the private key of the service provider. If for example, a company wants to let to the disposal of its clients some information trustfully free of viruses on the Internet, they must be signed using the private key of that company. For that, the archive file containing the code containing this information (e.g. a resource of some application) will be encrypted. The signer don't need to care who will read this information or even visit the site where it is let to the disposal since its signature can't be imitated. This will ensure the one (e.g. some client) who will decrypt that signed archive file using a public key, of the absence of any fake code. No third-party could have modified the signed archive file without destroying the whole file.

[0022] To optimize the downloading i.e. avoiding any delay or unnecessary checking procedure, it is of great advantage for the client to install a protocol according to the method of the invention onto its browser e.g. in an URL syntax (Universal Resource Locator) as below:

(URL: signed.protocol: //host/path?resource).

Where protocol is the underlying protocol used to

retrieve the archive file. It may be for example http, https, ftp or file. Host is the name of the server where the jar file is located (it may be empty for local file). Path is the location of the jar file on the host for the given protocol. Resource is the actual name of the resource inside the jar file.

Example:

signed.http://www.alcatel.com/applets/smart-card.jar?index.html

[0023] On Fig. 1, is shown a flow chart that depicts an example of the downloading method according to the present invention. As already said above, it can be implemented on the browser of client's terminal. The method starts 10 by an action of the client onto its terminal like choosing an Internet address out of an address book e.g. stored by its browser.

[0024] In step 11, the client requests access of a Web server site by sending the Web location (Internet address) he choose when starting. Such location may be in the form of a URL. In this step, a secure communication channel may be established between the client terminal and the site. For example, if SSL is employed, the secure communication channel is established during the SSL handshake, including by, among other things, (i) negotiating an encryption algorithm between the site and the terminal and (ii) authenticating the site to the client terminal. But the building of a secure communication channel is no more of priority since the resources are anyway protected according to the invention.

[0025] In step 12, the client requests a specific resource within an application to be activated on its terminal. This will bring the browser of the client to look after the corresponding archive file 13. After finding it, the transfer 14 of that file will occur through the communication channel.

[0026] When the archive file is downloaded onto the client terminal, the authentication procedure 15 of its signature will start. The browser will apply some decryption scheme in accordance to the one used to encrypt it.

[0027] Dependent on the result of that procedure 15, will depend if the resource is taken out of the archive file or not. In the negative case, that the signature was not entirely recognized, it will mean that either the client is not allowed to download the requested resource or some codes in the archive file were illegitimately modified or added, then the archive file will be deleted 16 from the client terminal. Optionally, the protocol will contain the step 17 to send a message to the client to warn him about the result of the authentication and/or to send to the site a message 18 informing the signer of that resource and/or site manager that someone tried unsuccessfully to download some resources.

[0028] Alternatively, if the downloaded archive file was decrypted successfully, then the browser will look 19 for the requested resource into the downloaded

archive file. It will then activate the resource onto the client terminal 20. The protocol will then end its procedure 21.

[0029] The steps described above can be configured to support various options, without departing from the principles of the invention to assemble all resources of sensible applications into a single archive file protected by a signature and ready to be downloaded.

[0030] The fact to implement the protocol onto the client browser, enable to perform the procedure in an almost transparent way. The client will not necessarily notice the take place of the authentication of the requested resource. He will even not know that the resource is somewhere archived on some signed file. It is the browser which will apply the protocol after the invention by first authenticate the signed archive file. If it succeeded, it will then retrieve the requested resource out of the archive file and activate it. All the steps may take a fraction of time mainly dependent on the transfer rate on the communication channel between the site of the Web server and the client terminal.

[0031] It is therefore particularly adapted for Web pages (applications on some site) which often contain a certain number of applets (resources made of java codes). They are some times part of the application user interface and are usually downloaded and dynamically generated. Applying the procedure according to the invention ensure that the whole application user interface does not contain any fake codes put there by some impostor. It is an ideal procedure for any application but some highly secure applications such as electronic commerce applications (electronic banking service or smart card facilities). The method according to the invention can be used also if the corresponding signed archive file is downloaded out of some untrustworthy site, since the entire content of the resource is itself protected. The author of the resource has the assurance that every reader of its resource will really read the information he put there himself.

Claims

1. Method of receiving a resource out of an application stored by a service provider on a site at a client terminal, both being interconnected, the method comprising the step of
 - requesting the resource within the application on the site from the client terminal; and
 - characterized by the additional steps:
 - receiving a signed archive file containing the requested resource by the client terminal;
 - authenticating the received signed archive file;
 - retrieving the requested resource out of the received archive file if that was undoubtedly authenticated.

2. Method of receiving a resource as claimed in claim 1, characterized in that the entire requested resource is signed.
3. Method of receiving a resource as claimed in claim 1, characterized in that the signature of the archive file is authenticated using a decryption scheme. 5
4. Method of receiving a resource as claimed in claim 1, characterized in that the service provider is part of a decentralized, electronic database service offering an ensemble of dynamically connected information like the Web. 10
5. Method of receiving a resource as claimed in claim 1, characterized in that it works transparently for the client. 15
6. Method of receiving a resource as claimed in claim 1, characterized in that the requested resources are object oriented resources like java applets. 20
7. A computer readable medium having a program recorded thereon, said computer readable medium comprising computer program code means adapted to perform all the steps of claim 1 when said program is run on the client terminal. 25
8. A computer readable medium as claimed in claim 7, characterized in that the program code is built with an Universal Resource Locator syntax. 30
9. A computer readable medium as claimed in claim 7, characterized in that the program code is implemented into a browser on the client terminal. 35
10. Trustable disposal of a resource from an application on a site to some client having a terminal interconnected with the site characterized in that the resource is stored in a signed archive file on the site. 40
11. Trustable disposal of a resource as claimed in claim 10, characterized in that the archive file is signed using an encryption scheme. 45

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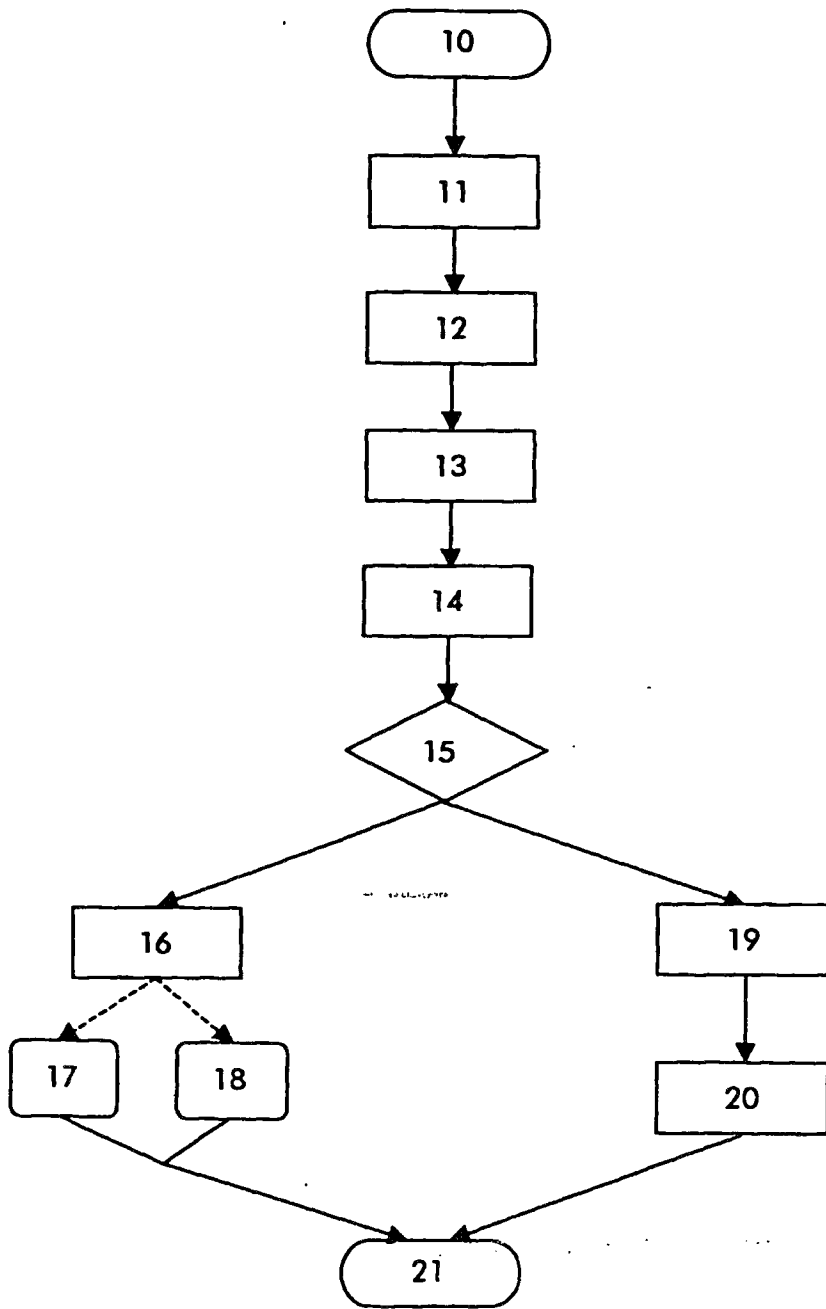


Fig.1



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 44 0269

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 892 904 A (ATKINSON ROBERT G ET AL) 6 April 1999 (1999-04-06) * abstract * * figures 2A,3,4,5,6 * * column 1, line 35 - column 3, line 36 * * column 5, line 14 - column 6, line 43 * * column 7, line 11 - column 7, line 30 * * column 11, line 9 - column 11, line 36 * * column 26, line 38-54 *	1-11	G06F1/00 H04L29/06
X	WO 98 44402 A (BRAMHILL IAN DUNCAN ;SIMS MATTHEW ROBERT CHARLES (GB); BRITISH TEL) 8 October 1998 (1998-10-08) * abstract * * figures 3,5 * * page 2, line 12 - page 4, line 29 * * page 6, line 16-22 * * page 9, line 15 - page 14, line 9 *	1,3-5	
A	EP 0 913 769 A (SUN MICROSYSTEMS, INC.) 6 May 1999 (1999-05-06) * abstract * * figures 1,2 * * page 2, line 21-29 * * page 4, line 20-27 * * page 4, column 42-43 * * page 7, line 42 - page 8, line 1 * * page 8, column 47-48 *	1,4-6	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G06F H04L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 January 2000	Examiner Sigolo, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 44 0269

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-01-2000

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82



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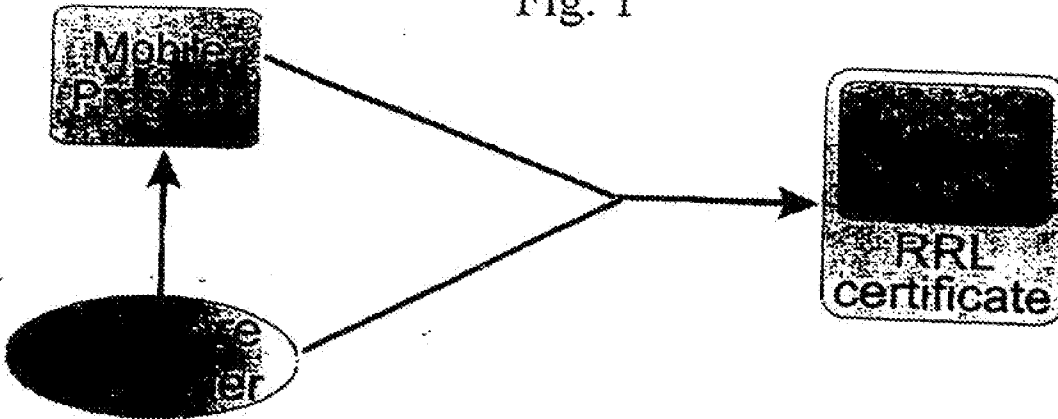
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(54) **Mobile code and method for resource management for mobile code**

(57) A mobile code linked to a certificate including at least a resource requirements list (RRL) including those resources needed by the mobile code to be properly executable plus those resources that are known a priori to be accessed when executing the mobile code. The unique certificate contains additionally an issuer of the certificate information identifying the entity issuing the certificate, a subject information identifying the mo-

bile code to which the certificate is referred, and a validity period information stating the period of time within which the certificate is valid. When downloading or uploading a mobile code the RRL is transferred to the user informing the user of the resource requirements of the mobile code. An execution environment is provided in an execution peer of the user, the execution environment defining at least the resource access policy that will be applied to the mobile code on execution.

Fig: 1



EP 1 132 796 A1

Description

[0001] This invention relates to a mobile code and method for resource management for mobile code.

[0002] Nowadays, with the recent explosive growth of the Internet, the number of computer interconnected in a global communications network grows exponentially. Many view the Internet as a universal communications medium that can replace telephone, television and radio. The potential is there, but progress has been hampered by the open design of the network itself. It is still too easy to intercept, monitor and forge messages on the Internet, and people are reluctant to use the network for financially or legally sensitive data.

[0003] Computer networks are evolving at a very fast pace, and this evolution proceeds along several aspects. Network links are constantly improved, and technological developments lead to increased computational power in network nodes. With increase in size and performance of computer networks, network connectivity has become a basic feature of computers and many products in the consumer electronics industry. On the other hand, users can exploit network connectivity independently of their physical location. In this new scenario, mobile users can move together with their hosts across different locations and still find their working environment.

[0004] The problems faced by users of the Internet fall into two main categories: privacy and authentication. Privacy involves transmitting messages that cannot be altered or read en route, while authentication allows each party to a communication to be sure of the identity of the other. Cryptography holds the promise of a solution to these problems.

[0005] These developments lead to a widespread diffusion of services and applications, making it necessary to increase the customizability of services. Thereby, different classes of users are then enabled to tailor the functionality and interface to a service according to their specific configuration, needs and preferences. Finally, the dynamic nature of both the underlying network infrastructure and market requirements demand higher levels of extensibility and flexibility.

[0006] There exist already a number of patent publications related to security aspects and authorizations for mobile programs. The systems described in these patent publications have, however some serious drawbacks. First, whenever certification is used, the systems require the existence of a hierarchic certification infrastructure in place. Second, all the systems deal with authorization. And finally, these patent publications all talk about low-level resource access such as file permissions, program execution, and network access. Some examples of these patent publications are discussed below.

[0007] The US 5,412,717 A relates to a computer system security method and apparatus having program authorization information data structures. The authoriza-

tion information is about low level resource access at operating system level. The only external resources available are the possibility to call another executable. Furthermore, the system needs to be implemented at an operating system level. The invention states that if all authorizations defined in the "Program Authorization Information" are not granted, the program can not be executed.

[0008] The US 5,892,904 A relates to a code certification for network transmission. A system is described to support the distribution of software over networks or off-line along with an Access Control List (ACL) for the program itself and a certificate that 'makes' the program secure for execution. In this case, the code production system submits the program and the ACL for the program to a certification authority, which sends back a certificate on the code and another one on the ACL for the program. At distribution time, the code is sent along with the ACL, the certificate on the code (which in fact is more a signature than a certificate) and another certificate on the ACL (again, this is more a signature by a CA over the ACL than a certificate). The contents of the ACL define the rights and authorizations a program has. In case not all of these authorizations are granted by the executing system or user, the program cannot run.

[0009] The US 5,892,904 A shows a system for certifying executable objects. The patent deals exclusively with program certification for network transmission. This certification guarantees program integrity, gives descriptive information on the program itself and information on the entity that certifies the program. This patent does not deal with any kind of authorization nor resource access.

[0010] The US 5,919,247 A relates to a method for the distribution of code and data updates over any network. Applications are seen as channels that can be subscribed to and updated. Whenever a user subscribes to a channel, the associated application is downloaded to the local disk and can be executed any number of times. On the other hand, there is the possibility to define an updating rate in which applications will be updated if necessary. This method basically deals with software downloading and updating and lacks, however, some important aspects on software downloading such as security and payment/licensing.

[0011] The US 5,978,484 A describes a system in which code to be sent through the network is associated with a "privilege request code", i.e. a set of rights the code may exercise, and digitally signed by a certification authority. A run-time system prevents the code from exercising unauthorized accesses. A certification hierarchy needs to be in place so that the user or executing system can verify the certificate attached to the program. The first drawback of the system is that it assumes the existence of a certification hierarchy in such a way that any user on the network can verify the validity of a given certificate. Such an infrastructure is not in place nowadays and will most likely never exist. On the other

hand, it makes the distributing authority dependent on a certification authority, which is a strong requirement.

[0012] There are also a number of scientific publications dealing mobile code handling. Examples are: D. Balfanz and L. Gong. "Experience with Secure Multi-Processing in Java". Technical Report, Princeton University, September 1997; and G. Back and W. Hsieh. "Drawing the Red Line in Java". In Proceedings of the 7th Workshop on Hot Topics in Operating Systems, March 1999. IEEE Computer Society; and G. Back, P. Trullmann, L. Stoller, W.C. Hsieh and J. Lepreau. "Java Operating Systems: Design and Implementation". Technical Report UUCS-98-015, University of Utah, August 1999; and G. Czajkowski and T. von Eicken. "JRes: A Resource Accounting Interface for Java". In Proceedings of the 1998 ACL OOPSLA Conference, Vancouver, BC, October 1998; and L. Gong, M. Mueller, H. Prafullachandra and R. Schemers. "Going Beyond the Sandbox: An Overview of the New Security Architecture in the Java Development Kit 1.2". In Proceedings of the USENIX Symposium on Internet Technologies and Systems, Monterey, CA, December 1997; and T. Tock, D. Sturman and R. Campbell. "Security, Delegation, and Extensibility". Technical Report, University of Illinois, November 1994; and T. von Eicken, C. Chang, G. Czajkowski, C. Hawblitzel, D. Hu and D. Spoonhower. "J-Kernel: a Capability-Based Operating System for Java". To appear in Secure Internet Programming: Security Issues for Distributed and Mobile Objects, Springer-Verlag Lecture Notes in Computer Science, 1999; and D. S. Wallach, D. Balfanz, D. Dean and E.W. Felten. "Extensible Security Architectures for Java". In Proceedings of the 16th Symposium on Operating Systems Principles, October 1997, Saint-Malo, France.

[0013] A few years ago, Java, developed by Sun Microsystems, triggered most of the attention and expectations on code mobility. Being able to run on any platform, Java has become a preferred research and development language for code mobility. Since then, most code mobility research literature refers to Java even if the paradigms, methodologies or concepts exposed are general and independent of any language. The Java 1.2 approach to the security of mobile code is focused exclusively on control access to resources on the machine onto which the application is executed. Classes are grouped in domains defined on the basis of the origin of the code. The address of the server providing the code or the public key associated with the signature over the code define such domains. A user can then associate to each domain an access control list containing the resources made available to classes within a domain. The Java runtime maintains a mapping from objects to their protection domains and then to their permissions. Each resource manages the permissions by itself. Nevertheless, it has some important drawbacks. Precisely, privileges are assigned to code based on their origin and totally independent of the application it implements. There is no support for resource accounting, monitoring

or reclamation, which are required from a system point of view. Furthermore, mobile code usually requires awareness of the location it is executed, and the resources and its state available to it.

[0014] Another totally different approach to resource management comes from research carried out in the past in the field of operating systems applied to type-safe languages such as Java. Type-safe languages provide the same functionality as a MMU (memory management unit) in classical operating systems, but within a single address space. The MMU is in charge of isolating address-spaces of different processes running on the same machine, and user and kernel execution modes.

[0015] Operating systems implemented with type-safe languages have several advantages over traditional operating systems with hardware-based MMU. One of the most time expensive operations on computers is context switching between user and kernel mode. These switches occur every time a user-space application makes a system call. Any operations on the file system, network access or keyboard read causes produces a context switch. Type-safe languages prevent from accessing variables or objects in an illegal way, opposed to the possibility in other languages like C/C++, in which one can access and modify the processes' memory. This feature makes unnecessary the use of MMU and boosts the performance of the system by avoiding context switching.

[0016] However, the concept of operating system limits the possibilities of such systems. The different prototypes deal exclusively with fair allocation of resources to different processes running on a machine, and provide applications with different ways to manage these resources. They lack, nevertheless, the possibility to externally define the resources available to an application.

[0017] Code mobility is exploited on an Internet scale, conceived to operate in large-scale settings with heterogeneous hosts connected by links at different bandwidths. This conception is opposed to distributed systems providing object migration that have been designed having in mind small-scale networks with high bandwidths. Mobile code is location and environment-aware and it takes actions based on such knowledge. Nevertheless, mobile code has some non-negligible risks regarding its security. A program going from computer to computer with the same privileges for the provider and the user is a non-acceptable risk for system administrators and users. Unless some precautions are taken, mobile code could read files, delete them, access the network impersonating the user or abuse of any of the resources the user has access to.

[0018] In view of the above, it is an object of the invention to provide a secured and scalable resource management at user level when using the code.

[0019] For achieving the above object, a mobile code comprises a resource usage needs section containing at least a resource requirements list (RRL) including

those resources needed by the mobile code to be properly executable plus those resources that are known a priori to be accessed when executing the mobile code. The invention provides a secure resource management for mobile code on the receiving and executing peer. A programmer or software provider/distributor attaches a RRL containing a description of the resources required by the application in order to correctly run. This information is a list of the different resources the mobile code will eventually access. The semantics of this Resource Requirements List is "the programmer of this mobile code states that the application needs to access the resources in the RRL". The goal of the RRL is not to transfer authorization but to provide a basis for the resource management.

[0020] According to a preferred aspect of the invention, the resource usage needs section of the mobile code is a certificate which is unique for each different mobile code. Out of security reasons, it is preferred to include the RRL in a certificate linked to the mobile code. For example the "most important" certificate is the certificate which is attached, for example, via a soft link by means of a hash function on the mobile code. The RRL can be contained in this certificate.

[0021] According to a preferred aspect of the invention, the resource usage needs section of the mobile code contains, in addition to the resource requirements list, any of the following information: a) issuer of the certificate information identifying the entity issuing the certificate, b) subject information identifying the mobile code to which the certificate is referred, and c) validity period information stating the period of time within which the certificate is valid. Any of this information subjects serve to further improve the ability of the system to manage resources.

[0022] According to a further preferred aspect of the invention, the information as to the issuer of the certificate is a digest of the public key of the entity having produced the mobile code. By using a digest of the public key of the entity having produced the mobile code, the safety of this information is further improved as it is made more difficult to forge the identity of this entity.

[0023] According to a further preferred aspect of the invention, the information as to the issuer of the certificate is a public key of the entity having produced the mobile code. Using the public key as an identification of the entity having produced the mobile code along with the signature on the certificate, identifies and authenticates the producer and gives a high level of security to this identification information.

[0024] According to a further preferred aspect of the invention, the subject information is a hash of the mobile code. To use a hash of the mobile code as subject information ensures again a high level of security in relation to this information. As security is an important aspect in the handling of mobile code, the importance of the last mentioned aspects of the invention is substantial.

[0025] According to a further preferred aspect of the invention, the resource requirements' list contains any of the following information: a) name of the resource [information specifying the type of resource, b) action on the resource specifying as to how the resource should be used, c) upper quantitative limit information stating the maximum usage of the resource from a quantitative point of view, and d) upper qualitative limit information stating the maximum usage of the resource from a qualitative point of view.

[0026] The more information is given about the resource requirements, the better is the basis for deriving a successful and tailored management. Therefore, if anyone or several or all of this information is provided, the results management is correspondingly improved.

[0027] According to a further preferred aspect of the invention, the mobile code and the certificate are logically linked by means of the code hash. This ensures that the mobile code and the certificate containing the information necessary for performing a good resource management are not separated in any stage of their co-existence so that the mobile code can, at any time, rely on the resource management based on the logically linked certificate.

[0028] According to a further preferred aspect of the invention, certificate or a sequence of certificates is linked to the mobile code and the RRL list, the certificate or certificates transferring trust from a principal trusted by the software consumer to the RRL certificate issuer.

The certificate or the sequence of the certificate contains one or several certificates transferring authorization from a executing peer to the principal who signed the certificate containing RRL. If the certificate or the certificate sequences is/are valid, the run-time execution environment will define the resource location policy. This system contributes very much to the success of the transfer and usage of the mobile code.

[0029] Furthermore, a certificate containing the RRL contains a digest of the mobile code that is used to verify its integrity which is another security feature.

[0030] According to a further preferred aspect of the invention, the mobile code comprises Java programs and applications. As mentioned before, Java provides programs and applications which are not restricted to special platforms which means that also the resource management will be platform independent.

[0031] According to a further preferred aspect of the invention, the format of the certificate or certificates is SPKI. As stated below, the SPKI is a preferred format when putting the invention to practice as SPKI provides all the features which are desirable for the invention in an efficient and elegant way.

[0032] According to a further preferred aspect of the invention, an execution program is provided in an execution environment of the user, the execution program defining at least the resource access policy that will be applied to the mobile code on execution. Such execution program will be the most suitable tool to define the re-

source access policy which also has the advantage that the implementation of the resource access policy will be done by a program which is adapted to the RRL transmitted with the mobile code.

[0033] For achieving the above object a method for resource management for mobile code using a mobile code as discussed above comprises, in the case of downloading upon request a mobile code from a principal (software provider or distributor) to a user, in a the negotiation phase in the beginning of the downloading process, a RRL list is transferred from the principle to the user informing the user of the resource requirements of the mobile code. Whenever a peer requests to download mobile code, the RRL information is used in the negotiation protocol the goal of which is to ensure that the receiving peer has all resources required for the execution of the mobile code. Exactly this information is provided by this method in a most advantageous way. Whenever a peer requests to download or upload mobile code, the RRL information can be used in a negotiation protocol. The goal of this negotiation protocol is for the sender peer to ensure that the receiving peer has all resources the mobile application requires to execute.

[0034] According to a further preferred aspect of the invention, in the negotiation phase, the downloading process further includes user and/or platform authentication, specifying restrictions imposed by the mobile code distributor as to the user and/or platform involved, and/or payment/licensing evaluation, comprising the financial aspects of the mobile code transfer. The platform authentication offers some guarantees for the software producer/distributor that is a contribution to the deal is acknowledged and the mobile code is used in the proper way.

[0035] According to a further preferred aspect of the invention, after the negotiation phase, the mobile code is downloaded. This ensures that the mobile code is downloaded and only then downloaded if all the basic requirements for its execution have already been checked and verified as being available.

[0036] According to a further preferred aspect of the invention, the mobile code or upgrades thereof are distributed from a service provider to a plurality of users, and wherein, in the case of upgrading, additional information is transmitted specifying which files need to be deleted, replaced or added. The mobile code and methods described so far can not only be used in a negotiation between two entities but also for distributing mobile code from a service provider to a plurality of users. It is advantageous that, for this application of invention, only a minimum of additional information is required which can be put into the resource usage needs section or the certificate containing the RRL.

[0037] For achieving the above object a method for resource management for mobile code using a mobile code as discussed above comprises, in the case of uploading upon request a mobile code from a resource owner to a user using a mobile code, in a the negotiation

phase in the beginning of the uploading process, a RRL list is transferred from the resource owner to the user informing the user of the resource requirements of the mobile code. Here again, the same advantages are achieved as with the downloading process.

[0038] According to a further preferred aspect of the invention, in the negotiation phase, the uploading process further includes user and/or platform authentication information specifying restrictions imposed by the resource owner as to the user and/or platform involved, and/or payment/licensing evaluation information comprising the financial aspects of the mobile code transfer. Also in the uploading process, such information is valuable to conclude an acceptable deal and to optimize the resource management.

[0039] According to a further preferred aspect of the invention, after the negotiation phase, the mobile code is uploaded. This is again to make sure that the actual transfer of the mobile code is effected only after all the security and resource management information checks have been made.

[0040] For achieving the above object, in a method for transferring mobile code through an active network for resource management for mobile code using a mobile code of as discussed above, the network comprising a plurality of active network nodes, the active flow is composed of the following information: a) a mobile code that needs to be executed in a node which is crossed by the active flow, b) a RRL list issued by the entity that sends the mobile code to the network, c) a certificate or a sequence of certificates whose first entry is a certificate from the network operator to the starting entity, and d) the data themselves. This method ensures in a most advantageous way that the mobile code with the resource usage needs section can also be used and transferred in an environment of active networks playing an ever increasing role in the global program and data transfer.

[0041] According to a further preferred aspect of the invention, when the active flow crosses a network operator boundary from an operator X to an operator Y, the exit node of the operator X adds a certificate to the sequence issued by network operator Y authorizing operator X to send active flows through its network. This is a simple and, therefore, advantageous way to ensure a safe transfer of the mobile code with the resource usage needs section within the active networks.

[0042] According to a further preferred aspect of the invention, an execution program is provided in an execution environment of the user, the execution program defining at least the resource access policy that will be applied to the mobile code on execution. As the certificate sequence with resource usage information is attached to the mobile code, this information can be used by the receiving peer to define the resource management policy on the mobile code at run-time.

[0043] According to a further preferred aspect of the invention, the execution program is transmitted together with the mobile code. Also the execution program could

also be provided separately or on other storage media to the user, the transfer of the execution program together with the mobile code is an advantageous way of handling this matter.

[0044] According to a further preferred aspect of the invention, the method comprises any of the following steps: a) verifying that the mobile code integrity has not been compromised, b) reducing the certificate chain associated with the mobile code to verify trust transfer from the execution environment to the supplier, and c) create a process-like structure for the mobile code which isolates the mobile code from other programs running on the same execution environment.

[0045] Before executing the mobile code, the receiving peer reduces the certificate sequence that comes along with the mobile code. If the certificate or sequence of certificates is valid, the run-time execution environment will define the resource allocation policy based on the RRL along with the type of access to the resource and an upper limit on its usage. Any or all of these steps contribute to a smooth execution of the mobile code. Furthermore, the mobile programs are isolated one from each other. Also the access to resources is done through the execution environment avoiding influence or interference of mobile code and programs among each other.

[0046] According to a further preferred aspect of the invention, the resource allocation policy is defined by an intersection between the sequence of certificates, one of which contains the RRL, and the ACL local to the executing peer. In other words, authorization to access resources at run-time will be defined on the executing peer based on the RRL and the ACL of each peer and/or user. If the certificate or the certificate sequence of the certificates is valid, the run-time execution environment will define the resource location policy based on the RRL and the ACL. The ACL contains a list of principals known to the executing peer along with a maximum resource usage list per principal. Unknown principals can have a default maximum resource usage list too.

[0047] According to a further preferred aspect of the invention, the mobile code or the execution program or its reduced program is configured to discover that a given resource is available through the execution environment and to request access to it, and thus to dynamically request access to other resources, and wherein the execution environment will decide on run time whether to grant or to deny such access. One advantageous feature of the mobile code is its ability to discover the resources and other applications present or running on the target machine to be able to communicate or work with them. This gives rise to new security concerns for both the calling and the called code. Each one of them might impose its own access control based on an authenticated message exchange system, which helps to run the mobile code in a safe way. Another functionality of the execution environment is the dynamic allocation of resources not listed in the RRL. More specifically, the mo-

bile code can dynamically discover resources on the executing peer. Therefore, the resource usage policy can be made dynamically updateable.

[0048] According to a further preferred aspect of the invention, for resources not listed in the RRL, if the resource is a build-in resource in the execution environment, the execution program will check its "run-time resource access policy" and determine, whether to grant access or not to the resource. This method takes advantage of the presence of the built-in resource and the general ability thereof.

[0049] According to a further preferred aspect of the invention, if the resource is another mobile code, this can define its own access policy stating to whom access should be granted, the advantage being that any resources which are available to anyone are integrated in the process in the execution environment almost automatically.

[0050] According to a further preferred aspect of the invention, wherein the execution program monitors and/or accounts for and/or reclaims the resources whenever its usage limit is exceeded depending on the level of trust the user has on the source of the mobile code, the resources made available to the application can be trusted to never exceed the allocated amount.

[0051] In the invention, resource needs are described and it is up to the executing environment to decide which ones are granted and which ones are not, based on their ACL and the trust path between themselves and the certifying programmer. This reflects a more generalized vision of resource as "anything a program can interact with" which is a much broader concept than the once present in the state of art. A main advantage of the invention is that it provides secure fine-grained access to resources, both quantitative and qualitative, for mobile code and that it is not restricted to provide an all or nothing access control to resources. Furthermore, in the invention, there is no need for a certificate infrastructure in order to validate the certificates or certificate sequences.

[0052] The invention also differs from the state of art specifically in that the mobile code comes along with a non-exhaustive list of required resources. The list is nevertheless only intended for execution environment information. The mobile programs could run with fewer/greater resources granted or discover new resources on the fly.

[0053] The execution environment embodying the invention allows, apart from controlling and managing access to resources, for collaboration between different programs running on this execution environment.

[0054] Embodiments of the invention are now described with reference to the attached drawings in which:

Figure 1 is a block diagram view of the software producer system depicting the phases involved in the production of a mobile pro-

- gram,
- Figure 2 shows a download upon request case in which a software consumer requests to download a mobile program from a software distributor;
- Figure 3 shows an upload upon request case in which a resource requester contacts a resource owner and asks to upload a mobile program that will act as personalized interface with the resource;
- Figure 4 shows a broadcast / multicast of mobile programs or upgrades case in which a service provider broadcasts mobile programs to offer new services to its clients or upgrades/patches;
- Figure 5 shows an active flow crossing the active network between two execution environments.
- Figure 6 shows an execution environment for mobile code.

[0055] A software producer is the entity responsible for producing a mobile code or program. This principal can be a programmer, a department within a company, an organization, etc. The mobile code is any code or application that can be sent/received through the net and is, thus, susceptible of attacking the executing peer. The mobile code can also be a local code that has arrived at the peer through a network or applications on CDROM and distributed to the users.

[0056] The first step in the process is to attach a certificate to the mobile code stating which are the resource usage needs for the given program: the software producer writes a mobile program that wants to diffuse over the Internet. To do so it needs to attach to the mobile program a certificate detailing the resource usage needs of the mobile program. This certificate is unique for each different mobile application and contains the following information:

a) Issuer of the certificate:

This is a unique identifier for the software producer. This needs not to represent a whole organization: it can be a programmer within a company, a research group or an open software group. Practically, it will be a digest (or hash) of the public key of the software producer, or the key itself.

b) Subject:

A value that uniquely identifies the mobile program to which the certificate is referred. In cryptographic words, this will be a hash of the mobile program.

c) Validity period:

This states from when to when the given certificate and thus the information contained in it is valid. This field allows for producing demo software with short validity periods, or release software with long ones.

d) Resource Requirements List (RRL):

This list should contain those resources needed by

the mobile program without which it is unable to execute, plus those resources that the software producer knows a priori that will be accessed. For each entry of the list there should be the following information which describes precisely the access to the resource:

d1) Name of the resource:

This name can be general specifying the type of resource, or more detailed, for example the resource manufacturer. The name can have constructor like 'any', or 'prefix'. For example, C:\Temp\ stands for any file in the temporary directory.

d2) Action of the resource:

A statement as to how the resource should be used. For example, if accessing a webcam, actions supported could be read (the images), zoom, on, off, focus and move.

d3) Upper quantitative limit:

This statement relates to the maximum usage of the resource from a quantitative point of view, for example writing 150Mbytes to disk or allocating 30Mbytes of memory.

d4) Upper qualitative limit:

This statement relates to the maximum usage of the resource from a qualitative point of view, for example a network connection with 10Mbits/sec, or a 4Mbits/sec video decoder.

[0057] With all the previous information, the software producer creates a certificate and attaches it to the mobile program. Here, "attach" should not be understood as a physical link, but a logical one. Precisely, a characteristic of cryptographic hashing functions is that for two different inputs, the result will be different. Moreover, it is computationally impossible, given an input, to find another one that generates the same output. Thus, mobile program and certificate are logically linked.

[0058] The certificate fields described above are those required. However, a certificate can contain some optional information such as the certification authority (entity capable of generating certificates) of the issuer, an address with detailed information on the mobile application, etc.

[0059] It should be noted that the RRL certificate is only a requirements list issued by the programmer of the mobile program. As can be seen in the following section, this certificate alone provides no security at all. Upon software distribution, the mobile program and the RRL certificate will be accompanied by a sequence of certificates transferring trust from a principal trusted by the software consumer to the RRL certificate issuer.

[0060] The distribution of mobile applications and programs can follow different patterns. In this section, different scenarios of mobile software distribution are presented. It should be noted that this section does not deal with classical software download from the Internet (ftp,

http, etc), but only with mobile applications that take advantage of the invention.

[0061] Figure 2 shows the interactions between a software distributor and a software consumer in the 'download upon request' case. A user or device contacts a software distributor and requests to download a specific piece of software. When the software distributor receives such a request, it starts a negotiation phase previous to the downloading of the mobile program. This negotiation comprehends several sub-phases:

a) User and/or platform authentication:

A software distributor may, and probably will, impose restrictions as to whom or where the software is being downloaded. Software producers or distributors may require software to be downloaded onto secure platforms that provide some guarantees as of there will not be any interference on program execution.

b) Resource requirements:

In this phase, the software distributor informs the consumer of the resource requirements on the mobile program. The objective of this phase is to avoid the downloading of software that will not be able to execute due to lack of resources. Note that the RRL is not exhaustive, since, by definition, mobile code should be able to discover resources present on the executing platform. The software consumer answers back to the distributor with a list of principals it trusts and to whom it will grant access to the resources. It is the distributor's responsibility to provide a sequence of certificates transferring trust from one of those principals to the principal that issued the RRL, along with the RRL certificate and the mobile program.

c) Payment / licensing / evaluation:

Since not all software is free of charge, this phase deals with the financial aspects of software distribution. Here, software distributor and consumer reach an agreement, possibly with proof of payment or license, before the downloading of the mobile program. Note that the consumer may be requesting an evaluation software. In this case, the only difference will be that the RRL certificate will have a short validity period, and platform authentication as described in the previous phase becomes mandatory in order to avoid illegal usage of the software.

[0062] The last step in the process is the actual download of the mobile program, the RRL certificate and a sequence of certificates that transfer trust from the software consumer down to the principal that issued the RRL certificate. Along with these data, the software distributor will most likely send a description of the mobile code with information such as name, version, etc. Software integrity is assured by the subject field in the RRL certificate which contains for example the result of a hash function on the mobile program file. If privacy is

needed, any protocol cryptographic protocol may be used.

[0063] Figure 3 shows a case in which a computer or device wants to access a resource residing on a remote computer. A resource requester contacts a resource owner and asks to upload a mobile program that will act as personalized interface with the resource. Examples of this are analyzing images of an electronic microscope or convert data from a compressed format to postscript before printing which means an application wanting to get some specific information from an electronic microscope or printing a compressed image. However, the requester may not want to access directly the resource, but use a specific interface providing the desired functionality. This is done by sending a mobile application to the resource owner system which, in the first case, extracts locally the information from the microscope images and sends it back to the application or, in the second case, converts from a compressed image format to postscript before sending to the printer, increases the performance of the application.

[0064] The protocols between peers are basically the same as in previous case of the communication between a software distributor and a consumer, with the exception that here there is a request to upload mobile code instead of downloading. As for the negotiation phase, user and platform authentication will be used here by the resource owner, since it can have its own policy as of who can upload software to the system. On the other hand, the payment/licensing phase can be used here whenever the resource requester should pay to access the resource. An example would be sending a mobile program that queries a remote database for which a subscription is required.

[0065] Figure 4 shows the case of a service provider with several subscribers broadcast or multicasts mobile programs to all or some of its clients. This mobile code can be whether a new mobile program that the service provider wishes to install on all its client platforms, or an upgrade/patch to already existing applications of the subscribers' systems.

[0066] Given the nature of the broadcast scenario, in this case there is not the possibility of an interactive protocol between service provider and consumers. Therefore, when the service provider broadcasts the mobile program along with some extra information:

a) Installation / upgrade information:

The installation information is basically the same information about the mobile program sent in the earlier cases. In the case of upgrading, the service provider needs to specify which files need to be deleted, replaced or added.

b) Certificate sequence:

If, in this scenario, the receiving systems are subscribed to a service and thus there is already a trust relationship, the service provider needs only to provide the sequence of certificates transferring trust

from itself to the programmer. The service provider itself may be also a software producer, in which case the certificate sequence will be empty.
c) RRL certificates and mobile program as in previous cases.

[0067] The case in which a service provider or software distributor sends a mobile program to a single receiver is a special case of the one presented above.

[0068] Active networks are a hot topic of research nowadays. The idea behind active networks is the possibility to configure each node of the network as a data flow traverses it. The active flow carries the data along with code that is executed by each active node and that does any processing on the flow. This processing can be from deciding which link the flow should follow up to reducing the quality of a video flow depending on the capacity of the link.

[0069] Figure 5 shows a scenario in which a flow between two execution environments, i.e. computers, crosses several active nodes or routers from different network operators. Any negotiation between active nodes belonging to the same or different network operators are not possible in this case. An active flow is composed of the following information:

- a) The mobile code that needs to be executed in every node the flow crosses.
- b) RRL certificate issued by the originating execution environment, the entity that sends the mobile code to the network.
- c) A sequence of certificates whose first entry is a certificate from the network operator X to the execution environment. This certificate allows the flow to cross all active nodes belonging to operator X. When the flow crosses an operator boundary, the exit node of operator X adds a certificate to the sequence issued by network operator Y authorizing operator X to send flows through its network.
- d) The data itself.

[0070] The certificates between network operators reflect real-world deals between network operators. An operator Y may authorize operator X to cross its network, but imposing some limits to the resources available to mobile code sent. In this case, there is a particular need for the active node to control the resources made available to "foreign" mobile programs.

[0071] The last phase involved in the present invention is mobile code security during execution and secured resource management. The mobile program has gotten to the executing system, or it is already present on the system. The execution environment, that is the software in charge of executing a mobile program, needs to meet some requirements so that the security of the system is not compromised (see Fig. 6). When a mobile program is launched, the execution environment performs the following steps:

- a) Verify that the mobile program integrity has not been compromised. This is done by computing the hash function on the mobile program and verifying that the result is the same as in the RRL certificate.
- b) Reduce the certificate chain associated with the mobile program to verify that trust is passed from the executing environment to the programmer or the issuer of the RRL certificate. To do this, the execution environment needs to access its own access control list (ACL) or the ACL of the user.
- c) Define the resource access policy that will be applied to the mobile program on execution. This resource access policy is the intersection between the RRL and the ACL plus certificate sequence reduction. Note that this resource access policy refers only to those resources specified in the RRL and the ACL. Mobile programs can dynamically request access to other resources: the execution environment will decide on run-time whether to grant or deny such access.
- d) Create a process-like structure for the mobile program, which isolates the program from other programs running on the same execution environment. The process abstraction also enforces the program to go through the execution environment in order to access any resource.

[0072] Whenever a mobile program requests access or tries to access a resource, the execution environment checks in the resource access policy of the process whether it has access to the resource or not. If it does, it will provide a capability that will monitor, account for and reclaim the resource whenever its usage limit is exceeded. There are, nevertheless, exception to this: low level resources, that is CPU time and memory, cannot be managed through capabilities; the execution environment manages them directly.

[0073] As stated above, the mobile code has the ability to discover the system on which it is being executed and take advantage of the resources available. This means that a program can discover that a given resource is available through the execution environment and request access to it. This resource can be a built-in resource in the execution environment or a software-based resource, i.e. any other mobile program that allows being called.

[0074] If the resource is a built-in one in the system, the execution environment will check its "run-time resource access policy" and determine whether to grant access or not to the resource. If, on the other hand, the resource is another mobile program (a video decoder or a decryption service for example) that gives access to anyone (it has not defined a its own resource access policy), access is granted too.

[0075] In case the software-based resource defines its own access policy, the execution environment will query the resource itself as to whether access is granted or not. This means that mobile programs available as

resources on a system have the ability to manage and define who (that is which mobile programs) can access them.

[0076] As stated above, security and privacy is a major concern with the handling of mobile code to cope with these requirements, one relies on cryptography. There are many different ways to implement cryptographic features in a program or on data. However, one particular format, the Simple Public Key Infrastructure or SPKI-format is particularly adapted for the purposes of the invention as will be described below.

[0077] Cryptography provides a means whereby two people can communicate openly in such a way that a third party is unable to determine or alter what is being said. By assuring privacy, cryptography indirectly provides authentication because only the communicating parties know how to encrypt and decipher each other's messages. A form of cryptography known as public-key cryptography appears to be best suited to fulfilling the requirements of the Internet. Each user of a public-key cryptosystem holds a pair of related keys. Anything encoded with one key can only be decoded by its counterpart. Each user keeps one key secret and makes the other publicly available. Thus, other people can employ the user's public key to send messages that only the user can read, or the user can "sign" a message with her private key to authenticate it - other people can apply the user's public key to verify that the message came from the user. Crucial to the operation of a global public-key cryptosystem on the Internet is a practical and reliable means of having access to the public keys, called a Public Key Infrastructure or PKI.

[0078] Much recent work has focused on moving away from identity-based PKIs to a more general system based on attributes or credentials. SPKI and SDSI (Simple Distributed Security Infrastructure) are two of such efforts. These two initiatives merged later into SPKI, given that their approach to security infrastructures and certificates were almost identical. SPKI is designed to "facilitate the construction of secure systems" and "provides simple, clear terminology for defining access-control lists and security policies". It is also an attempt to move away from identity-based certification and towards a system based on roles and credentials.

[0079] SPKI calls its entities "principals" and defines them to be digital signature verification keys. Thus, SPKI principals are public keys that can make declarations by issuing verifiable signed statements. Those signed statements come mainly in the form of certificates. SPKI provides for so called SPKI authorization certificates as a basic form of certificates which transfer some specific authorization or permission from one principal to another. Because a certificate merely transfers authorizations, rather than creating them, it is required to inject authorizations into a chain of certificates. This is done by means of ACL-entries (ACL = Access Control List). An ACL-entry lives on the machine of the verifier, leading to the observation that all authorization flow is in a

circuit -- from the verifying machine's ACL, possibly through certificates and then back to the verifying machine. Alternatively, one might say that the only root of an authorization certificate chain is the verifier.

[0080] SPKI allows its principals to define groups, or sets, of principals by means of name certificates. Each group has a name and a set of members. The name is local to some principal, which is the "owner" of the group. Only a group's owner may change its definition. A group can be an explicit list of the group's members (either as a list of principals and/or names of principals), or it can be defined in terms of other groups. Any principal can define his own groups and export them via his servers in much the same way as name bindings. The servers can issue membership certificates based on the groups' definitions.

[0081] If, from a practical point of view, mobile applications are programmed in the Java language, and programs and applications can be distributed using a specific file format that packages all files that compose the application. Moreover, this format fits the requirements of code certification, since a single file can easily be hashed to create a certificate.

[0082] As for the certificate format, SPKI certificates fit the above expressed requirements. Moreover, the fact that there is no need for an infrastructure of certification authorities in place will make the present invention easy to deploy.

Claims

1. Mobile code comprising a resource usage needs section containing at least a resource requirements list including those resources needed by the mobile code to be properly executable plus those resources that are known a priori to be accessed when executing the mobile code.
2. Mobile code according to claim 1, wherein the resource usage needs section of the mobile code is a certificate which is unique for each different mobile code.
3. Mobile code according to claim 1 or 2, wherein the resource usage needs section of the mobile code or the certificate contains, in addition to the resource requirements list, any of the following information:
 - a) issuer of the certificate information identifying the entity issuing the certificate,
 - b) subject information identifying the mobile code to which the certificate is referred, and
 - c) validity period information stating the period of time within which the certificate is valid.
4. Mobile code according to claim 3, wherein the re-

source requirements list contains any of the following information:

- a) name of the resource information specifying the type of resource, 5
 - b) action on the resource specifying as to how the resource should be used,
 - c) upper quantitative limit information stating the maximum usage of the resource from a quantitative point of view, and 10
 - d) upper qualitative limit information stating the maximum usage of the resource from a qualitative point of view.
5. Mobile code according to any of the preceding claims, wherein an execution program is provided in an execution environment of the user, the execution program defining at least the resource access policy that will be applied to the mobile code on execution. 15
6. Method for resource management for mobile code using a mobile code of any of the claims 1 to 5, wherein: 20
- (a) in the case of downloading upon request a mobile code from a principal to a user, in a the negotiation phase in the beginning of the downloading process, a RRL list is transferred from the principal to the user informing the user of the resource requirements of the mobile code, and 25
 - (b) in the case of uploading upon request a mobile code from a resource owner to a user, in a the negotiation phase in the beginning of the uploading process, a RRL list is transferred from the resource owner to the user informing the user of the resource requirements of the mobile code. 30
7. Method according to claim 6, wherein, in the negotiation phase, the downloading process further includes user and/or platform authentication, specifying restrictions imposed by the mobile code distributor as to the user and/or platform involved, and/or payment/licensing evaluation, comprising the financial aspects of the mobile code transfer; and wherein, in the negotiation phase, the uploading process further includes user and/or platform authentication information specifying restrictions imposed by the resource owner as to the user and/or platform involved, and/or payment/licensing evaluation information comprising the financial aspects of the mobile code transfer. 35
8. A method for transferring mobile code through an active network for resource management for mobile code using a mobile code of any of the claims 1 to 40
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5, the network comprising a plurality of active network nodes, wherein the active flow is composed of the following information:

- a) a mobile code that needs to be executed in a node which is crossed by the active flow,
 - b) a RRL-list issued by the entity that sends the mobile code to the network,
 - c) a certificate or a sequence of certificates whose first entry is a certificate from the network operator to the starting entity, and
 - e) the data themselves.
9. Method according to claim 8, further comprising any of the following steps: 15
- a) verifying that the mobile code integrity has not been compromised,
 - b) reducing the certificate chain associated with the mobile code to verify trust transfer from the execution environment to the supplier, and
 - c) create a process-like structure for the mobile code which isolates the mobile code from other programs running on the same execution environment. 20
10. Method according to claim 8 or 9, wherein the mobile code or the execution program or its reduced program is configured to discover that a given resource is available through the execution environment and to request access to it thus to dynamically request access to other resources, and wherein the execution environment will decide on run time whether to grant or to deny such access. 25
- 30
- 35
- 40
- 45
- 50
- 55

Fig: 1

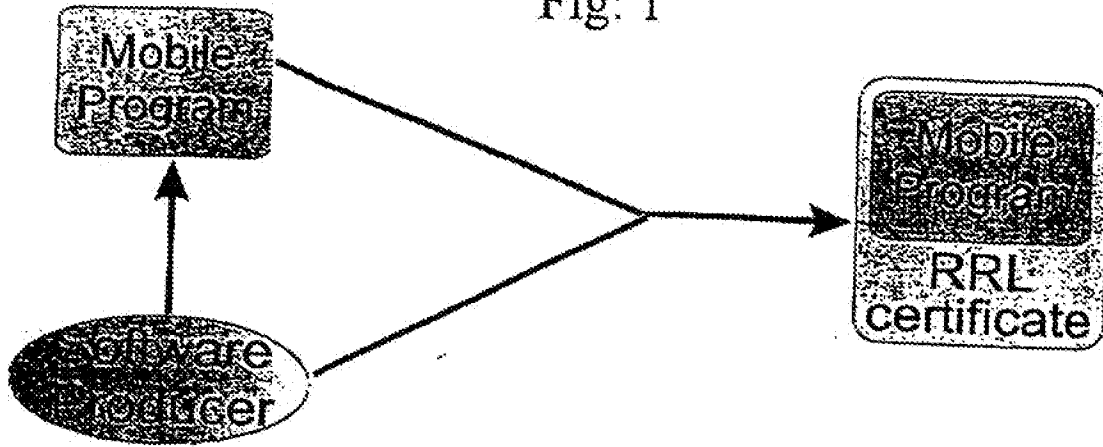
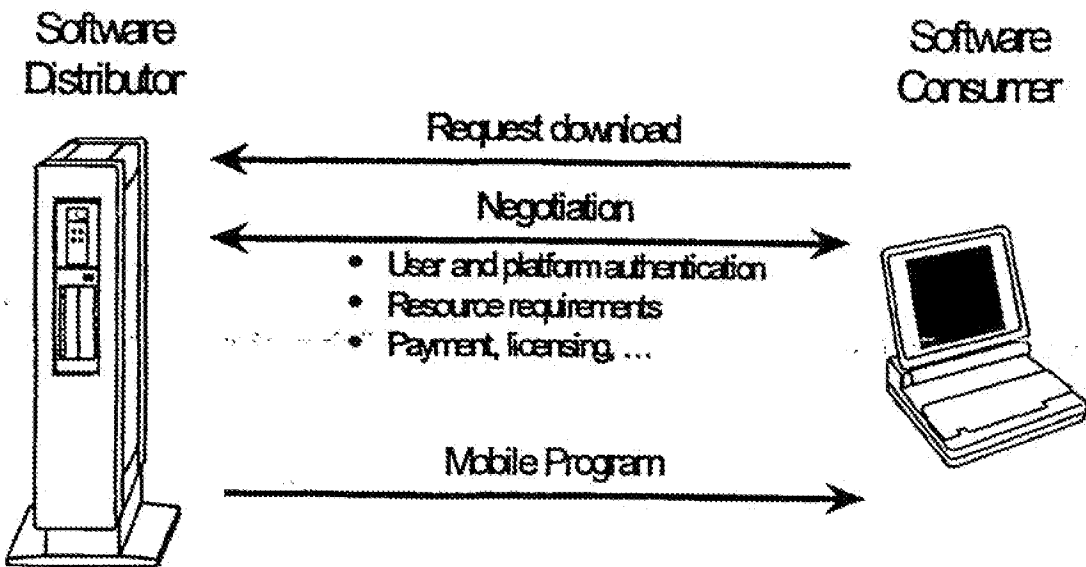


Fig: 2



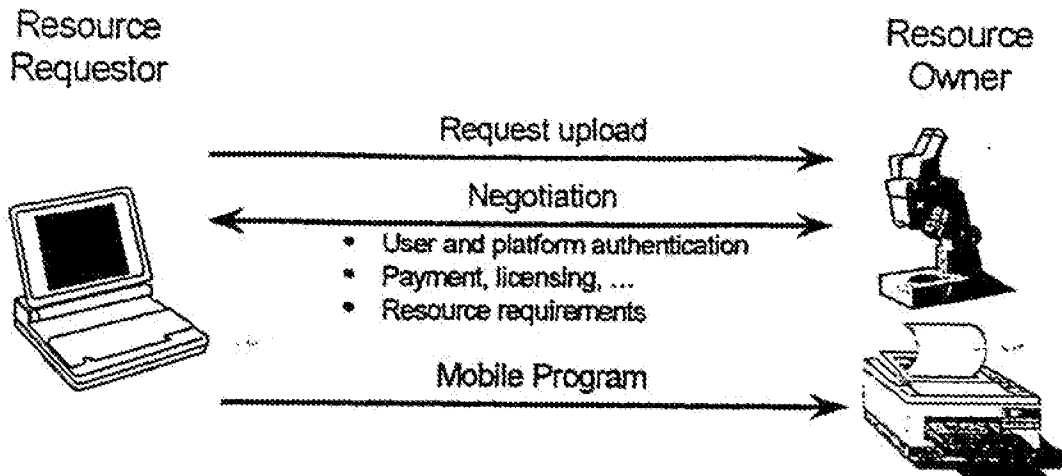
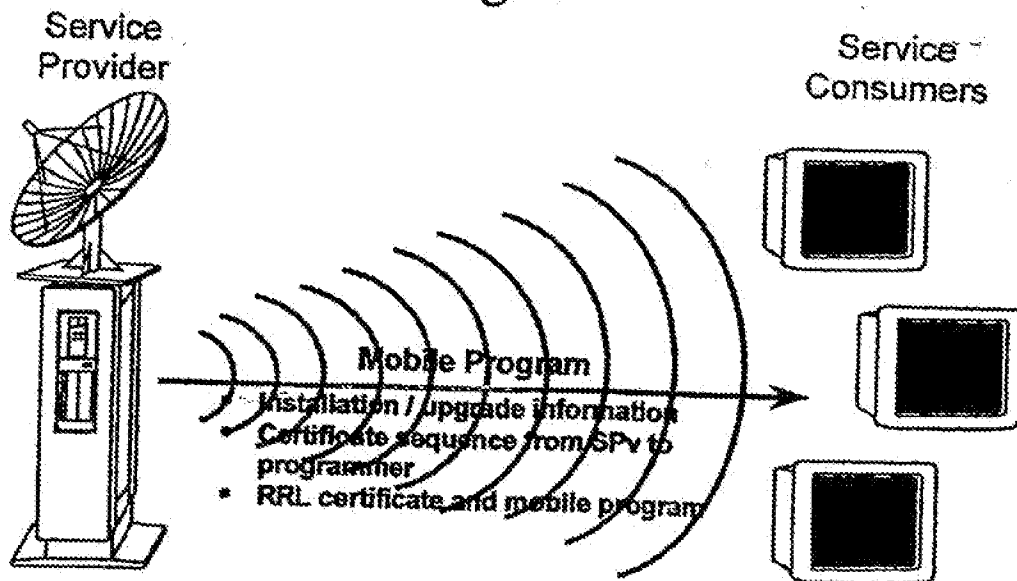


Fig: 3

Fig: 4



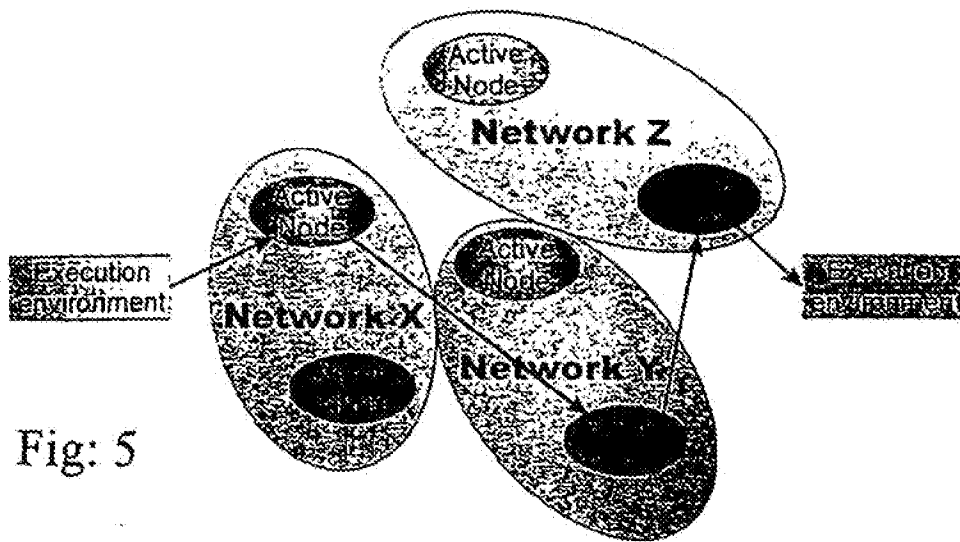


Fig: 5

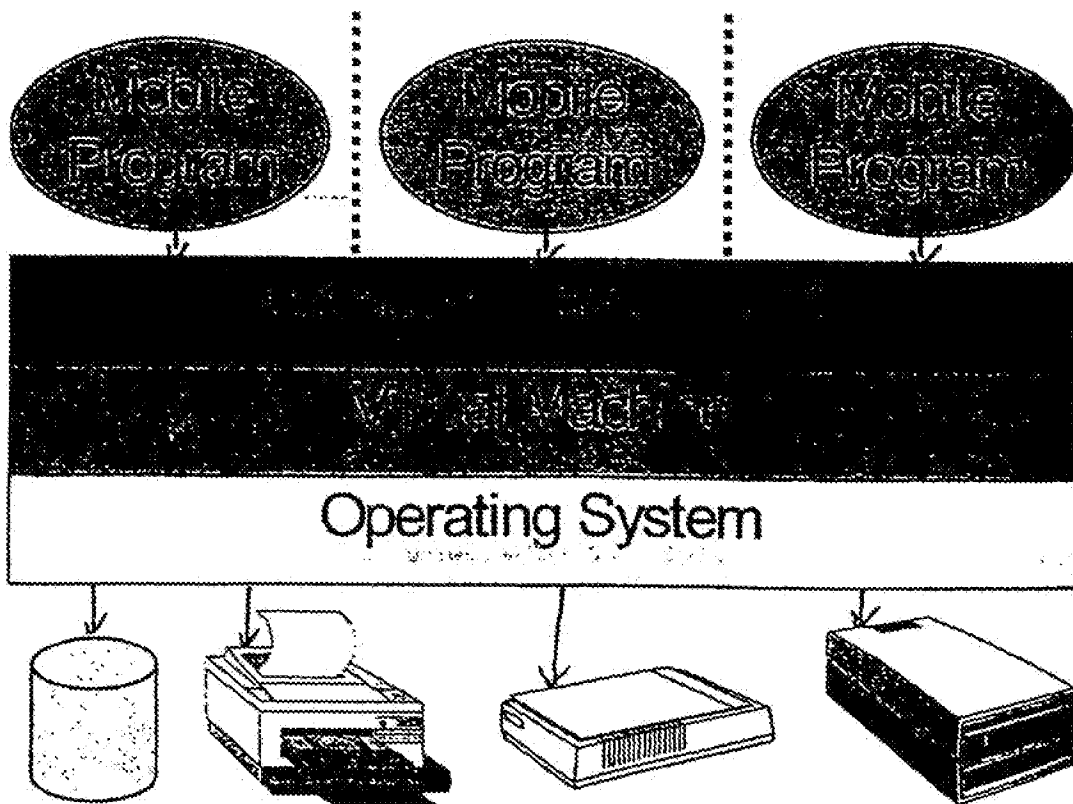


Fig: 6



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 4966

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (InCL17)
X	EP 0 813 132 A (IBM) 17 December 1997 (1997-12-17) * abstract; figures 1-3 * * page 2, line 59 - page 3, column 57 * * page 4, line 40 - page 5, line 4 *	1-4	G06F1/00
Y	—	6,7	
X	EP 0 813 133 A (IBM) 17 December 1997 (1997-12-17) * abstract * * column 3, line 5 - column 4, line 7 * * column 6, line 33 - line 50 *	1-3,5	
A	—	8,9	
Y	WO 98 07085 A (SMITH BENJAMIN HEWITT; SMITH FRED HEWITT (US); BEN SMITH INC (US)) 19 February 1998 (1998-02-19) * abstract; figures 1,3 * * page 4, line 2 - page 5, line 14 * * page 9, line 1 - page 10, line 27 *	6,7	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (InCL17)
			G06F
Place of search	Date of completion of the search	Examiner	
THE HAGUE	20 December 2000	Sigala, A	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : documents cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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EP 00 10 4966 A1 (99) 0001

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 10 4966

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20-12-2000

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(54) **Method and apparatus for detection of computer viruses.**

(57) A behavior analyzing antivirus program detects viral infection of a target program by emulating the execution of the target program and analyzing the emulated execution to detect viral behavior. The antivirus monitor program contains both variables corresponding to the CPU's registers and emulation procedures corresponding to the CPU's instructions. The target program is loaded into memory and its execution is emulated by the antivirus monitor program. Intelligent procedures contained in the monitor program are given control between every instruction emulated so as to detect aberrant or dangerous behavior in the target program in which case the danger of a viral presence is flagged and emulation is terminated.

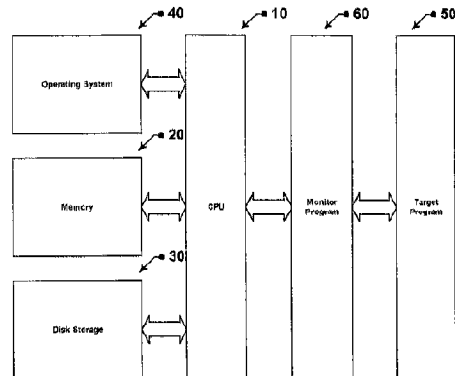


Figure 1B

EP 0 636 977 A2

BACKGROUND OF THE INVENTION

The present invention relates generally to a method and apparatus for emulating the execution of a program on a computer system. In particular, the present invention relates to monitoring program behavior to detect and terminate harmful or dangerous behavior in a program. More particularly, the present invention relates to monitoring program behavior to detect computer viruses.

In recent years, the proliferation of "computer viruses" (generally designed by rogue programmers either maliciously or as "pranks") has become an increasingly significant problem for the owners and users of computer systems. True computer viruses vary, but they share the general characteristic that they comprise executable computer code capable of replicating itself by attachment to and modification of standard computer files. Such files are then considered "infected". On most computer systems, viruses are limited to infecting program applications. When the application is executed, the virus can then replicate and attach copies to further application files. Typically, viruses also engage in other forms of behavior that are considered undesirable, such as re-formatting a hard disk.

Often grouped with true computer viruses are some other types of malevolent computer programs: worms and trojan horses. Worms do not infect other applications but merely replicate, either in memory or in other storage media. The harmful effect of worms is generally to reduce system performance. Worms are of concern for large multiuser computer systems, but are generally not of concern for personal computers. Trojan horses are programs that masquerade as useful programs or utilities; they generally run only once and have a harmful effect (such as destroying or damaging the computer system data storage). Trojan horses do not replicate, and after being run once by a user, the user is usually alerted to the harmful behavior and will not run the trojan horse again.

In response to the proliferation of computer viruses, a variety of "antivirus" methodologies and programs have been developed to detect the presence of infected files. These antivirus programs can be generally categorized into groups: behavior interceptors, signature scanners, and checksum monitors.

BEHAVIOR INTERCEPTORS

The earliest antivirus programs were generally of the behavior interceptor type: they would allow a virus program to execute in memory but would intercept strategic operating system function requests made by the computer virus. Such requests would generally be functions which the virus re-

quired to be performed in order to replicate or to destroy its host, i.e., "Write to a file", "Erase a file", "Format a disk" etc. By intercepting these requests, the computer operator/user could be informed that a potentially dangerous function was about to be performed. Control could be halted or continued as necessary. Some antivirus programs actually modify the instructions of the discovered virus program and make them inoperable so as to "kill" them.

The behavior interceptor method of virus detection has several drawbacks. The first problem is that it relies entirely on user input and decision making when potentially dangerous behavior is detected. This places a great burden on the user, for it is often very difficult to determine whether the flagged behavior is part of the normal operation of the program being executed. For example, disk optimizing programs routinely reformat hard disks to improve the interleave value. In response to a warning message, a user might suspect that their disk optimizer was infected with a virus (when in fact it was not) and halt program execution. Or, worse yet, if the user knows that such behavior is part of the normal operation of a disk optimizer program, they would likely allow the format to continue uninterrupted, which would be disastrous if the program were actually infected.

A second problem with behavior interceptor antivirus programs is that computer virus technology has advanced to such a state that some computer viruses are able to bypass the interception points used by the antivirus. The virus can then make operating system function requests that are never intercepted by the antivirus, thus avoiding detection.

A third problem with behavior interceptor antivirus programs is that by allowing the virus to execute, the virus has an opportunity to locate and identify the antivirus program in computer memory. Once the antivirus program is located, the virus can modify the antivirus-- rendering it completely ineffective in exactly the same manner that antivirus programs locate and modify virus programs to render them ineffective.

A fourth and very significant problem with behavior interceptor antivirus programs is that there are no low level operating system function requests employed by computer viruses that are not also used by any of thousands of non-virus programs. At an instruction by instruction level, or at a function-call by function-call level, a computer virus performs the same operations as legitimate computer programs. In other words, the closer a computer virus is examined, the less distinguishable it becomes from any other computer program.

SIGNATURE SCANNERS

The next generation of antivirus technology, signature scanners, answered the problem of over-reliance on user interaction as well as the problem of allowing the virus to execute. A signature scanner operates by knowing exactly what a target virus program code looks like ("signature" code) and then scanning for these program codes in any programs requested to be executed or otherwise requested to be scanned. As long as the signature codes were sufficiently long enough so as not to be confused with another program's code, then positive identification was virtually guaranteed and the request to execute could be stopped before execution ever began. The primary problem with this technique is that it requires the antivirus developer to have previously collected and analyzed the target viruses, and included the signature codes in the antivirus program. The antivirus program thus relies on an extensive virus signature library, for there are currently several thousand known IBM PC viruses and several new viruses appear each day. Any new viruses appearing after the antivirus program was developed are not included in the library of program codes for which the antivirus can scan. Signature scanning antivirus programs therefore require frequent updates to keep them current with the increasing number of viruses. If the antivirus developer is lax in providing updates, or the user is lax in obtaining and employing available updates, a signature scanning antivirus program can rapidly lose its effectiveness.

CHECKSUM MONITORS

The last standard technique of virus detection does not look for anything to do with viruses in particular, but concentrates on the host programs which the viruses attack. Every program on a system can be "checksummed" at antivirus installation time. Then, when a virus attaches itself to the unsuspecting host program, the checksum value will (probably) be different and the file infected with the virus can be isolated. The primary problem with this technique is that many programs store varying program information within themselves; this will change the checksum value and thus trigger a false alarm virus detection. Another problem is ensuring the integrity of the checksum information, which is typically attached to the program file itself or stored in a separate file. Both locations are vulnerable to covert virus modification. Once a virus infects a host, it can then update the stored checksum value to correspond to the newly infected file and then execute undetected.

SUMMARY OF THE INVENTION

An improved antivirus program according to a first aspect of the present invention avoids the problems of the prior art and detects viral infection of a target program by emulating the execution of the target program and scanning for viral behavior. By emulating the execution of the target program, viruses are prevented from circumventing the monitor program's protective mechanisms. A second aspect of the present invention recognizes that a key viral behavior is replication: viruses generally operate by passing replication/program-modification code onto uninfected programs. Uninfected programs, on the other hand, do not generally add program-modification code to other programs. According to this aspect of the invention, the emulated target program is tested for replication behavior to determine whether the target program is virus-infected.

A monitor program according to the first aspect of the present invention contains both variables corresponding to the CPU's registers and emulation procedures corresponding to the CPU's instructions. The monitor program includes means for loading a target program into memory and emulating its execution. The monitor program also includes means for analyzing the emulated behavior of the target program and for signalling a warning if the emulated behavior is determined to be aberrant, dangerous or otherwise undesirable.

In one embodiment according to the second aspect of the present invention, the monitor program further includes means, responsive to a file access request by the target program, for providing a dummy program, having known behavior, for modification by the target program. The monitor program also has means for emulating the execution of the modified dummy program after the emulation of the target program is complete. If the modified dummy program is determined to have modified functionality, the original target program is flagged as possessing viral behavior. In one particular embodiment according to this aspect of the invention, a first dummy program is known to not possess the ability to modify another file. If after modification by the target program the first dummy program is emulated and found to modify a second dummy program, then the original target program is flagged as virus infected, for having "infected" the first dummy file with aberrant behavior.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A is a block diagram illustrating the primary components of a computer system executing a target program in a standard manner.

5
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Fig. 1B is a block diagram illustrating the primary components of a computer system executing a target program according to the present invention.

Figs. 2A and 2B are diagrams illustrating memory maps of the computer systems of Figs. 1A and 1B, respectively.

Fig. 3 is a block diagram illustrating the register set emulated by a particular embodiment of the present invention.

Figs. 4A and 4B are flowcharts illustrating respectively the installation and replication procedures typically employed by computer viruses.

Fig. 5 is a flowchart illustrating the general emulation process performed by a monitor program according to a particular embodiment of the present invention.

Fig. 6 is a flowchart illustrating in further detail the memory access control step of the flowchart of Fig. 5.

Fig. 7 is a flowchart illustrating in further detail the procedure access control step of the flowchart of Fig. 5.

Fig. 8 is a flowchart illustrating in further detail the operating system entry point monitoring step of the flowchart of Fig. 5.

Fig. 9 is a flowchart illustrating the process performed by a particular embodiment of the present invention to check the behavior of an interrupt handler.

Fig. 10 is a flowchart illustrating the process performed by a particular embodiment of the present invention to identify viral replication behavior.

In Fig. 1A a block diagram is shown illustrating the primary components of a computer system executing a target program in a standard manner. The computer system includes a CPU 10, a memory 20, and a disk storage device 30. This is simply an exemplary configuration; the system could of course employ a tape storage device rather than disk storage, and many other variations are possible as well. Operating system 40 typically exists in Read Only Memory, but may also be partially loaded from the disk storage 30 into memory 20. At power up, the CPU begins executing the instructions of operating system 40, which thereafter controls the loading and execution of application programs such as target program 50.

In this standard configuration, if a user selects target program 50 for execution, operating system 40 would load target program 50 from disk storage 30 into memory 20 and then transfer control to target program 50 by loading the start address of target program 50 into the program counter register, or instruction pointer register, of CPU 10. CPU 10 would then begin executing the instructions of target program 50, as pointed to by the instruction

pointer register. Target program 50 will typically include calls to operating system routines, which are identified by a table of pointers, commonly known as interrupt vectors. It is by remapping these interrupt vectors that standard behavior interceptor antivirus programs attempt to maintain control and supervision of target programs. As discussed above, however, many computer viruses are able to circumvent this remapping of the interrupt vectors and are able to use operating system routines without being monitored by the antivirus program.

In order to prevent this circumvention of monitoring code, a particular embodiment of the present invention is invoked by a user to request that an application program be analyzed for viral behavior. This embodiment takes the form of a monitor program that emulates the execution of the application for a period of time, monitoring its behavior. By emulating the execution of the application program, the application program can be maintained in a controlled environment that cannot be circumvented by a virus.

The configuration of the monitor program and target application program is illustrated in Fig. 1B. Monitor program 60 loads target program 50 into memory and emulates the execution of the instructions of target program 50, serving as a protective barrier between the application program and the remainder of the computer system. If the application program has not shown any viral behavior at the end of the monitor period, then it is loaded and executed in the standard manner, such as illustrated in Fig. 1A.

In the secure environment created by the monitor program of Fig. 1B, every aspect of execution can be scrutinized and the operation of the virus can be controlled completely. If the virus were to request a hard disk format operation, a successfully completed status would be returned to it making the virus "believe" that the operation was successful when in fact it was never executed in the first place.

Figs. 2A and 2B respectively show the general layout in memory 70 for an IBM PC type computer system with a target program loaded directly by PC DOS as in Fig. 1A, and for a target program loaded by an embodiment of the present invention as in Fig. 1B. As shown in Fig. 2A, ROM occupies the upper portion of the memory address space with the remainder of memory being filled up from the bottom: first the operating system 40 in lower memory, followed by device drivers and memory resident programs, then user selected programs such as target program 50. Fig. 2B illustrates memory usage as in Fig. 2A, but additionally with monitor program 60 loaded.

Fig. 3 illustrates the various CPU registers employed by an 8086 type CPU, the general type of CPU employed by many personal computers, and for which the presently described preferred embodiment is intended. Flags register 300 is a set of bit-wise flags that may be set or cleared during the execution of various types of instructions. These bits can be examined by other instructions to alter program flow or to perform other tasks. Registers 310 are general purpose and are used for a variety of tasks. Index registers 320 are typically used to indirectly reference memory. Stack pointer 330 is used to maintain a data storage stack in memory. Instruction pointer (program counter) 340 points to the location in memory at which the next instruction to be executed resides. Finally, segment registers 350 are used to prepend and additional 4 bits onto other memory addressing registers (16 bits wide), allowing them to access a broader range of memory. Because these registers are intimately involved in the execution of programs, they are all emulated by the monitor program of the preferred embodiment, so as to fully control the execution of a target program.

Viral Code

Fig. 4A illustrates the installation procedure typically employed by computer viruses. The virus execution begins at block 400 and proceeds to block 410, at which the virus determines if a copy of itself has already been installed in memory. If not, execution proceeds to block 420, where the virus saves the current value of interrupt vector 21h (the operating system entry point on 8086 type computers), and saves this value for later use. Next, at block 430, the virus sets the entry point to point to a procedure within the virus itself, after which at block 440 control is passed to the host program. If at block 410 the virus had determined that a copy had previously been installed, control would pass immediately to block 440.

Fig. 4B illustrates a typical viral procedure for replication. The beginning of such a procedure would be the replacement entry point stored by the viral code at step 430 of Fig. 4A. When a program later attempts to make an operating system call through int 21, the call would be directed to beginning block 450 of the viral procedure of Fig. 4B. The viral code would then execute, and at block 460 would determine if there was a file name associated with the operating system call. Such operating system calls are typically used by a normal program to open a file or execute another program. If there was a name associated with the operating system call, then at block 470 the viral code would replicate itself by writing its own executable code to the file that was the subject of the

operating system call, in some instances after having checked to ensure that this file was not already infected by the virus. After block 470, the viral code would then exit at block 480, passing control to the original interrupt handler, a pointer to which had been saved at block 420 of Fig. 4A. If at block 460 the viral code had determined that there was no filename associated with the operating system call, then execution would have passed directly from block 460 to block 480. In this manner the operating system continues to function normally except for a slight interruption while the viral code executes.

Emulation to Detect Viral Code

Fig. 5 illustrates the operation of monitor program 60 according to a preferred embodiment of the invention. The monitor program can be executed explicitly by the user with a designated target program, or in alternative embodiments can be executed automatically whenever an operating system call is placed to execute a program. At block 500, the monitor program loads the target program into memory, in exactly the same manner as the operating system would have loaded the target program, but rather than passing execution to the target program immediately, the monitor program retains control for a period of time, to evaluate the target program.

After the target program is loaded at block 500, at block 510 the monitor program initializes the emulated registers, which correspond to the registers used by CPU 10. These register variables are used by a set of instruction emulation routines that are capable of emulating the instructions of CPU 10. The emulated registers are initialized with the same values that the real registers would have had if the target program had been loaded by the operating system for execution.

After the emulation registers are initialized, the main emulation loop is entered. At block 520 the instruction pointed to by the emulated program counter register is fetched by the emulation software and the emulated program counter register is incremented by the size of the fetched instruction, so that it points to the next instruction. Control then proceeds to a set of evaluation procedures for the instruction. At block 530, the monitor program determines if the target program is attempting to access memory selected for controlled access. In the preferred embodiment, operating system procedures and data areas the address range of the monitor program are selected for controlled access. Optionally, any memory not belonging to the target program can be selected for controlled access. The memory access process is explained in more detail below with reference to Fig. 6.

After block 530, at block 540 the monitor program evaluates the instruction for attempted access to a controlled procedure, explained more fully below with reference to Fig. 7, and then also emulates the execution of the instruction. Following block 540 is block 550, at which the monitor program evaluates any possible modifications to the operating system entry points. The processes performed at block 550 are described in more detail below with reference to Figs. 8-10.

Following the emulation and evaluation blocks 530-550, at block 560 the monitor code determines if the target application has terminated. If so, emulation is terminated at block 570. The determination of step 560 can be according to whether the target program terminates of its own accord, or the determination can be set by a total number of instructions to be emulated or by a fixed period of time for emulation. If the target program has not terminated of its own accord at step 560, and if the monitor program has not forcibly terminated it, control returns to block 520, where the next cycle of the emulation loop is begun. The emulation termination at block 570 includes some "cleanup" on the part of the monitor program. This includes displaying to the user a status report of all operating system requests performed by the target program. This step may optionally also include reporting any memory accesses that have been performed outside of the area provided for the target program by the monitor program.

Controlling Access to Memory

The memory access monitoring process of block 530 is illustrated in further detail in Fig. 6. The described process involves remapping selected parts of memory, which effectively virtualizes those memory areas, making them inaccessible to the target program, and thus protected. In alternative embodiments, access by the target program to these areas of memory is simply denied by the monitor program.

From the starting point at block 600, the procedure passes to block 610, at which the monitor program determines if the current instruction is one whose function is to access memory. If so, then control passes to block 620, where the monitor program determines if the memory location to be accessed by the current instruction is in an area selected for controlled access. If so, then control passes to block 630, which implements a remapping of the memory address. The monitor program's representation of the instruction is modified to point to the mapping destination, so that the original memory location is protected from the target program.

In the preferred embodiment, the contents of the original memory location are copied to the mapping destination the first time the location is accessed by the target program. In other embodiments, the contents of the entire memory area selected for controlled access are copied into the mapping destination area when the monitor program first starts. In yet other embodiments, certain areas selected for controlled access can have their mapping destination areas initialized with null or dummy values. For example, it may be desirable that the content of the monitor program be protected and hidden from the target program, so that a virus cannot detect the presence of the monitor program.

After the remapping of block 630, at block 640 the attempted access to a controlled memory area is logged for later analysis and reporting to the user. After block 640, the memory access control procedure ends at block 650, which returns control to the main process of Fig. 5, at block 540. A negative determination at either of blocks 610 or 620 also results in control passing immediately to block 650.

Controlling Access to Procedures

In some instances, it is desirable to control access to certain procedures. For instance, operating system procedures, ROM procedures, and interrupt handling procedures can have powerful effects and can be subject to misuse by a virus. For these reasons, it is desirable to control access to them and substitute special purpose procedures in their place, to encapsulate viral code within the emulated environment.

After the memory access control procedure of block 530 of Fig. 5, control passes to block 540, which is illustrated in further detail in Fig. 7. From beginning block 700 control passes to block 710, at which the monitor program determines if the emulated program counter points to a controlled procedure entry point; a list of such entry points is maintained by the monitor program. If so, then at block 720 the attempted access to a controlled procedure is noted. This can be by displaying a message to the user on the screen, writing to a log file, etc.

Next, at block 730 the monitor program determines if the instruction is to be directly emulated. This determination is made according to information stored for each controlled procedure entry point; for certain such procedures a special case emulation may be desired rather than directly emulating the instructions of the procedure. If the procedure is not to be directly emulated, then control passes to block 740, where a special case emulation of the entry point instruction is performed. In

some instances this special case emulation will entail emulation of the entire controlled procedure at this point.

If at block 730 it were determined that the controlled procedure was to be directly emulated, or if at block 710 it were determined that the emulated instruction pointer did not indicate a controlled procedure entry point, then control would pass to block 750, where the instruction indicated by the emulated instruction pointer is emulated in the same manner as other instructions. Following the emulation according to either of blocks 740 or 750, control passes to block 760, which returns execution to the main process of Fig. 5

Controlling Access to Operating System Entry Points

Block 550 is illustrated in further detail by Fig. 8. This control of operating system entry points need not be performed to obtain substantial benefits from the emulation of the target program; however, this process does a higher level of control over the target program and also allows for a more accurate evaluation of viral behavior on the part of the target program.

From beginning block 800 control passes to block 810, at which the monitor program examines a list of operating system entry points to determine if any have changed as a result of the instruction just emulated. This would indicate that the target program had replaced an interrupt handler with a routine of its own. If there is such a change, then it is logged at block 820. At block 820 a flag is also preferable set to indicate that the entry point has changed, so that the change will not be logged redundantly later. In some embodiments, the flag indicates the new value of the entry point, so the monitor program can determine if the entry point gets modified yet again.

After block 820, at block 830 the emulated instruction pointer, emulated code segment register, and emulated flag register are saved onto the emulated stack. Then the emulated stack pointer is decremented the corresponding 6 bytes, in the same manner as if a hardware interrupt had been received. Next, at block 840, the emulated code segment register and emulated instruction pointer are set to a special purpose monitor program routine to test the interrupt handler just installed by the target program. This interrupt handler testing routine is described below with reference to Fig. 9.

After block 840, execution passes to block 850, which returns control to the basic process of Fig. 5. This causes the interrupt handler routine of Fig. 9 to be emulated in the same step by step manner as the target program. This maintains the highest degree of encapsulation around the target program,

although if detecting viral replication is essentially the only concern, the interrupt handler testing routine of Fig. 9 may alternatively be executed in a more straightforward emulation without many of the execution safeguards described above.

If at block 810 the monitor program had determined that no operating system entry points had been changed, then control would have passed directly to block 850, and thus returned to the process of Fig. 5 to emulate the remainder of the target program.

Interrupt Handler Testing

The basic tack of the interrupt handler testing routine is to offer up a guinea pig file for "sacrifice" to a potential viral interrupt handler, and then test the guinea pig file for corruption. This requires that a "clean" guinea pig file already be at hand and also be disposable. This can be easily provided for by several methods, such as by creating the guinea pig file or copying the guinea pig file from a clean library copy at the very start of the monitor program. The guinea pig file should have a known content. It is preferably executable, but without its execution involving writing to other files. The guinea pig file can thus be essentially a null file that does nothing when executed, simply returning immediately.

As shown in Fig. 9, when the interrupt handler routine is entered at block 900, the first action is to open the guinea pig file, at block 910, after which the guinea pig file is closed at block 920. Next, at block 930 the interrupt handler testing routine examines the guinea pig file to determine if its content has been changed. Such would be the result of a virus having contaminated the interrupt handlers for opening or closing files. If a change is not detected at block 930, then at block 940 the guinea pig file is executed, after which at block 950 the guinea pig file is again examined by the interrupt handler testing routine to determine if its content has been changed by the execution interrupt handler.

If a positive determination had been made at either of blocks 930 or 950, then execution would pass from the respective block to block 960, at which the unauthorized access to the guinea pig file would be logged. After block 960, and also after a negative determination at block 950, execution passes to block 970, which executes an (emulated) IRET instruction. This is a return from interrupt instruction, which causes the values placed onto the emulated stack at block 830 of Fig. 8 to be restored to the emulated registers. This completes the interrupt handler testing, and returns the emulation to its last point of emulation in the target program.

For a more refined and definitive degree of analysis, block 960 can also initiate a routine to determine not just if the guinea pig was contaminated, but if it was contaminated in a way so as to contaminate other files; i.e., if it was infected with viral replication behavior. Such a routine is illustrated in Fig. 10. The process of Fig. 10 essentially creates a completely new emulation, with the modified guinea pig file serving as the target program. If this first guinea pig file now passes modification behavior on to a second guinea pig file, then the original target program has been shown to be contaminated with viral code having replicative behavior. To prevent needless additional recursion, the second level of emulation should be identified as such, through use of a flag, etc., so that if block 960 is reached during the second level of emulation, viral behavior is confirmed and the second level of emulation is terminated (rather than beginning another level of testing with yet another guinea pig file).

This replication detection process is illustrated in Fig. 10. After beginning at block 1000, at block 1010 the complete state of the current emulation is saved, and all operating system entry points, etc., are returned to their values at the beginning of the first emulation. Block 1010 also then includes the step of initiating emulation again, but with the guinea pig file specified as the target program. As noted above, this emulation level should be flagged as a second level emulation.

Block 1020 indicates the point at which the emulation of the guinea pig file has terminated, after which at block 1040 the first level emulation determines if the emulated guinea pig file had written to a second guinea pig file. This determination is most straightforward if a flag is simply passed from the second level emulation back to the first; it can also be by examining a checksum for the file. If the determination is positive, then at block 1050 the initial target program is confirmed and logged as being virus-contaminated. At block 1060 at the end of the process of Fig. 10, control is passed back to block 970 of Fig. 9, to continue emulation of the initial target program. Alternatively, reaching block 1050 can result in the entire emulation being terminated, as the target program has been confirmed as being virus-contaminated.

Alternative Embodiments

Rather than requiring the user to load the monitor program which then loads the target program, a "zero length loader" TSR version could be installed in a system and every program requested to be executed could be emulated. If no abnormal behavior is found in the first 'n' instructions, the monitor program could pass control to the CPU to allow the

target to execute at "full speed" and the end user would not have to be aware of the existence of the monitor program (other than a slight delay during the initial execution).

Another alternative approach would be where a recursive parser/emulator could effectively evaluate every single instruction of executable code in a program by noting the address of conditional branch instructions, and returning to that branch location, restoring the cpu/memory state of the machine at that instant, and continuing emulation as if the branch had taken the alternate route instead. Emulation continues until all instructions have been evaluated. This would be a time consuming process; however, the information revealed would definitively answer the question of whether the original code was virus infected.

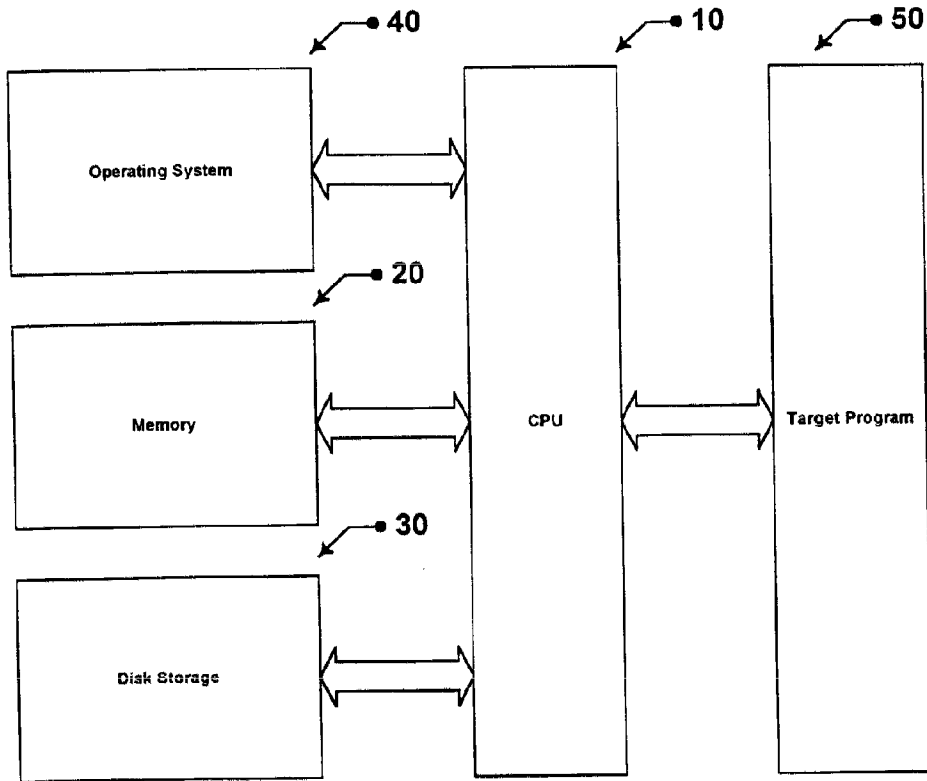
It is also important to note that, although the described embodiment is oriented towards identifying viral behavior, the disclosed emulation techniques can be constructively employed to emulate program execution in all types of situations where potentially destructive or other predetermined program behavior is a concern.

It is to be understood that the above description is intended to be illustrative and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. For instance, the instructions of the emulated application program could be read directly from disk storage rather than being loaded into memory first. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

Claims

1. A computer system configured to monitor the execution of a target program, said computer system comprising:
 - a processing unit having an instruction set;
 - instruction emulation means for emulating instructions in the target program corresponding to said instruction set;
 - monitor means, coupled to said instruction emulation means, for emulating execution of said target program and for monitoring said emulated target program execution to detect a predetermined behavior by said target program; and
 - means, coupled to said monitor means, for logging said predetermined behavior when detected.
2. The computer system of claim 1, wherein said computer system is configured to detect a computer virus associated with said target pro-

- gram, wherein said predetermined behavior is chosen to be indicative of replication of said computer virus.
3. The computer system of claim 1 wherein said instruction emulation means comprises:
 a register emulator for emulating registers of said processing unit; and
 a procedure controller for substituting emulation procedures for procedures accessed by said target program during emulation.
4. The computer system of claim 1 wherein said instruction emulation means comprises:
 a memory access controller for controlling access by said instructions to memory.
5. In a computer system, a method for monitoring execution of a target program comprising the steps of:
 emulating the target program; and
 monitoring emulation of the target program to detect a predetermined behavior indicating presence of a computer virus.
6. A computer system configured to monitor the execution of a target program, said computer system comprising:
 a processing unit having an instruction set;
 an instruction emulator for emulating instructions corresponding to the instruction set;
 an entry point access controller for controlling access to operating system entry points; and
 a logger for logging improper access by said instructions to operating system entry points.
7. The computer system of claim 6 further comprising a procedure access controller for controlling access to procedures during instruction emulation, wherein said logger logs improper access by said instructions to procedures.
8. The computer system of claim 6 further comprising a memory access controller for controlling access by said instructions to memory during instruction emulation wherein said logger logs improper access by said instructions to memory.
9. The computer system of claim 6 wherein said entry point access controller includes an interrupt tester for checking if a viral interrupt has been installed.
10. The computer system of claim 9 wherein said interrupt tester executes a guinea pig file and tests for modification of the guinea pig file to determine if a viral interrupt has been installed.
11. The computer system of claim 9 wherein said interrupt tester opens and closes a guinea pig file and tests for modification of the guinea pig file to determine if a viral interrupt has been installed.
12. The computer system of claim 10 wherein said interrupt tester executes the guinea pig file as a new target program, thereby creating a second guinea pig file, and tests for modification of the second guinea pig file to determine if a replicative viral interrupt has been installed.



**Figure 1A
(Prior Art)**

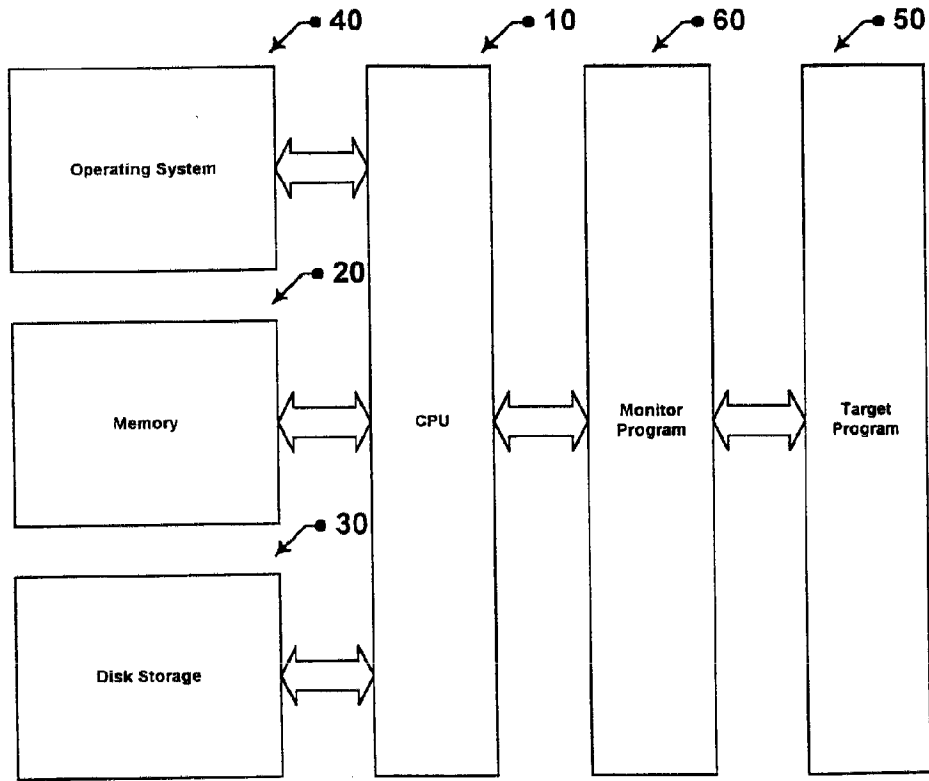
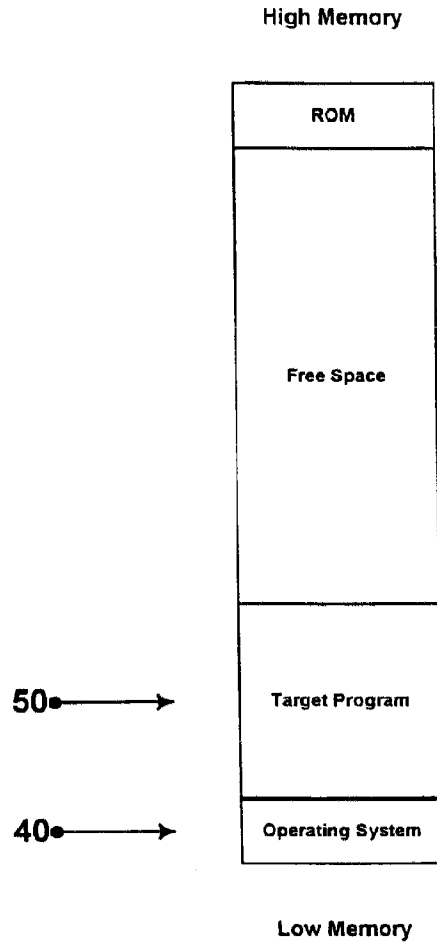


Figure 1B



**Figure 2A
(Prior Art)**

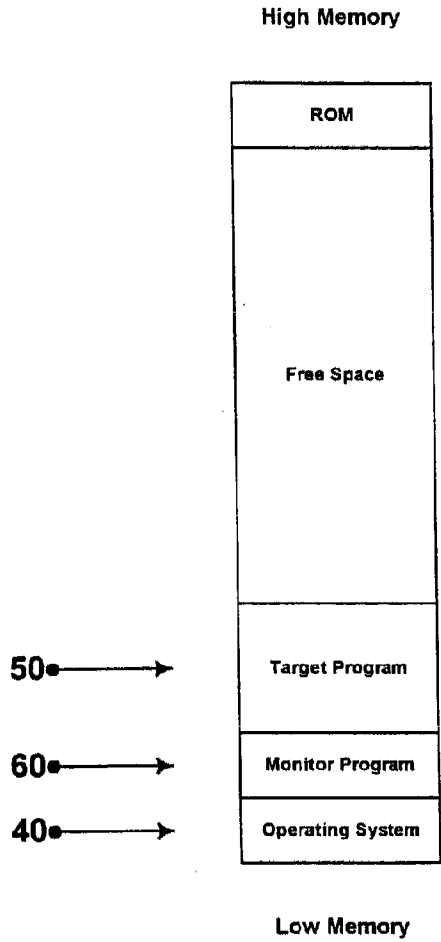


Figure 2B

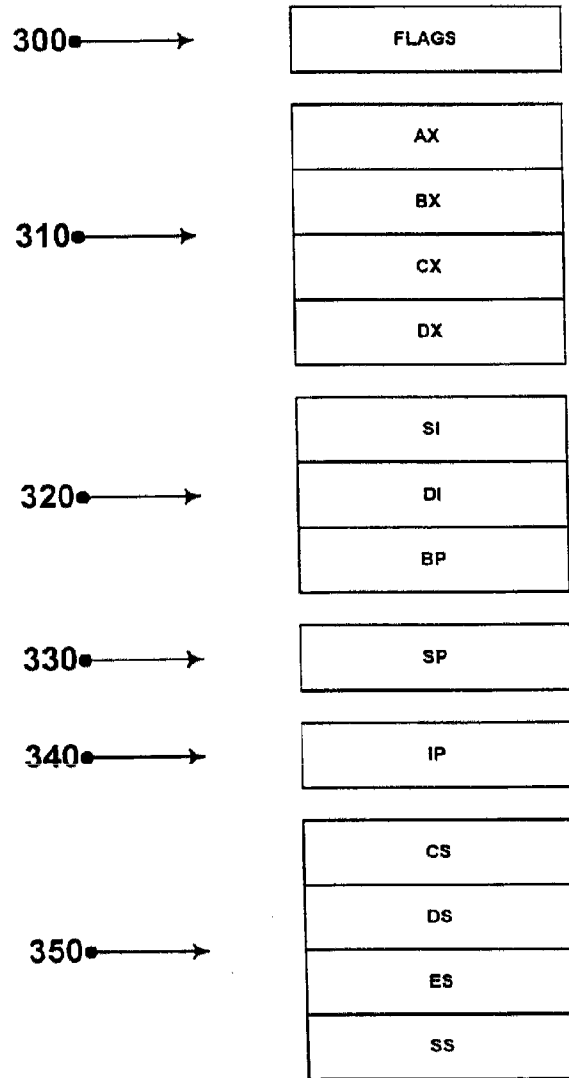


Figure 3
(Prior Art)

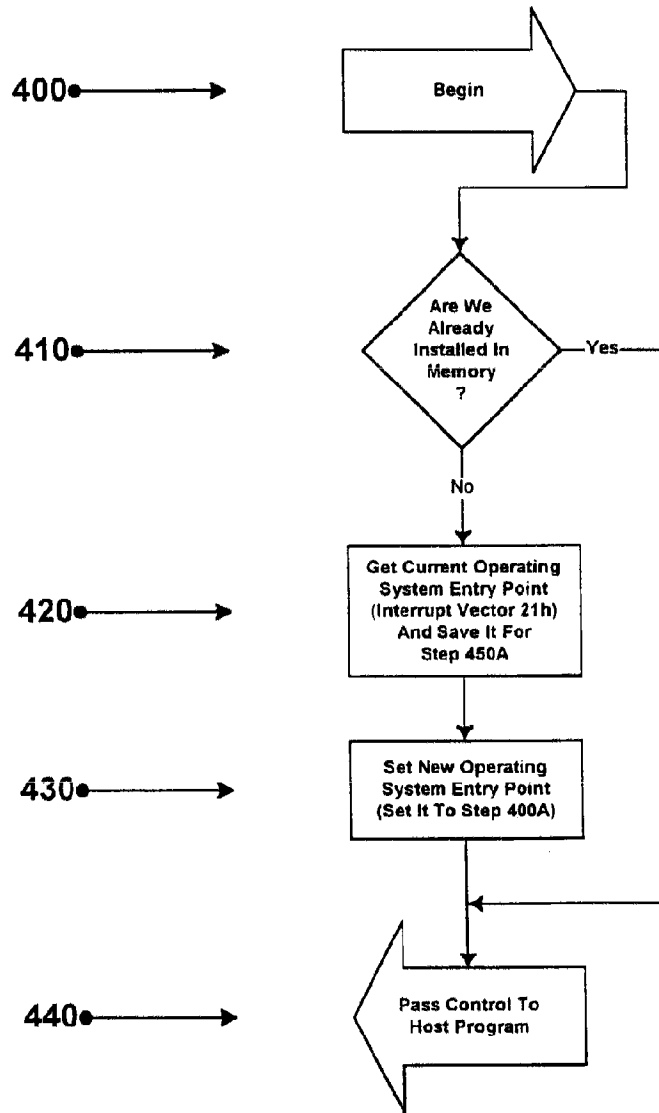
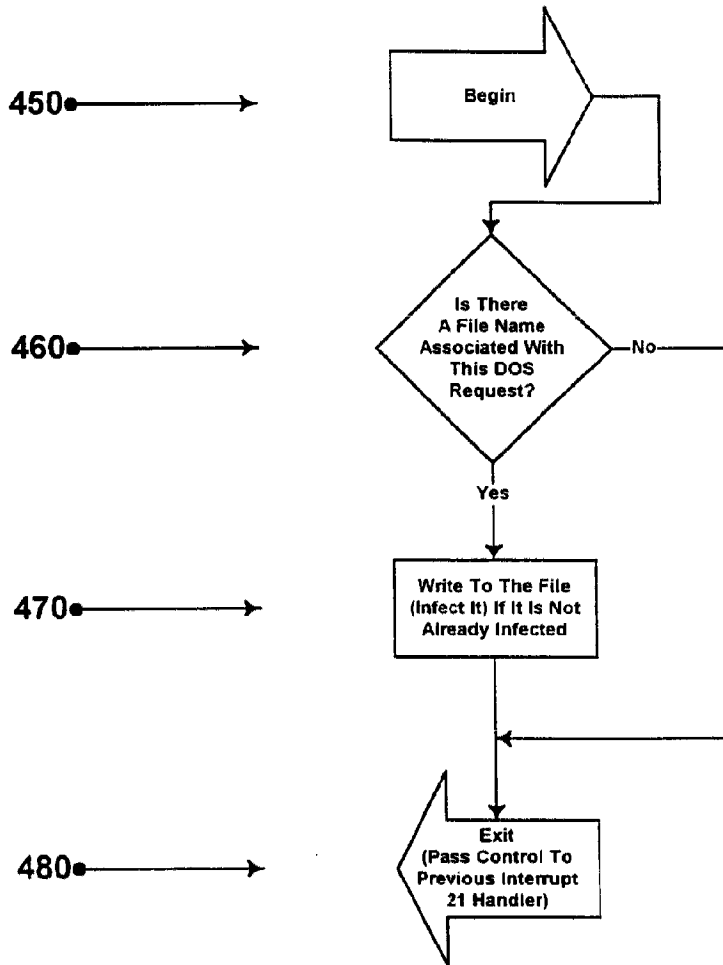


Figure 4A
(Prior Art)



**Figure 4B
(Prior Art)**

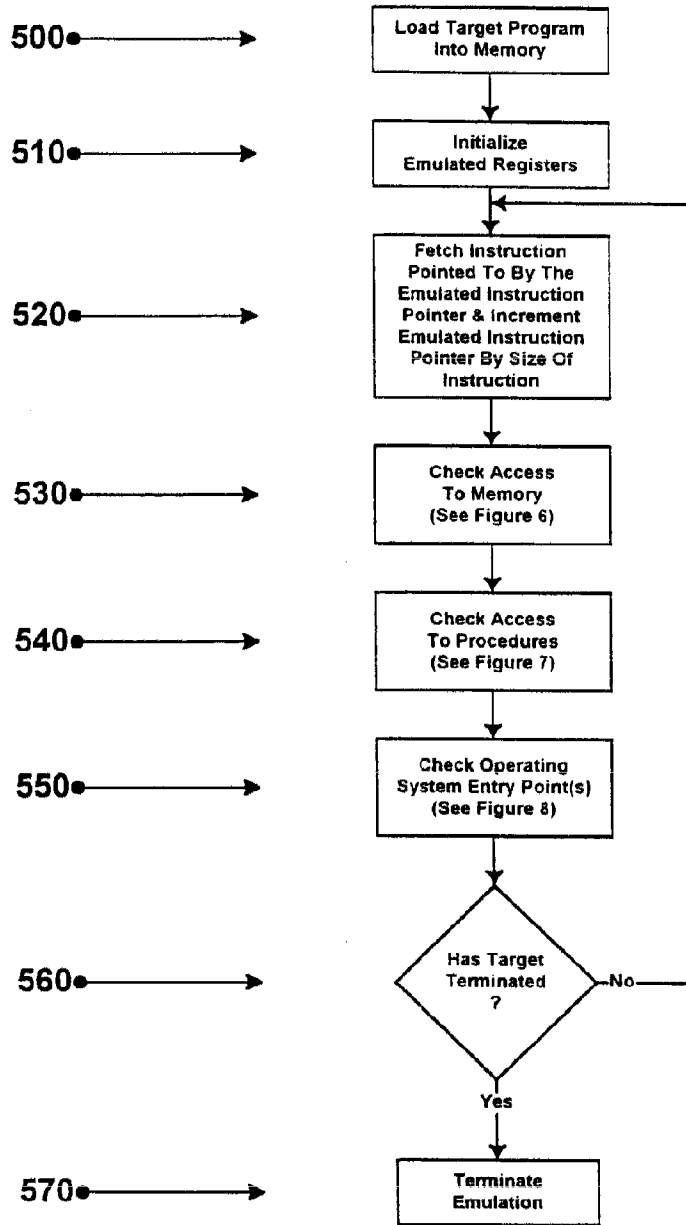


Figure 5

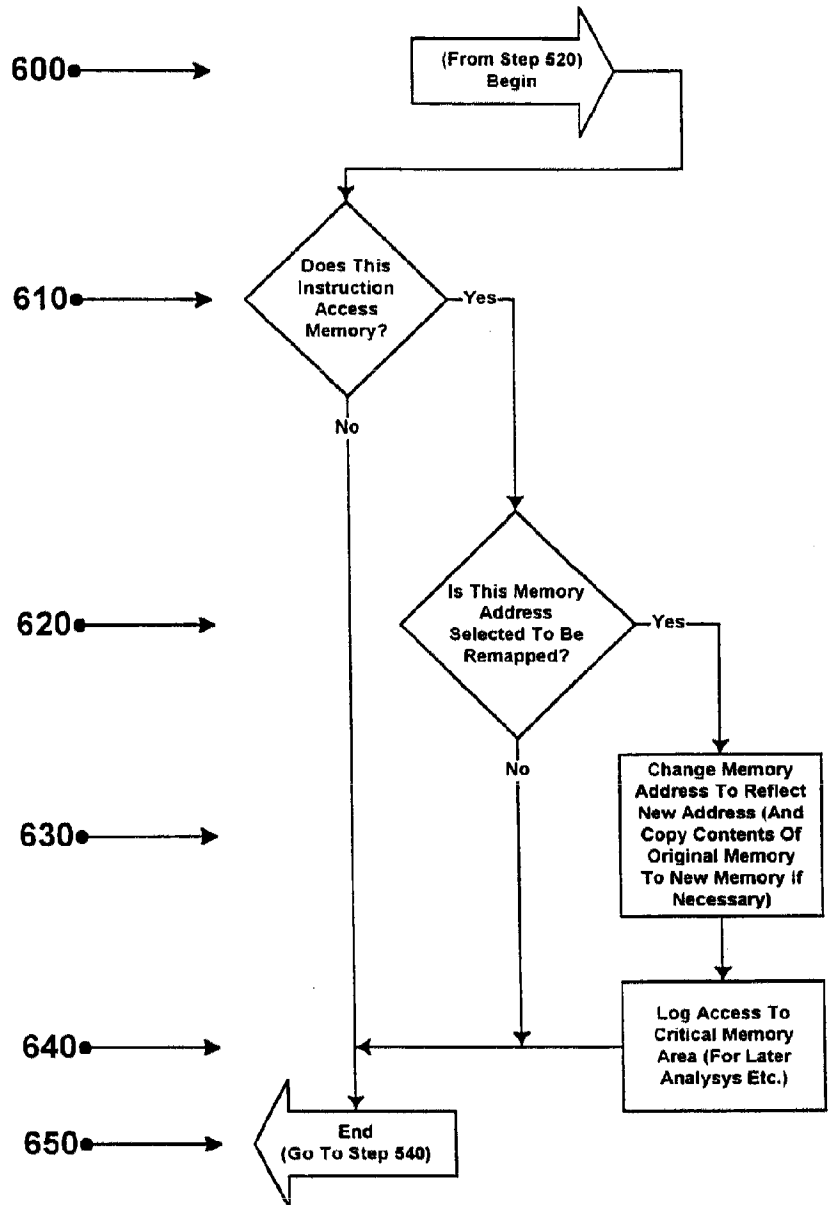


Figure 6

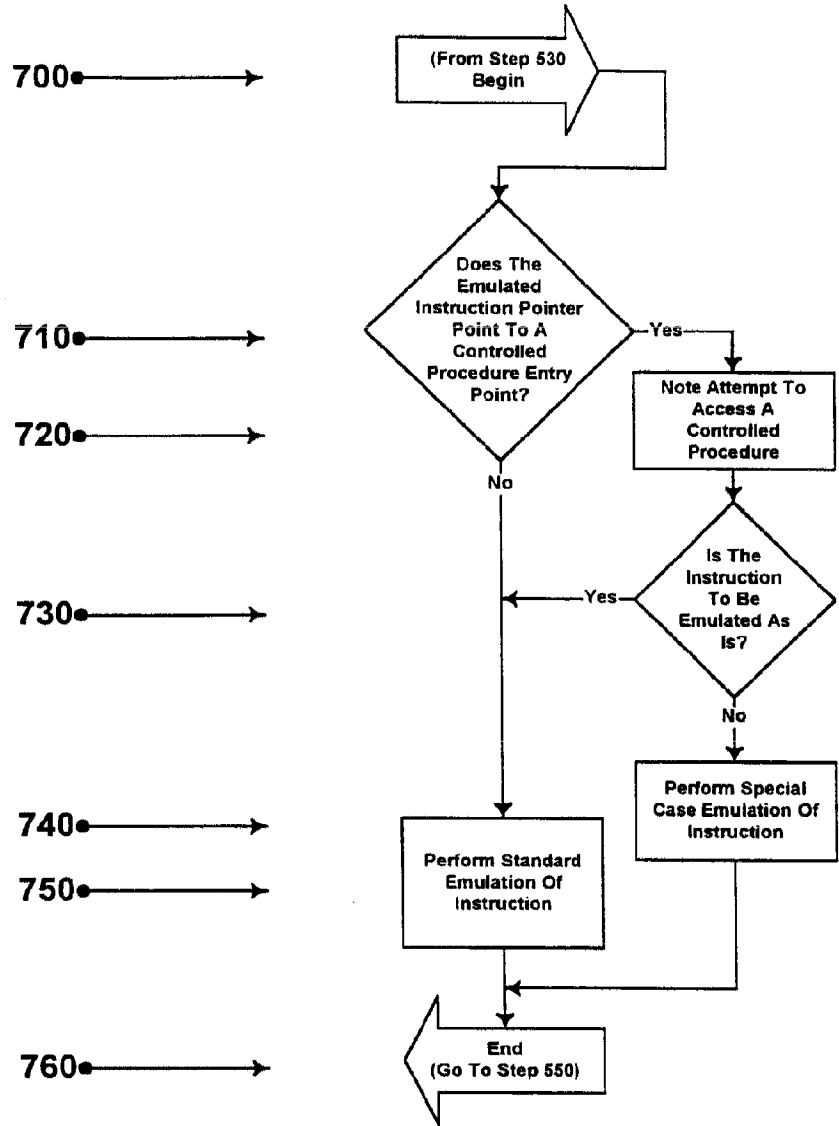


Figure 7

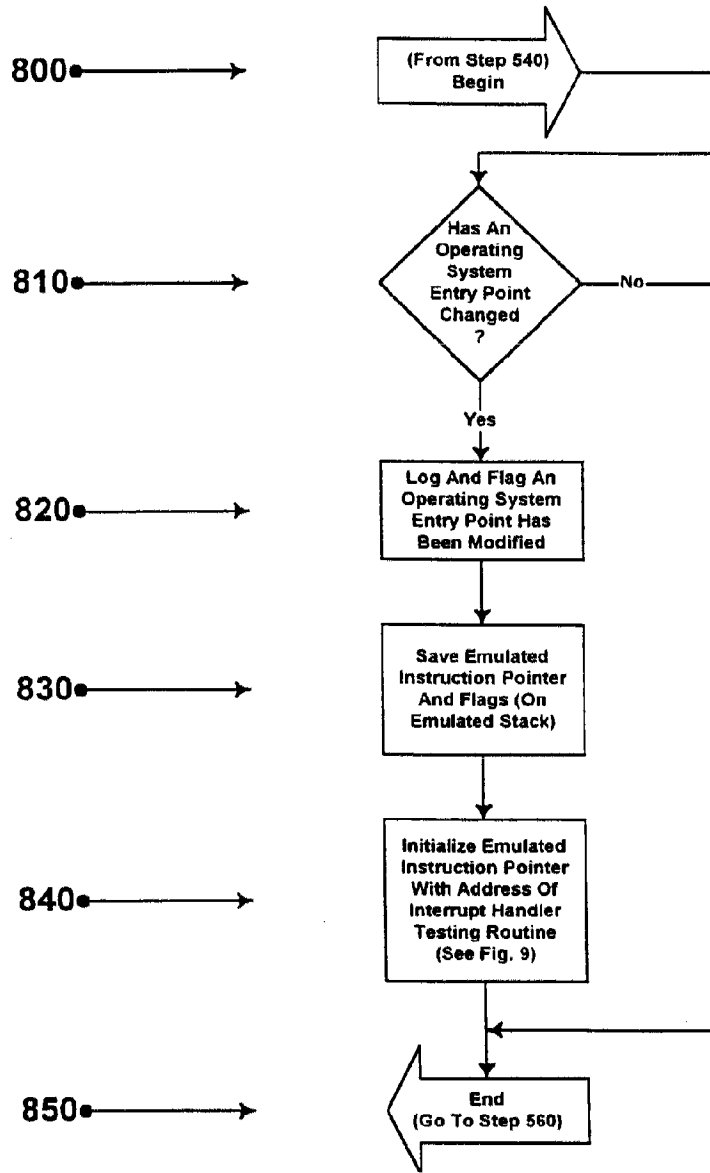


Figure 8

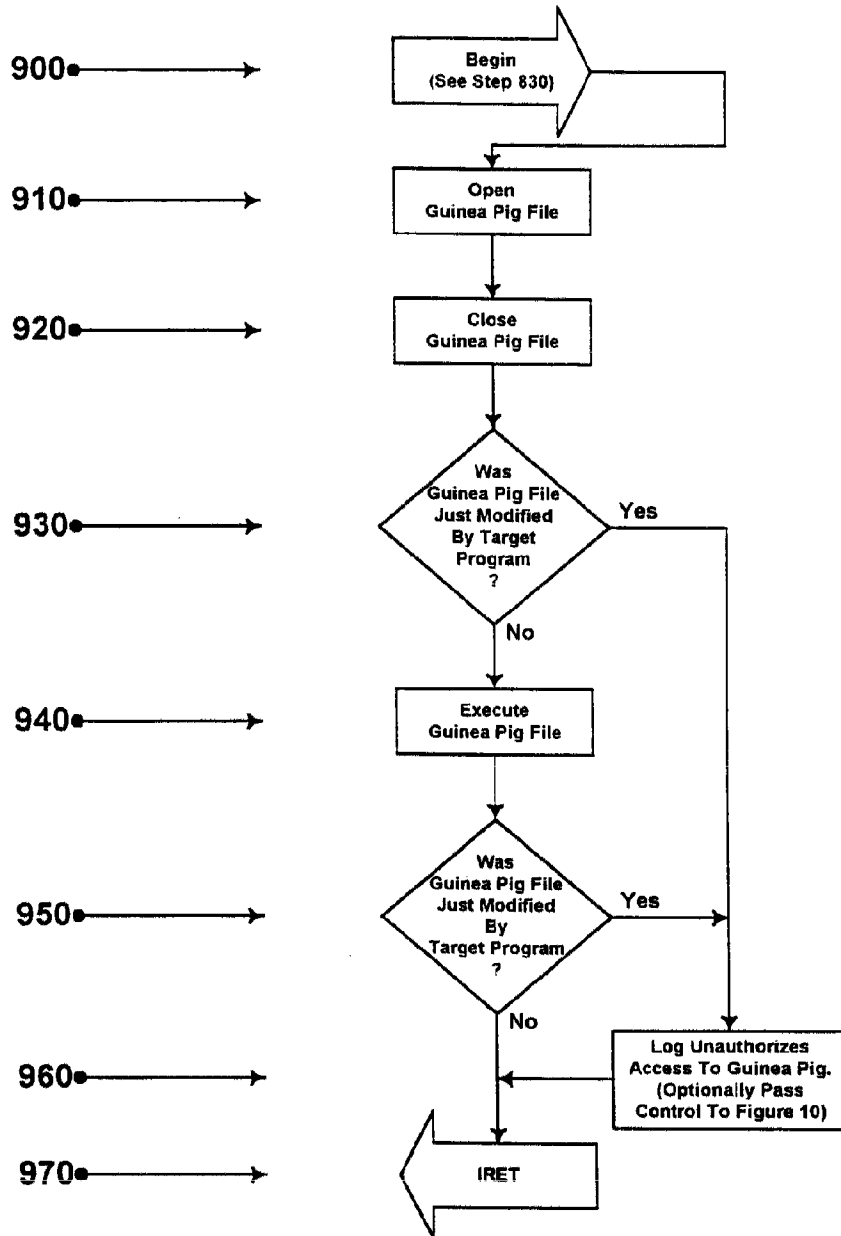


Figure 9

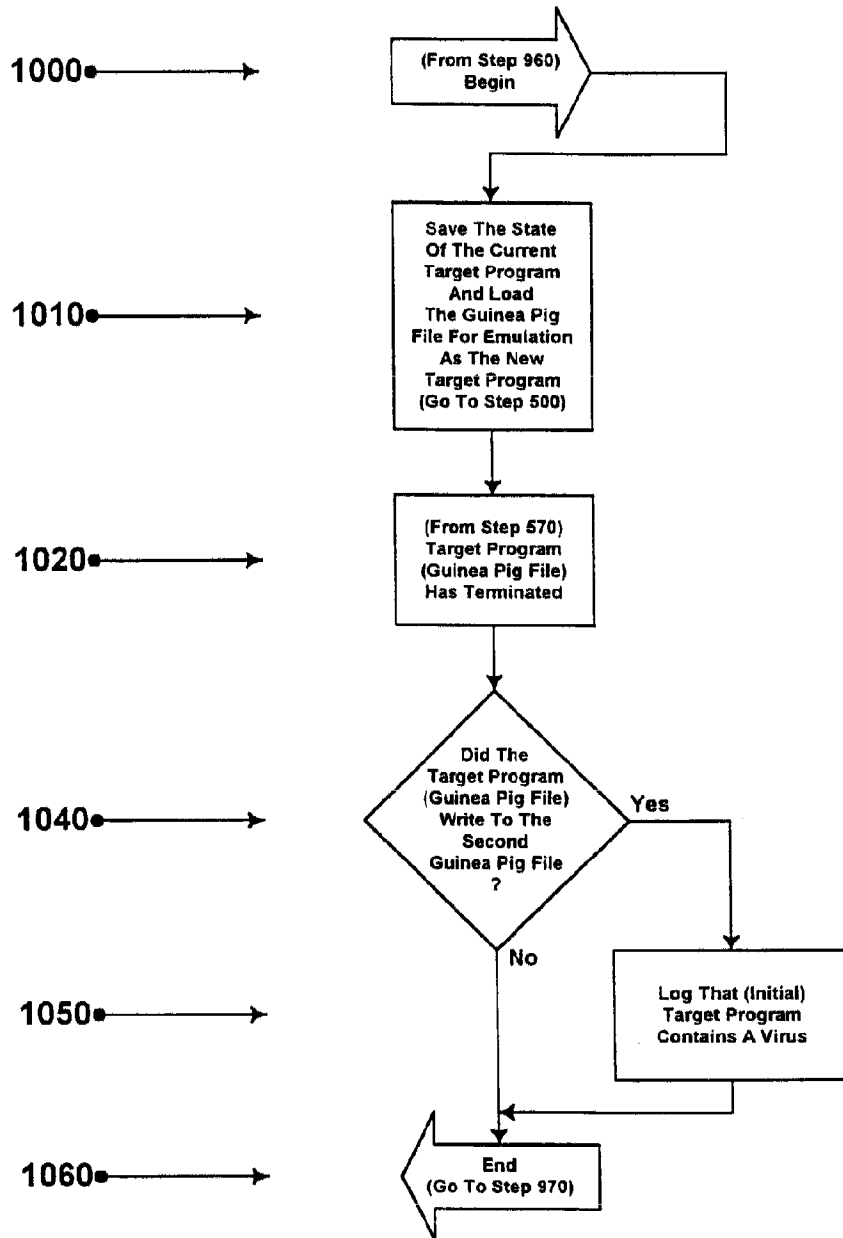


Figure 10

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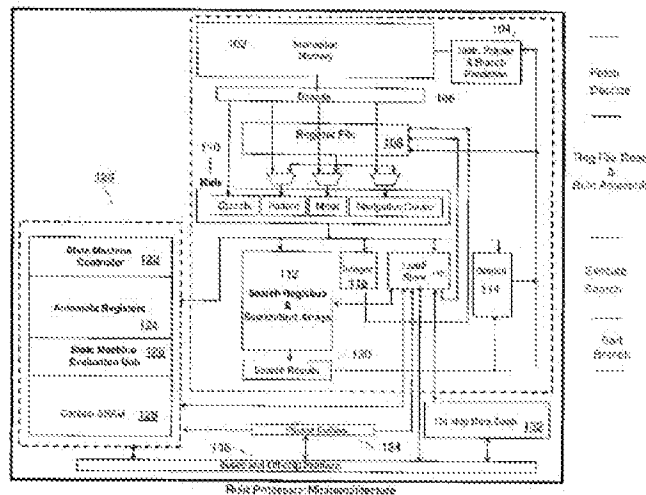
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[Continued on next page]

(54) Title: A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO SUPPORT RAPID APPLICATION OF RULESETS TO DATA



(57) Abstract: A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

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**A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING
DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE
REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO
SUPPORT RAPID APPLICATION OF RULESETS TO DATA**

[0001] This application is a non-provisional application of U.S. Provisional Patent Application Serial No. 60/438,847, filed January 9, 2003, which is incorporated herein by reference.

RELATED APPLICATIONS

[0002] The present application is related to U.S. Patent Application No. 10/650,363 entitled "Programmable Rule Processing Apparatus for Conducting High Speed Contextual Searches and Characterizations of Patterns in Data," filed on August, 27, 2003; U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____ entitled "_____" concurrently filed with this application, the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0003] The present invention relates to the field of information processing, specifically the field of content analytics and processing.

BACKGROUND OF THE INVENTION

[0004] Significant trends in computing and communications are leading to the emergence of environments that abound in content analytics and processing. These environments require high performance as well as programmability on a certain class of functions, namely searching, parsing, analysis, interpretation, and transformation of content in messages, documents, or packets. Notable fields that stress such rich content analytics and processing include content-aware networking, content-based security systems, surveillance, distributed computing, wireless communication, human interfaces to computers, information storage and retrieval systems, content search on the semantic web, bio-informatics, and others.

[0005] The field of content-aware networking requires searching and inspection of the content inside packets or messages in order to determine where to route or forward such packages and messages. Such inspection has to be performed on in-flight messages at "wire-speed", which is the data-rate of the network connection. Given that wire rates in contemporary networks range from 100Mbits/second all the way to 40Gbits/second, there is tremendous pressure on the speed at which the content inspection function needs to be performed.

[0006] Content-based security systems and surveillance and monitoring systems are required to analyze the content of messages or packets and apply a set of rules to determine whether there is a security breach or the possibility of an intrusion. Typically, on modern network intrusion detection systems (NIDS), a large number of patterns, rules, and expressions have to be applied to the input payload at wire speed to ensure that all potential system vulnerabilities are uncovered. Given that the network and computing infrastructure is continuously evolving, fresh vulnerabilities continue to arise. Moreover, increasingly sophisticated attacks are employed by intruders in order to evade detection. Intrusion detection systems need to be able to detect all known attacks on the system, and also be intelligent enough to detect unusual and suspicious behavior that is indicative of new attacks. All these factors lead to a requirement for both programmability as well as extremely high performance on content analysis and processing.

[0007] With the advent of distributed and clustered computing, tasks are now distributed to multiple computers or servers that collaborate and communicate with one another to complete the composite job. This distribution leads to a rapid increase in computer communication, requiring high performance on such message processing. With the emergence of XML (Extensible Markup Language) as the new standard for universal data interchange, applications communicate with one another using XML as the "application layer data transport". Messages and documents are now embedded in XML markup. All message processing first requires that the XML document be parsed and the relevant content extracted and interpreted, followed by any required transformation and filtering. Since these functions need to be performed at a high message rate, they become computationally very demanding.

[0008] With the growth of untethered communication and wireless networks, there is an increase in the access of information from the wireless device. Given the light form factor of the client device, it is important that data delivered to this device be filtered and the payload be kept small. Environments of the future will filter and transform XML content from the wireline infrastructure into lightweight content (using the Wireless Markup Language or WML) on the wireless infrastructure. With the increasing use of wireless networks, this content transformation function will be so common that an efficient solution for it's handling will be needed.

[0009] Another important emerging need is the ability to communicate and interact with computers using human interfaces such as speech. Speech processing and natural language processing is extremely intensive in content searching, lexical analysis, content parsing, and grammar processing. Once a voice stream has been transduced into text, speech systems need to apply large vocabularies as well as syntactic and semantic rules on the incoming text stream to understand the speech.

[0010] The emergence and growth of the worldwide web has placed tremendous computational load on information retrieval (IR) systems. Information continues to be added to the web at a high rate. This information typically gets fully indexed against an exhaustive vocabulary of words and is added to databases of search engines and IR systems. Since information is continuously being created and added, indexers need to be "always-on". In order to provide efficient real-time contextual search, it is necessary that there be a high performance pattern-matching system for the indexing function.

[0011] Another field that stresses rich content analytics and processing is the field of bio-informatics. Gene analytics and proteomics entail the application of complex search and analysis algorithms on gene sequences and structures. Once again, such computation requires high performance search, analysis, and interpretation capability.

[0012] Thus, emerging computer and communications environments of the future will stress rich analysis and processing of content. Such environments will need efficient and programmable solutions for the following functions - searching, lexical analysis, parsing, characterization, interpretation, filtering and transformation of content in documents, messages, or packets.

[0013] Central to these rich content processing functions are (1) operations to perform contextual and content-based search, lookup, navigation, and rich associative lookup, and (2) the capability to efficiently evaluate state machines against an input data stream.

[0014] In the prior art, search and lookup processing has typically has been performed in one of two ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions using a combination of content addressable memories (CAMs), comparator hardware and dedicated logic. For example, search rules are stored in a content-addressable memory, and the data is streamed across the structure, shifting it 1 byte or 1 word at a time. Alternatively, specific comparators are arranged at fixed locations to recognize specific values in the incoming data. Incidences of matches are recorded and consumed by the dedicated logic as per the requirements of the target application. Although the fixed ASIC approach can increase performance, it lacks easy programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0015] Second, traditional general-purpose microprocessors with general-purpose execution datapaths have been used to handle rich search and lookup functions and associated content processing. Microprocessors are fully programmable devices and are able to address the evolving needs of problems -- by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the performance level it can offer to rich content analytics and processing.

[0016] The limitation in performance on content analytics is inherent in the design and evolution of the microprocessor architecture. The microprocessor originated as a computing unit, performing arithmetic operations on 1,2,4,8 byte words. Subsequently, as the field of computing evolved, more functionality was progressively added to the microprocessor to address emerging fields. As a result, the general purpose microprocessor is functional across a very wide range of applications, but not very well tuned for any one in particular. Fundamentally, as it applies to the needs of content analytics, the microprocessor architecture has two key limitations -- (1) it lacks the capability to simultaneously perform massively parallel and fine-grain

pattern-matching and comparison operations on large datasets, and (2) it lacks the capability to make rapid and multiple state transitions and efficient multi-directional control flow changes based on input data.

[0017] A number of search and pattern matching algorithms have evolved to make best use of the microprocessor. The Boyer-Moore algorithm is widely regarded as one of the best-known techniques employed on a microprocessor to find occurrences of patterns in a given data set. The algorithm processes only one pattern at a time and must be repeatedly invoked if more than one pattern is to be searched in a data set. For each pattern to be searched, it advances sequentially through the data set making selective comparisons based on observations obtained from pre-characterizing the pattern. This algorithm provides superior performance relative to other pattern matching algorithms by reducing the total number of comparisons within a given data set. However, due to the sequential nature of the algorithm, the performance is limited by fundamental constraints of microprocessor architecture, namely the scalar instruction set and the penalty incurred on branching.

[0018] Owing to the aforementioned architectural limitations of the microprocessor, the efficiency and capability of conventional microprocessors are severely challenged by the emerging computing and communications environments described earlier. Several data points can be provided to support these arguments. For example, in a Network Intrusion Detection System (NIDS) such as Snort, it is already desirable to apply signature detection of hundreds of strings on incoming packets. Performing this workload with signatures of 8-byte patterns on a 3GHz Pentium IV processor in a commercial microprocessor-based system that employs an improved version of the Boyer-Moore pattern matching algorithm limits the packet rate to less than 50Mbps. Likewise, parsing of XML documents on such a platform is limited to the 10MB/s range, and speech processing is limited to 1 real-time stream on restricted grammars and vocabularies. These data points indicate that the conventional microprocessor of 2003 or 2004 will be able to deliver rich content analytics and processing at rates around the 100Mbps range. However, by that timeframe, data rates of between 1Gbps to 10Gbps will not be uncommon in enterprise networks and environments. Clearly, there is a severe mismatch of one to two orders of magnitude between the performance that can be delivered by the conventional microprocessor and that which

is demanded by the environment. While it is possible to employ multiple parallel microprocessor systems to execute some of the desired functions at the target rate, this greatly increases the cost of the system. There is clearly a need for a more efficient solution for these target functions.

[0019] A similar parallel exists in the case of state machine evaluation. The history of state machines dates back to early computer science. In their simplest formulation, state machines are formal models that consist of states, transitions amongst states, and an input representation. Starting with Turing's model of algorithmic computation (1936), state machines have been central to the theory of computation. In the 1950s, the regular expression was developed by Kleene as a formal notation to describe and characterize sets of strings. The finite state automaton was developed as a state machine model that was found to be equivalent to the regular expression. Non-deterministic automata were subsequently developed and proven to be equivalent to deterministic automata. Subsequent work by Thompson and others led to a body of construction algorithms for constructing finite state automata to evaluate regular expressions. A large number of references are available for descriptions of Regular Expressions and Finite State Automata. For a reference text on the material, see "Speech and Language Processing" (by Daniel Jurafsky and James H. Martin, Prentice-Hall Inc, 2000).

[0020] Using techniques available in the prior art, state machine and finite state automata processing can be performed in one of three ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions that directly implement a fixed and chosen state machine that is known a priori. Although the fixed ASIC approach can increase performance, it lacks programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0021] Second, Field Programmable Gate Arrays (FPGA) can be used to realize state machines in a programmable manner. Essentially, the FPGA architecture provides generalized programmable logic that can be configured for a broad range of applications, rather than being specially optimized for the implementation of state machines. Using this approach, one can only accommodate a small number of state

machines on a chip, and furthermore the rate at which evaluation can progress is limited. The density and performance characteristics of the implementations make this choice of solution inadequate for the broad range of emerging applications.

[0022] Third, traditional general-purpose microprocessors have been used to implement a variety of state machines. Microprocessors are fully programmable devices and are able to address the evolving needs of problems – by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the efficiency with which it can implement and evaluate state machines.

[0023] There is a need for a new solution for a programmable processing apparatus that is more suitable for content analytics and processing, and that is efficient on a set of functions that include state machine evaluation as well as the execution of operations for contextual search, lexical analysis, parsing, interpretation, and transformation of content on messages, packets, or documents.

SUMMARY OF THE INVENTION

[0024] A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

[0026] **Figure 1** is a block diagram of a rule processor.

[0027] **Figure 2** is an example of the use of one embodiment of a rule processor.

- [0028] **Figure 3** illustrates interfaces of one embodiment of a rule processor.
- [0029] **Figure 4** is a block diagram of one embodiment of a line card with a look-aside configuration.
- [0030] **Figure 5** is a block diagram of one embodiment of a line card with a flow-through configuration.
- [0031] **Figure 6** is a block diagram of one embodiment of a server co-processor configuration.
- [0032] **Figure 7** is a block diagram of one embodiment of a rule processor with a search apparatus.
- [0033] **Figure 8A** is a block diagram of one embodiment of a search register and the search execution hardware.
- [0034] **Figure 8B** is a block diagram of one embodiment of a search array.
- [0035] **Figure 9A** is a block diagram of one embodiment of a sorter.
- [0036] **Figure 9B** is a block diagram of one embodiment of a range select mechanism in a sorter.
- [0037] **Figure 10** is a circuit schematic of one embodiment of a search array.
- [0038] **Figure 11** illustrates an exemplary micro-architecture of a rule processor comprising of four processing stages.
- [0039] **Figure 12** illustrates an example pseudo-code of a complex pattern matching rule-set and the corresponding micro-code for an exemplary rule-processor.
- [0040] **Figure 13** illustrates the clock-by-clock pipelined execution of the micro-code shown in Figure 12.
- [0041] **Figure 14** illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention.
- [0042] **Figure 15** illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention.
- [0043] **Figure 16** illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention.
- [0044] **Figure 17** illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0045] A programmable rule processor apparatus integrating dedicated search registers and dedicated state machine registers with execution hardware to support rapid application of rulesets and grammars to data is described. Such a processor may be used for content analysis and searches. In one embodiment, the programmable rule processor includes portions or apparatus typically found in a general purpose processor along with search registers coupled with a search/parse execution array and also state machine registers coupled with state machine evaluation units. The portions of a general purpose processor may include the use of an instruction (or rule) memory, instruction pointer and instruction sequencer, as well as a decoder and general purpose register file. Other portions may be used and will be described in more detail below.

[0046] In one embodiment, the search registers store data or content in an array and the general purpose processor front end presents rules to the array for executing searches. The content may be a packet, stream, message or a document. The search registers and search/parse execution array allow for parallel and recursive sequencing of rules against the content payload, as well as parallel pattern matching capability and the capability of making multiple rapid content-based state transitions. Operations such as, for example, pattern matching, lexical analysis, parsing and interpretation functions, may be performed.

[0047] In contrast, in one embodiment, the state machine registers and state machine evaluation engines operate in an inverse fashion by storing rules programmed into the state machine registers and by streaming data through them. Note that for the discussion herein the terms state machine registers, automata registers and expression registers may be used interchangeably.

[0048] The coupling of the search registers and the search/parse array with the state machine registers and evaluation logic using a generalized sequencer and an instruction set format provide for a powerful programmable rule processor that accelerates rule-processing functions through dedicated and tailored hardware, and that allows a rich mix of operations to be performed in a single integrated processor apparatus. By integrating dedicated search registers and associated search/parse execution hardware with the general purpose processor apparatus, the associative

search and lookup functionality can be accelerated efficiently, and yet a rich mix of general purpose operations can be simultaneously performed. Likewise, by integrating state machine registers and associated state machine execution hardware with the general purpose processor apparatus, the state machine evaluation functionality can be accelerated, and simultaneously, a rich mix of general purpose functions can be performed on the data. The integration of all three pieces of apparatus – search registers and search execution hardware, state machine registers and state machine evaluation hardware, and general purpose processor hardware, yields a powerful programmable rule processor solution. Data can be fed into the rule processor and a mix of search functions, state machine evaluation functions as well as general purpose programming functions can be simultaneously performed. The state machine hardware and the search hardware can be viewed as another dedicated resource in the rule processor. A variety of operations can be performed on the data, which can be both analyzed and transformed progressively. In one embodiment, the various functional operations that can be performed in this rule processor can be performed in any sequence or order, and also in parallel, leading to accelerated content analysis and transformation capability.

[0049] Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[0050] It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussion, it is appreciated that throughout the description,

discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

[0051] The present invention also relates to apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus.

[0052] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these systems will appear from the description below. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the invention as described herein.

[0053] A machine-readable medium includes any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). For example, a machine-readable medium includes read only memory ("ROM"); random access memory ("RAM"); magnetic disk storage media; optical storage media; flash memory devices; electrical, optical, acoustical or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.); etc.

Overview

[0054] A programmable rule processor is disclosed that comprises a general purpose processor portion having general purpose registers, a general purpose execution data path attached thereto, and an instruction sequencer. The general purpose processor portion is a tightly coupled with search registers with search execution units and state machine registers with state machine execution units. Together the search registers with search execution units and together the state machine recognition units the state machine execution units may each be considered processor execution units much like a floating point unit and an integer unit are execution units in a general purpose processor. Based on the type of instruction (e.g., opcode), a decoder in the general purpose processor portion is able to direct instructions to either of these execution blocks.

[0055] The general purpose processor portion feeds data and rules to the search registers and the state machine registers and is able to receive results from either one and supply them to the other or to both. That is, the general purpose processor portion is integrated with the search registers and the state machine registers such that the general purpose processor portion can access all the data in the search registers and the state machine registers, as well as move data between the search registers, and the state machine register, and the general purpose registers.

[0056] The general purpose processor portion also includes a (rule) instruction memory to store instructions, a instruction sequencer, including an instruction pointer, to sequence through a set of instructions stored in the instruction memory, a decoder to decode each instruction. The decoder is able to examine the instructions fed to it and to obtain search parameters and operands or retrieve indexes to locations in a general purpose register file that store such parameters and operands. Thus, the decoder decodes the instructions and then assembles the operands and parameters and prepares the rules that will be presented to the various rule processing execution units.

[0057] Figure 1 is a block diagram of one embodiment of a programmable rule processor. The programmable rule processor integrates traditional microprocessor capability with grammar processing, expression processing and string matching capabilities. Simple string matching is provided by search registers and a search/parse array that search for a set of bytes. The expression processing is

provided by state machine hardware that detects and processes combinations of multiple strings and operators. The grammar processing is achieved by the combined use of these two pieces of specialized hardware along with the general purpose processor to perform contextual and progressive parsing by applying a tree of rules and expressions, resulting in a contextual search with complex control flow.

[0058] Thus, the programmable processor of the present invention integrates parallel pattern matching, contextual search, navigation and progressive rule analysis, state machine hardware and elements of a conventional processor (e.g., integer, load/store, associative lookup, branching).

[0059] Referring to Figure 1, the instructions are stored in an instruction memory 102. Instructions are selected by flow control using an instruction fetch pointer and branch prediction unit 104. The instruction pointer points to locations in instruction memory 102 from which instructions are to be fetched. This occurs during the fetch stage of the hardware pipeline. Instruction fetch pointer and branch prediction unit 104 operate in a manner well known in the art to sequence instructions to decoder 106.

[0060] Decoder 106 reads and decodes instructions during a decoding stage. As far as decoded instructions for rule processing by the search registers and search hardware is concerned, the results from decoder 106 include an identification of the opcode, pattern, mask and navigation control (e.g., windows of where to begin and end searching) for each rule, such as instruction 110, or an indication of where in the general purpose register file 108 such information is stored. The instruction format is expanded to specify rules for searching and analysis of data. Note that other instruction formats may be used. After reading from register file 108, the values can be used to incorporate or write specific values into various fields of a rule that is being assembled.

[0061] As far as decoded instructions for rule processing by the state machine apparatus is concerned, the results from the decoder include an identification of the opcode, the input data values or a pointer to where the data values reside (either in general purpose register 108, or in packet buffers 134, or in an external address), as well as a code or indication as to which of state machine registers 124 and state machine units need to be invoked.

[0062] Next, the parameters of each instruction are supplied by decoder 106 to state machine unit 120, search registers & search/sort arrays 112, integer (or other arithmetic logic unit (ALU)) unit 118, load/store unit 116, and branch unit 114. In another embodiment, this is done with an instruction sequencer unit, which acts both as an instruction sequencer and a decoder.

[0063] Load /store unit 16 loads values into or stores values from the search registers as well as state machine registers 124 as well as streams data into the state machine unit 120.

[0064] The instructions may specify rules for searching and analysis of data. In such a case, the rule is presented to the search registers of search registers & search/sort arrays 112. The search execution hardware finds the specified pattern in the search registers, if it exists. Sort array sorts and delivers the desired match location and match results and completes execution of the search(es). Results of the searching are sent to search results storage 130.

[0065] More specifically, search registers & search/sort arrays 112 comprises search register and a sorter. These will be described in more detail below. The search register stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of the search register may be arbitrary, and in one embodiment is organized within a larger array, called a search array having multiple rows of a predetermined number of bytes each. Data from search register is stored in a replicated manner inside the search array. Irrespective of the manner in which the searchable data is organized throughout the search array, the search array receives a pattern and mask from rule 110. The pattern is compared against entries in the search array. The mask provides an indication of those bytes in the pattern that are not part of the pattern being searched. In one embodiment, the search array has an output line for each of the rows in the search array indicating whether the pattern being searched matched that content data stored in that particular row. The output lines of the search array are coupled to inputs of the sorter.

[0066] The sorter receives offsets that indicate a starting and ending point, respectively, of a range in the search register that is to be searched. Based on the match indication lines from the search array and the start and end range as specified

by the offsets, the sorter processes the results of the search array. Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by the opcode in search instruction 110. The sorter may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from the search array. In this manner, the sorter may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations. Thus, after processing, the sorter generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in the search register where the first match occurs or where the last match occurs with respect to the top of the search register. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[0067] Following the computation of the outputs, namely, the match indication and the index, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 102) dependent on the match indication or other similar techniques. For example, the search results in search results storage 130 can be made available for branching via branch unit 114, which causes branching based on those results, or to instruction pointer & branch prediction unit 104 for changing values of the instruction pointer and determining a new set of rules that are to be executed by the rule processor. Note that the branch unit 114 may branch based on a value specified in a rule or opcode field, which branch unit 114 receives after decoding. Branch unit 114 operates in a manner well-known in the art and is described in greater detail below.

[0068] Additionally, the sorter may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of the

sorter may also be coupled to the rule processor instruction sequencer 104 to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[0069] Alternatively, the instructions may specify rules for expression processing or state machine evaluation. Such an instruction may indicate that the state machine unit is to be invoked, what state machines are to be tested and what data is to be streamed or input to those state machines. In such a case, state machine unit 120 performs the expression processing in response to the instructions. State machine controller 122 controls state machine registers 124 based on state machine configuration information. State machine configuration information may be received by state machine unit 120 via load/store unit 116, packet buffers 134 or the buses 136, and state machine controller 122 loads this information in state machine registers 124. The state machine configuration information is used to program state machine behavior into state machine registers 124. Once programmed, data may be streamed across the state machines and the state machines may be evaluated. State machine evaluation unit 126 comprises hardware that evaluates one or more state machines programmed into the state machine registers 124 in view of the data being presented to state machine unit 120. In one embodiment, state machine evaluation unit 126 evaluates a large number of state machines in parallel. One embodiment of state machine unit 120 is described in more detail below.

[0070] Multiple state machines may be evaluated in parallel. Each state machine's behavior is specified in a set of state machine registers. For each state machine register set, a state machine evaluation unit executes the state machine specified in the register set against input data. Multiple state machines are specified via multiple sets of state machine registers. Multiple state machines can be evaluated in parallel, by providing an execution unit for each state machine register set. Each state machine could be fed independent data so that multiple state machines could be evaluated in parallel on multiple distinct data streams.

[0071] Context static random access memory (SRAM) 128 is used to store context information for multiple sets of data being evaluated (e.g., data from multiple different streams). If a packet is from a different stream or connection, then the front-end of the programmable rule processor issues an indication to state machine controller 122 that indicates a new stream (or connection) and not part of the same

stream as the previous bytes being processed. This indication can be issued on either a dedicated instruction or issued on a field of the instruction that invokes the state machine operation. In response, state machine controller 122 causes the accumulated state machine evaluation information that exists in state machine registers 124 and state machine evaluation unit 126 to be stored away as context in context SRAM 128. More specifically, once a new rule provides this indication (e.g., via opcode), state machine controller 122 first stores all temporary status of the execution thus far in context SRAM 128 and loads in the context for the stream corresponding to the new rule. If it is a new stream, there is no context accumulated as yet and it starts with the register context initialized. Note that in this case after the end of the first packet of a fresh stream, fresh context is created. Note that in one embodiment, load/store unit 116 has access to context SRAM 128.

[0072] Note that the state machine unit 120 and search registers and search/sort array 116 act as distinct execution units that may operate in parallel. They may be processing the same or different data, or process the same data at different times.

[0073] In one embodiment, load/store unit 116 stores values into search registers 112 or remove values from search registers 112. Load/store unit 116 could load values into general purpose registers file 108 in a manner well-known in the art. Load/store unit 116 communicates with an on-chip data memory or data cache 132 and external memory (through bus and off-chip interface 136).

[0074] Load/store unit 116 also reads from and writes from a message buffer or packet buffer (temporary storage) 134. Packets flow into the message buffer or data buffer or packet buffer 134. Load/store unit 116 may move those into search registers 112 to enable an entire packet or message or document to be stored in search registers 112 via packet buffer 134. This allows the programmable rule processor to receive packet, message, document or stream data and load it into search registers 112 and, using the rule processor, do a series of finds or navigated windowed searches to locate specific portions of the data, characterize the packet, or delineate various zones in the packet or regions of interest in the packet wherein more pattern matching or state machine evaluation has to be performed. Rulesets stored in instruction memory specify the high level control flow of the program that includes the overall control flow graph specifying the graph or tree of rules that needs to be applied or performed.

A variety of rich sequences or rulesets or grammars could thus be applied to the data. For example, initially, based on a context search to be performed, search registers 112 are loaded to find a zone of interest. Once the zone of interest in the data has been found, load/store unit 116 transfers that region to state machine unit 120 for application of a certain number of rules or regular expressions to that zone or portion of data. After transfer, a new rule is presented to state machine controller 122 that indicates which state machines to evaluate against this zone of data.

[0075] Load/store unit 116 can access state machine unit 120. For example, load/store unit 116 can send values to program state machine registers 124 with state machine behavior. Load/store unit 116 may provide data from a number of sources for evaluation. Load/store unit 116 may provide data from packet buffers 134 and can be streamed or fed to state machine unit 120. Load/store unit 116 can provide data or from buses via off-chip interface 136. Load/store unit 116 may send program or data values. State machine unit 120 then evaluates such data by having state machine controller 122 take the data and feed it to state machine registers 124 and state machine evaluation unit 126 for evaluation.

[0076] Note that although not shown, in one embodiment, state machine unit 120 and the search registers and search/sort arrays 112 may be coupled together using dedicated buses or shared buses to transfer data and/or results between each other.

[0077] Integer unit 118 performs general purpose integer functions. In one embodiment, integer unit 118 computes indexes or addresses, or transforms data that may be then fed back to the search registers or state machine registers.

[0078] Thus, one embodiment of the programmable rule processor includes three sets of registers. These include general purpose registers and two other sets of registers, namely search registers and state machine registers. An execution unit is coupled to each of the search registers and the state machine registers. For the state machine registers, the execution unit is the state machine evaluation unit, while for the search registers, the execution unit is the search and sort array. Thus, the rule processor takes a conventional microprocessor front-end and adds search registers and a search and sort execution hardware and state machine registers and state machine evaluation unit to evaluate state machines.

[0079] Figure 2 is an example illustrating the capability of one embodiment of the rule processor executing a rich rule tree comprising a sequence of operations that include a protocol decode function followed by the use of regular expression processing to find patterns of interest in specific portions of the input data. Referring to Figure 2, the rule tree is shown with two phases or levels. The first phase involves a protocol decode operation in which packets going through a network are examined and decoded to understand what protocol is in effect. This requires pattern matching on potentially all the bytes in each packet. In this case, the search registers and search/parse array are used to perform a series of find operations. In this example, various routines of FindForward and FindNotForward operations, which are discussed in more detail below are used to determine if the protocol being used is HTTP and to determine if a GET command or a POST command is being used. More specifically, FindNotForward and FindForward operations locate where the commands begin and end as well as locating arguments for any universal resource indicator (URI). Note that each of a series of such location operations may be executed in a single iteration of a cycle.

[0080] After determining that the packet is some type of HTTP packet, determining if a get command or a post command exists, and after locating the arguments, the last sequence shown in the program, the FINDRE sequence or function, is used to determine if a set of patterns exists. To that end, the start and end locations that were found by the search register and search/parse execution hardware identify where the relevant bytes are in the search registers that may be extracted by the load/store unit and sent to the state machine unit for processing thereby. The instruction sequencer provides a command to point to a group of state machines for evaluation and the state machine controller decodes the group and invokes them against the data. In the end, results are available that indicate whether any of the URIs were found in that zone (i.e., whether there was a match). The result information can be passed back to the remainder of the rule processor, which may, for example, use the branch unit to branch to some other location based on those results (maybe due to some pattern identified in the payload of the packet).

[0081] Thus, one embodiment of the programmable rule processor performs stateful inspection, pattern matching, analysis, and state machine evaluation on high speed data streams.

[0082] Embodiments of the rule processor described herein include one or more advantageous features. For example, one embodiment of the rule processor may utilize a non-procedural high-level language to describe data and data patterns. The use of high level descriptions reduces coding effort. Embodiments of the present invention also provide support for complex protocols and data layouts, such as, for example, variable size, string terminated, conditional, overlaid, or arbitrarily ordered data, as well as arbitrary data layouts.

Exemplary Card Configurations

[0083] Figure 3 illustrates interfaces of one embodiment of a rule processor. Referring to Figure 3, rule processor 300 includes a host interface 301, a streaming interface 302, a memory interface 303, and a look-aside interface 304. Host interface 301 may comprise, for example, a PCI-X interface. Streaming interface 302 may comprise, for example, a SPI 4.2 interface or a HT & Cascade interface. Memory interface 303 may comprise, for example, a DDRII interface. Look-aside interface 304 may comprise, for example, a LA-1 interface. Note that in other embodiments, the rule processor may have additional interfaces or a subset of the interfaces shown in Figure 3.

[0084] A rule processor, such as rule processor 300, may be included in a number of card configurations. Figures 4-6 illustrate a number of exemplary card configurations. Figure 4 is a block diagram of a line card look-aside configuration. Figure 5 is a block diagram of a line card flow-thru configuration. The in-line codes operate on a stand-alone basis. Therefore, in such a configuration, the rule processor does not send results back to a host processor. The rule processor receives packets on one interface, unravels the packets and determines the protocol to detect packets. The rule processor creates results and may modify the data to be sent. Subsequently, the rule processor sends the data to its next destination. Note that rule processor performs, storing, routing, delivery and other network functions.

[0085] Figure 6 is a block diagram of a server co-processor card configuration. In this configuration, the host processor receives a message, because the host processor handles all of the network functions. The host processor sends a message (packet or buffer) and some instructions indicating what type of rule processing is to be applied to the rule processor. In response, the rule processor applies a rule processing sequence or program and then sends the results to the host processor. The host is then able to take any action, if necessary.

[0086] Referring to Figure 4, the line card configuration comprises a rule processor 401 having a memory 402 coupled to its memory interface and a network processor 403 coupled to a streaming interface of rule processor 401. Rule processor 401 has a host interface for coupling to a host or other control plane.

[0087] Network processor 403 is coupled to a memory 404 and includes an interface 407 for coupling to a host or other control plane. Network processor 403 has an input 405A and an output 405B. Input 405A is coupled to receive network traffic, which network processor 403 forwards to rule processor 401 for processing (e.g., attack detection using patterns, rules, expressions and grammar). The network traffic is forwarded from network processor 403 via output 406.

[0088] Referring to Figure 5, the line card flow-thru configuration comprises a rule processor 501 having a memory 502 coupled to its memory interface, an output 505B of a network processor 503A coupled to its streaming interface, and an input 506A of a network processor 503B coupled to its look-aside interface. Rule processor 501 has a host interface for coupling to a host or other control plane.

[0089] Network processor 503A is coupled to a memory 504A and includes an interface 507A for coupling to a host or other control plane. Network processor 503A has an input 505A and an output 505B. Input 505A is coupled to receive network traffic, which network processor 503A forwards to rule processor 501, via output 505B, for processing (e.g., attack detection using patterns, rules, expressions and grammar). After processing, rule processor 501 forwards the network traffic to network processor 503B via input 506A. Network processor 503B is coupled to a memory 504B and includes an interface 507B for coupling to a host or other control plane. Network processor 506B outputs network traffic via output 506B.

[0090] Referring to Figure 6, the co-processor card resembles a standard PCI-X card that includes a host processor 606 coupled to a chipset 604 via a host interface.

Chipset 604 includes a memory interface coupled to host memory 605. Chipset 604 also includes two PCI-X interfaces, one coupled to a network interface card (NIC) 603 and the other coupled to a host interface of rule processor 601. Rule processor 601 also includes a memory interface coupled to memory 602.

[0091] In the arrangement in Figure 6, content is received via NIC 603 and is sent via chipset 604 to host memory 605. Processor 606 receives an indication (e.g., interrupt) indicating that content has been received and is stored in host memory 605. In response, host processor 606 signals rule processor 601 to handle the content processing. Once completed, rule processor 601 signals host processor 606, which signals NIC 603 indicating to NIC 603 that the data in host memory 605 is ready for transfer. Finally, NIC 603 access the network traffic from host memory 605 via chipset 604 and sends the network traffic out to the network

An Exemplary Embodiment of Search Register and Search/Sort Array Hardware

[0092] One embodiment of the search register and search/sort array hardware is given below. Note that alternative embodiments of search register and search/sort array hardware may be used.

[0093] Figure 7 is a block diagram of a portion of one embodiment of a rule processor comprising search registers 701 and search execution hardware 702. Such a portion may be part of the rule processor of Figure 1. Search instruction 703 is presented to search registers 701 and search execution hardware 702. As described above, the processor further comprises of an instruction store referred to as rule/instruction memory 704 and an apparatus to control the flow of instructions that includes, in one embodiment, instruction sequencer 705 and instruction pointer 706.

[0094] A typical search entails presentation of an instruction or rule to the search registers. The rule specifies a pattern along with one or more additional search parameters. In one embodiment, the search function returns a number of results. These include an indication of whether or not a match was found between the pattern and the content in the search registers, and also a match location indicating where in the payload search registers the match occurred.

[0095] Additional search control parameters are provided by the rule processor to search execution hardware 702. Search instructions might provide a mask vector along with a set of bytes comprising the target search pattern. The mask vector might be comprised of bits that correspond to the target pattern byte or bytes. In one embodiment, specific bytes in the target pattern to be ignored during the search operation are selected by setting the corresponding bits in the mask vector to a pre-determined logic level of 0 or 1. Thus, the target pattern used in the search may be reduced in size. Additionally, the rule processing instructions may specify starting and ending locations that constitute a search window or a range of bytes in search registers 701 within which the search is constrained.

[0096] Additional parameters to search instructions may include a branch address to be utilized by the rule processor in the event of an unsuccessful search.

[0097] An example of a search instruction is a windowed-find-first-forward instruction. In one embodiment, in a windowed-find-first-forward search, given an 8-byte pattern specified in or by a rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content data (e.g., document data) in search registers 701, and an ending location offset address pointing to an ending byte in the content data (e.g., document data) in search registers 701, the search returns the starting address in search registers 701 of the first string after the specified starting location address that matches the masked pattern, providing this address starts before the ending location offset address. In another example, a windowed-find-first-reverse search may be performed. In one embodiment, in a windowed-find-first-reverse search, given an 8-byte pattern in the rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content in search registers 701, and an ending location address pointing to an ending byte in the content in search registers 701, the search returns the starting address of the last string before the specified ending location address that matches the masked pattern, providing this address starts after the starting location offset address.

[0098] The rule processor also provides a control store or rule memory 704 that contains rules or rule sets to be applied to the payload data. In one embodiment, the memory 704 holds rule sets or sequences of instructions or code that describe patterns, rules, expressions or grammars that need to be applied and detected in search

registers 701. The rule vocabulary may specify a range of operations, including, but not limited to, global or local (windowed) searches with either exact matches or partial matches, with individual and multiple match information delivered to some registers, primitives to generate offsets and addresses in the output payload of the rule processor, as well as logical and computational operators to be applied to the search results. Such rules may be composed of multiple fields that specify the various parameters described above. Each parameter may be directly specified within the rule or, alternatively, indirectly specified through the use of a pointer to a register or memory location containing the value to be used. In embodiments where both direct and indirect specifications are permissible, each such field may contain an additional sub-field that indicates whether direct or indirect specification is being utilized.

[0099] In one embodiment, the rule processor performs sequences of prioritized and directed searches of anchored or unanchored patterns and windowed and ranged searches for an arbitrary long pattern starting at any arbitrary location in a document, stream, message, or packet. The patterns as well as the range control and program control flow (e.g., branch addresses) can be specified statically in rules contained in the program store or dynamically selected indirectly from a register file using a pointer or index set forth in a rule. This enables powerful dynamic and contextual pattern matching.

[00100] The rule processor presents one or more rules of a search to a search register structure. In one embodiment, the search register is a 2KB register file with each entry being one byte wide. Data to be searched is loaded in the search register file. Each rule may specify a pattern that is presented to the search register file to determine if the pattern is present in the data stored therein. A mask may also be provided to further configure the pattern and/or to reduce the size of the pattern being used in the search.

[00101] Referring to Figure 7, search registers 701 and search execution hardware 702 is collectively presented with a search instruction 703. Search instruction 703 is further illustrated in Figure 8A. Referring to Figure 8A, search instruction 801 comprises an opcode 801a that describes the type of search operation, a search pattern 801b, a mask 801c that specifies the bytes in the pattern that are relevant to the current search instruction and two offsets 801d and 801e that specify

the starting and ending bounds, respectively, of the locations in the search register that are relevant to the current search instruction. Search execution unit 802 outputs a result 803 that, in one embodiment, comprises an indication of the success of the search operation and additionally includes one or more parameters such as, but not limited to, an index that indicates the location within the search register that met the search instruction of the search operation.

[00102] Search execution hardware 802 comprises search register 802a and a sorter 802b as shown in Figure 8A. Search register 802a stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of search register 802a may be arbitrary, M bytes, and in one embodiment is organized within a larger array, called a search array 802c, of M rows of N bytes each. Data from search register 802a is stored in a replicated manner inside the search array

[00103] In one embodiment, data to be searched is stored in search register 802a by use of a data generator 813, based on addresses generated from address generator 811, which are decoded by address decoder 812. The process of storing also entails recording the size of the searchable data in search register 802a. For data sets that are smaller in size than the capacity of search register 802a, search register 802a provides a mechanism to restrict the search operation to the appropriate data. In one embodiment, data generator 813 may store a pattern that is established a priori to be data that will be ignored for search operations in the remaining locations of search array 802c or in an alternate embodiment search register 802a disables the appropriate locations of search array 802c from participating in search operations.

[00104] Irrespective of the manner in which the searchable data is organized throughout search array 802c, search array 802c receives a pattern 801b and mask 801c. Pattern 801b is compared against entries in search array 802c. In one embodiment, search array 802c has M rows of N bytes, where N is the same number of bytes as are in pattern 801b. Mask 801c provides an indication of those bytes in pattern 801b that are not part of the pattern being searched. In other words, if pattern 801b is a pattern that is less than N bytes, mask 801c specifies which bytes of pattern 801b search array 802c is to ignore. In one embodiment, search array 802c has an output line for each of the M rows in search array 802c indicating whether the pattern

being searched matched that content data stored in that particular row. In one embodiment, if the output is a 1, the pattern matched content data in the particular row. The M output lines of search array 802c are coupled to inputs of sorter 802b. [00105] Sorter 802b is also coupled to receive offsets 801d and 801e that indicate a starting and ending point, respectively, of a range in search register 802a that is to be searched. In one embodiment, these offsets are $\log_2 M$ -bit numbers. Based on the match indication lines from search array 802c and the start and end range as specified by offsets 801d and 801e, sorter 802b processes the results of search array 802c. Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by opcode 801a in search instruction 801. Sorter 802b may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from search array 802c. In this manner, sorter 802b may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations. Additionally, sorter 802b may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of sorter 802b may also be coupled to the rule processor instruction sequencer, such as instruction sequencer 705 of Figure 7, to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[00106] After processing, sorter 802b generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in search register 802a where the first match occurs or where the last match occurs with respect to the top of search register 802a. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[00107] Note that the range specified by the offsets may be changed dynamically. For example, a first search instruction may be applied to search array 802c initially while a range that is specified by offset 801d and offset 801e comprises all rows of search array 802c. However, after the first search instruction and a match is

identified, the start and end ranges may be changed in a subsequent search instruction such that the searching begins from a location that includes the match lines found within the range specified by the previous search instruction. This capability is achieved by using the indirection functionality that allows fields of a rule or an instruction to reference values in a general purpose register file.

[00108] In Figure 8A, in one embodiment, search array 802c is comprised of 2K rows of 8 bytes each. Thus, search register 802a holds 2K bytes of data. Search array 802c holds replicated data. Each 8-byte string that begins with a distinct byte in search register 802a is stored as a distinct row of bytes in search array 802c. These strings are comprised of the distinct byte from search register 802a and additionally 7 consecutive bytes that follow that byte in search register 802a. Thus, each row of search array 802c holds the 7 most significant bytes of the previous row and additionally one immediately succeeding higher order byte, which is appended to the right of these 7 bytes.

[00109] Data is loaded into search array 802c by data generator 813, which, in one embodiment, supplies the appropriate 8 bytes of data for each row from the source data.

[00110] In one embodiment, an 8-byte search pattern is presented in each search instruction. The search pattern is aligned with search array 802c such that each of the 8 columns in the array is presented with a unique byte. This is shown in Figure 8B. Referring to Figure 8B, state bytes 1 through 8 are stored in the search array for each of rows 1 through 2K. For each byte that is stored as an element of the search array of 2K rows and 8 columns shown in Figure 8B, there exists a signal line 310. For example, byte 1 of row 1 generates signal line 310₁₁, byte 2 of row 1 generates signal line 310₁₂, byte 1 of row 2 generates signal line 310₂₁, and so forth. The signal for each byte is asserted during a search operation when the stored byte matches the byte of the search pattern that is presented to the same column that the element belongs to. In this embodiment, where each row contains 8 bytes, 8 signal lines, for example 310₁₁ through 310₁₈, are used to indicate each of the byte level matches in the row. The byte level matches for each row are ANDed together with the masks from masks 102c in row & mask resolver blocks 311. The result of the AND function is an indication of whether a match occurred in each row. In this embodiment, where the

search array includes 2K rows, 2K match lines are output to the sorter. The circuit structure of two of the byte elements 312 in this array is shown in Figure 10. The circuit operates in a manner that provides a fully parallel search operation by performing a simultaneous search within all its rows in one clock period. When a search operation is conducted, all byte level match lines 401 in a column simultaneously indicate matches with their respective stored bytes. A search operation is invoked on all columns simultaneously allowing the masked reduction block in each row to indicate a row level match. Thus, in this embodiment of the search array, in a single clock, a parallel search of all 2K strings in the search register that are comprised of 8 contiguous bytes is performed and the results are indicated on the 2K match lines.

[00111] Figure 9A is a block diagram of one embodiment of a sorter. Referring to Figure 9A, match lines 910 from the search array are coupled to and input to a range mask and select unit 901. In one embodiment, match lines 910 comprise match 1 to match 2048. Range mask and select unit 901 receives a pair of offsets specifying a range of rows of the M match lines from search array to perform further processing. In one embodiment, the offsets are 11 bit numbers that are converted into 2K mask bits that may be ANDed together with the match lines to provide an output. Such an example is shown in Figure 9B in which the offset for the start range is converted to one or more zeros with the remainder of the bits being a one bit, while the offset for the end of the range is converted to all zeros starting from the bottom up to a certain point after which all bits are ones. By ANDing these registers with the match lines, the matches that occur within the specified start and ending range are output without change, while other match lines outside the range are masked (e.g., changed to a predetermined logic level).

[00112] The output of range mask and the select unit 901 is coupled to the inputs of index resolution functions unit 902. In one embodiment, index resolution functions unit 902 includes one or more functions that are performed on the outputs of range mask and select unit 901. For example, as shown, the sorter includes an ascending priority encoder 902A to find the first occurrence (with respect to the top of the search array) of a match between the specified pattern of N bytes and the content data in the search array as indicated by the non-masked match lines. A descending priority

encoder 902B may also be included to find the last occurrence (with respect to the top of the search array) of a match between the N byte pattern and the content data in the search array as indicated by the non-masked match lines. A population counter 902C indicates the number of matches that occur between the N byte pattern and the data in the search array as indicated by the non-masked match lines. Other index selectors may also be used.

[00113] The outputs of index resolution functions unit 902 are input to an index combine and select unit 903, which is also coupled to receive opcode 102a. The opcode 102a is specified in the search instruction and selects one of the index resolution function outputs as the output of the sorter. Index combine and select unit 903 generates a match indicator 921 indicating that there was match along with an index 922 indicating that the location within the search array of the data that is either the first occurrence of a match if the output ascending priority encoder 902A is selected, the last occurrence of a match in case the output of descending priority indicator 902B is selected, indicates the number of matches in the non-masked match lines if the pop counter 902C is selected, etc. Following the computation of the outputs, namely, match indicator 921 and index 922, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 704) dependent on the match indicator 921 or other similar techniques.

[00114] Figure 11 illustrates the micro architecture of a rule processor that includes search apparatus. Referring to Figure 11, the search instructions are stored in an instruction memory 1101. Instructions are selected by flow control using an instruction fetch pointer register 1102. Instructions are decoded by a decoder 1103. The individual subsets of each instruction are either taken from the instruction or fetched from general purpose register file 1104. Then the various subsets of each instruction are supplied to the separate units, namely, search array 1105, sorter 1106 comprising of a sort unit 1106a followed by a characterization unit 1106b, a conventional arithmetic logic unit (ALU) 1107, as set forth above. In one embodiment, the processing of each instruction follows a 4-stage pipeline consisting

of (i) instruction fetch stage 1108, (ii) an instruction assembly stage 1109, (iii) a search/execute stage 1110, and (iv) a sort and delivery of results and/or branch stage 1111.

[00115] In one embodiment, the rule engine instruction format comprises a number of bits are divided into subsets that contain various fields to issue directives to various hardware engines on the rule processor. In one embodiment, the search subset contains a search/sort opcode field, a pattern field (in one embodiment, this contains a value or a pointer to a location that provides a value along with an additional bit(s) that specifies whether the value in the instruction is a pointer or not), a byte level mask field, a start location address field (in one embodiment, this field, comprises a value or a pointer to a register that provides the value, and including an additional bit(s) to indicate whether the start location address contains the value or such a pointer), an end location address field (in one embodiment, this field, comprises a value, or a pointer to a register that provides the value, with an additional bit(s) to specify whether the end location address information is a pointer or not), a result register field that specifies where the results of the search operations are to be returned and a branch address field (in one embodiment, this field comprises a value or a pointer to a register that provides the value, with an additional bit(s) to specify whether the branch address information is a pointer or not)

[00116] Figure 12 illustrates an example pseudo-code 1201 of a rule-set that may be processed by one embodiment of the rule processor described above. The rule has multiple patterns with some specific constraints on the locations of where such patterns may exist in a message or document or packet. The constraints are expressed in the pseudo-code through the use of key words such as BEFORE and AND. For purposes of simplicity, the patterns in 1201 are used in this example without any additional delimiters between strings, which may be the case in practice. Also, in Figure 12 is a listing 1202 of the corresponding micro-code for the exemplary rule processor. The format of the instructions is as described earlier. Using the first instruction 1203 for illustration, it consists of the FIND_FIRST_FORWARD opcode where all 8 bytes of the Pattern "cp /bin/" are relevant for the search (through the use of 0xFF as Mask) with the start and end offsets expressed as constant values (through the use of Indirection Flags) to denote the start and end of the searchable payload held

in the search registers. For purposes of brevity, the derivation of the constant numbers has been skipped here. The result of this opcode is shown to be loaded into general purpose register A and lastly the branch address is specified as the constant value of 11 which is the instruction that would follow the micro-code snippet shown in Figure 12. This instruction will cause the search execution hardware to search for the occurrence of "cp /bin/" within byte locations 0x03D and 0x800 of the search registers 802a. All rows in the search array 802c that match will assert their respective match lines 910 by the end of the search execution stage 1110 of the micro-architectural pipeline. In the sort and branch stage 1111, the sorter 802b converts 0x03D and 0x800 into bit vectors as illustrated in Figure 9B. The bit vectors are used to perform the range mask and select function 901 to negate any matches that start outside of the location window from 0x03D to 0x800. Of the remaining matches that are now within the location window, the opcode of this instruction chooses the ascending priority encoder 902a from the index resolution functions 902 to convert the lowest numbered match into an 11-bit binary encoded location. If such a match was found, match 921 would be asserted and index 922 would hold the 11-bit location. If match 921 were to be not asserted because a match was not found, the instruction sequencer 705 would load the branch address 0xB into the instruction pointer 706. Index 922 would be loaded into general-purpose register A by the control circuitry of the register file 1104. The load into general-purpose register A and the load of the instruction pointer, if applicable, will be completed by the end of the sort and branch execution stage 1111. Second instruction I204, FIND_FORWARD_ANCHORED, further illustrates the rich vocabulary of the exemplary rule engine. It is a variant of FIND_FIRST_FORWARD in that the match begins at the start_offset for the search to be successful.

[00117] Figure 13 illustrates the execution of the micro-code shown in Figure 12 within the micro-architecture of the exemplary rule processor shown in Figure 11. Table 701 shows the execution across multiple clock cycles. For purposes of simplicity, it is assumed that all the search instructions are successful in finding the specified patterns in the search registers. In one embodiment, the execution proceeds in a pipelined fashion through the 4 stages described in Figure 11. Through the use of indirect specification, the execution of a search instruction can use the offsets

calculated in the immediately preceding instruction. Therefore, instructions 1 through 8 are executed in consecutive cycles. Instruction 8 is a branch dependent on the result of the comparison of the contents of general purpose register A and general purpose register B which are computed in clock cycle 8 and clock cycle 9 respectively. The branch is taken in clock cycle 11 and the instruction execution completed in clock cycle 14. Thus, the complex pattern matching expression described using pseudo-code 1201 is executed in only 14 clock cycles using the rich instruction vocabulary of the exemplary rule processor. This example illustrates the capability and efficiency of the exemplary rule processor on execution of functions that include dynamic and contextual search and analysis of documents, messages or packets.

An Exemplary Embodiment of State Machine Unit Hardware

[00118] One embodiment of state machine unit hardware is described below. Note that other embodiments of state machine unit hardware may be used.

[00119] A state machine evaluation architecture is described that allows for efficient implementation and evaluation of state machines and finite state automata. In one embodiment, the apparatus employs a technique of building graphs using circuits in a way that enables, in a programmable manner, the physical realization of any arbitrary control flow graph in hardware. The apparatus provides a high performance and compact solution for implementation of multiple state machines as well as large and complex state machines. The apparatus can be used for efficient parsing and evaluation of data via the hierarchical application of thousands of regular expressions on the incoming data stream. Such an apparatus may be the central evaluation engine for a regular expression processor. Note that one embodiment of finite state machine units are described in U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____ entitled "_____" concurrently filed with this application, which are incorporated herein by reference.

[00120] Figure 14 illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention. FSA building block 1400,

shown in Figure 14 includes a number of registers that allow the FSA building block to be fully programmable. Register 1401 contains node elements that specify the current state of the FSA. Register 1402 contains state transition evaluation symbols on which match a state will be transitioned. Register 1403 contains a state transition connectivity control matrix that specifies which states of the FSA are connected (i.e., the enabled state connections).

[00121] Initially, the nodes are in a certain state. With each evaluation cycle, an input (e.g., an input byte) 1405 is input to the state transition dynamic trigger computation 1410, which compares the input to the state transition evaluation symbols contained in register 1402. The comparison information is input to the state transition interconnections and next state evaluation logic 1415. Then, based on the nodal connections contained in register 1403, the next state is computed and latched and then becomes the current state. That is, the next states are calculated using triggers, connectivity controls, and current state bits. The architecture of the FSA building block allows a character of input data to be analyzed every clock cycle without the need for external memory.

[00122] Figure 15 illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention. The logic circuit 1500, shown in Figure 15, may be used to implement a state machine architecture for realization of a non-deterministic finite state automata with R nodes, R symbols, and R^2 arcs. In Figure 15, R has been set to a variable M , and the hardware organization is designed and laid out to be scalable for any M . By fixing the value of M and providing the appropriate level of hardware, an FSA building block with specifically M instantiated nodes can be realized.

[00123] The node elements N_1-N_M are fully connected with interconnections 1501. Each node element has an arc or interconnection to itself, as well as to each of the other node elements. Hence, for $M=32$, there are 32×32 or 1024 interconnections 1501. Likewise, for $M=16$, there are 16×16 or 256 interconnections 1501.

[00124] For $M=32$, the state transition connectivity controls 1502 comprise 1024 bits organized as a matrix of 32 bits \times 32 bits. Likewise, for $M=16$, the state transition connectivity controls 1502 comprise 256 bits organized as a matrix of 16 bits \times 16 bits. A bit in row Y and column Z represents the control to enable or disable an

interconnection between node element N_Y and node element N_Z . The mechanism by which the interconnections 1501 between node elements N_1-N_M can be enabled or disabled by the state transition connectivity controls 1502 is embodied as a switch on the interconnection (e.g., wire) 1501, with the switch being gated by the relevant control bit for that interconnection. This could be implemented using AND gate logic as well.

[00125] In this embodiment, there are as many state transition evaluation symbols 1503 as there are states in the machine. For $M=32$, there are 32 symbols. For $M=16$, there are 16 symbols. Each symbol could comprise a single 8-bit character value and compare operator, so that input data is specified for comparison to the 8-bit character value to compute the state transition dynamic trigger 1504. In this embodiment, the logic for the state transition dynamic trigger 1504 computation is as follows. A fresh byte of input data is fed simultaneously to all M comparators. A set of M match lines act as state transition dynamic triggers 1504. Once again, M may be either 16 or 32.

[00126] The mechanism by which the state transition dynamic triggers 1504 govern the update and transfer of values between node elements N_1-N_M (over interconnections 1501 that have been enabled) is implemented in this embodiment as simple AND gate logic. That is, AND gates in cooperation with OR gates act to enable and/or disable interconnections 1501.

[00127] The data transfer unit 1505 dynamically configures and programs the state transition connectivity controls 1502 and the state transition evaluation symbols 1503. This enables dynamic realization of a range of control flow graph structures or configurations. In this embodiment, for $M=32$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 32 registers of 32 bits each. Likewise, for $M=16$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 16 registers of 16 bits each. In this embodiment, for $M=32$, the storage for the state transition evaluation symbols 1503 can be implemented as 32 registers of 8 bits each. Likewise, for $M=16$, the storage for the state transition evaluation symbols 1503 can be implemented as 16 registers of 8 bits each.

[00128] The data transfer unit 1505 also provides access to read and write the node elements N_1-N_M . For $M=32$, the node elements could be viewed as a logical register of 32 bits. Likewise, for $M=16$, the node elements could be viewed as a logical

register of 16 bits. The data transfer unit 1505 executes load and store operations to read and write values from and into all these registers. This ability to read and write the node elements N_1-N_M can be used to enable the data transfer unit 1505 to communicate with an external interconnect fabric to connect the state machine building block to other such building blocks, in order to construct larger state machines or graphs. The data transfer unit 1505 outputs values from selected node elements on dedicated signal wires, which can be sent to, for example, other state machines (e.g., another FSA building block) or an external interconnect fabric. Likewise, it receives values from the external interconnect fabric on dedicated signal wires. These values can be transferred into selected node elements.

[00129] A single reset signal 1507 is fed to various elements of the apparatus to clear values to zero.

[00130] Before the start of the state machine evaluation, the state transition connectivity controls 1502 and the state transition evaluation symbols 1503 should have been programmed with desired configuration values. Hence, the signal values in the storage assigned for these controls will be stable before the state machine evaluation begins.

[00131] In one embodiment, there is a mechanism to control the start of the state machine evaluation. In one embodiment, for $M=32$, the start state select controls 1509 consist of a register of 32 bits. In one embodiment, for $M=16$, the start state select controls 1509 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Upon initialization of the state machine, node elements that correspond to active bits in the start state select controls 1509 register will start as active states.

[00132] In one embodiment, the progress of the state machine evaluation is conditioned by a clock 1508 that determines an evaluation cycle. In one embodiment, every evaluation cycle, a fresh byte of input data is presented to the apparatus, and this byte is evaluated in parallel against all state transition evaluation symbols (in this embodiment, this is a comparison of the input byte versus the 8-bit character value), leading to an update of set of M match lines representing the state transition dynamic triggers 1504. These M triggers 1504, along with the M^2 bits corresponding to the state transition connectivity controls 1502, combine with the current state values in

the node elements N_1 - N_M to compute the next state value for each node element. The logic equation for the computation of the next state of each node element is as follows:

If the state transition dynamic triggers are T_1 to T_M

If node elements are N_1 to N_M

If state transition connectivity controls are a bit matrix $C_{I,J}$ with $I=1,M$, and $J=1,M$

Then, given previous state PS_K for node element N_K , the next state NS_K is as follows:

$$NS_K = \text{OR} ($$

$$\quad [PS_1 \text{ AND } T_1 \text{ AND } C_{1,K}],$$

$$\quad [PS_2 \text{ AND } T_2 \text{ AND } C_{2,K}],$$

$$\quad \dots\dots\dots$$

$$\quad \dots\dots\dots$$

$$\quad [PS_I \text{ AND } T_I \text{ AND } C_{I,K}],$$

$$\quad \dots\dots\dots$$

$$\quad \dots\dots\dots$$

$$\quad [PS_M \text{ AND } T_M \text{ AND } C_{M,K}]$$

$$)$$

Effectively, for each node element, the next state computation is a large OR function of M terms. Each term is computed by ANDing together 3 values – the previous state value of a node element, the corresponding dynamic trigger, and the corresponding connectivity control bit that indicates whether that particular interconnection 1501 is enabled.

[00133] Once the next state computation is complete, the node elements are updated with the next state values, and the state machine completes a single evaluation cycle. As can be seen by the logic equations for the next state computation, the evaluation cycle time for the apparatus is three levels of logic evaluation. The first level comprises of AND gates to compute the triggers, the second level comprises of AND gates to factor in the connectivity controls, and finally an M-input OR gate. This

evaluation cycle time is considerably shorter than the cycle time that governs the operating frequency of commercial microprocessors.

[00134] Note that the sequence of steps described above represents the computation needed in a single logical evaluation cycle. Physically speaking, additional pipelining is possible, to further boost the frequency of operations. For example, the computation of the state transition dynamic triggers (given a fresh byte of input data) can be decoupled from the next state evaluation.

[00135] In one embodiment, there is a mechanism to control the halting of the state machine evaluation. For $M=32$, the accept state select controls 1510 consist of a register of 32 bits. For $M=16$, the accept state select controls 1510 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Once the state machine enters into any of these states (corresponding node element goes active), the state machine halts its evaluation.

[00136] The foregoing provided a description of the evaluation cycle for a single FSA building block. When such an FSA building block is coupled to other state machines (e.g., another FSA building block) via the external interconnect fabric, an additional synchronization handshake would be incurred to enable the respective evaluation cycles to be coordinated.

[00137] The basic FSA building block, as described above, may be implemented in various ways. The remainder of the detailed description will discuss specific embodiments that address a number of concerns.

[00138] As discussed above, embodiments of the invention provide a fixed-size FSA building block (i.e., an FSA building block having a fixed number of states) to facilitate efficient implementation. In alternative embodiments, FSA building blocks of various sizes may be implemented. However, a regular, repeatable structure of a fixed size FSA building block allows for efficient implementation of a large number (e.g., 1000) of FSA building blocks on a chip.

[00139] The fixed size FSA building block, while easier to implement, raises the issue of how to address REs having a number of states greater than the fixed size of the FSA building block. For one embodiment of the invention, a fixed size for the FSA building block is determined based upon the particular problem space, and two

or more FSA building blocks are connected (stitched) to accommodate REs having a greater number of states.

[00140] For one embodiment, the stitching of FSA building blocks to solve REs having an excessive number of states is accomplished as follows. The RE is converted into a syntax tree. The syntax tree is then split into a number of sub-trees, each having a number of characters that is no greater than the fixed size of the FSA building block. This division of the syntax tree may be effected using a number of well-known algorithms. Each sub-tree is then converted to an NFA having a number of states that can be accommodated by the fixed size FSA building blocks. The NFA for each sub-tree is then implemented on a separate FSA building block and each of the separate FSA building blocks are then stitched together to effect evaluation of the RE.

[00141] Depending upon the size of the REs in the problem space, a number of the FSA building blocks may be grouped together. For example, for a fixed size FSA building block of 16 states, grouping 16 FSA building blocks together would accommodate an RE having 256 states. For one embodiment of the invention, the approximately 1000 FSA building blocks on a chip are divided into groups of 16 FSA building blocks each. By interconnecting each FSA building block with all FSA building blocks within its group, clock penalties for cross-group transitions are avoided.

[00142] For one embodiment, each group of FSA building blocks is not interconnected with every group, rather the groups are cascaded with some groups "triggering" one or more particular other groups. For one embodiment, where such architecture is unable to accommodate an excessively large RE, a controller is employed to read the state of the FSA building block(s) and explicitly write the transitions states.

[00143] As described above, an RE may be too large to be solved by a single FSA building block. By the same token, occasionally REs are smaller than the fixed size of the FSA building block. For one embodiment, two or more REs are solved using a single FSA building block as described below.

[00144] For one embodiment, the number of REs that can be solved is not limited by the number of REs instantiated within the FSA building blocks. For one embodiment,

REs can be loaded to the FSA building blocks from a rule memory (e.g., conventional memory), that can store many more RE's than are implemented in hardware.

Coupling the FSA building blocks to a rule memory allows REs to be stored in memory and used to dynamically program the FSA building blocks.

[00145] Occasionally, the input data to an FSA building block is fragmented, that is, a first portion of the input data is followed immediately by unrelated data, which is followed subsequently by the remaining portion of the input data. To address this situation, one embodiment of the invention provides the capability of storing a partial context to a context memory and accessing the partial context at the appropriate time.

[00146] For one embodiment of the invention, the FSA building blocks include counters, pointers, and status registers to provide additional information (e.g., beyond whether or not a pattern has been discerned). For example, a counter may be used to indicate the number of times a particular RE matched or to implement more complex REs; a pointer may be used to indicate the start and end locations of an RE match; and status bits may be used to indicate various occurrences during an RE search.

SYSTEM

[00147] Figure 16 illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention. FSA building block 1600 shown in Figure 16 is a 16-state FSA building block. FSA building block 1600 includes an enable signal 1615 that is driven by an externally programmed start offset/end offset register. That is, when receiving an input data stream, it is not necessary to commence evaluation at the beginning of the stream.

[00148] The starting and ending points of the evaluation can be determined and programmed to drive the enable signal 1615 of FSA building block 1600. A clock signal 1608 controls the evaluation process and a reset signal 1607 resets the FSA building block (i.e., sets all node elements 1616 to zero). A start state register 1609 is programmed via software to indicate which of the 16 states are initially active. When the initial clock signal 1608 is received, if the enable signal 1615 is high, the values contained in start state register 1609 are latched into node elements 1616. When an input byte 1606 is received, it is compared to the evaluation symbols of the symbol

evaluation unit (SEU) 1603. The determination, as to whether or not the input byte is a match, is forwarded to the state transition interconnection and next state evaluation logic (STINSEL) 1617. Then upon a match, and based upon the nodal connections as programmed into the state transition connectivity control (STCC) register 1602, the dynamic next state (DNS) 1625 is enabled and used by the next state determination logic (NSDL) 1618 to determine the next state. The NSDL 1618 then latches the next state to the node elements 1616 at the end of the clock cycle. The latched value then becomes the current state of the FSA building block, the next input data byte is received, and the evaluation continues.

SYMBOL EVALUATION UNIT

[00149] In accordance with one embodiment of the invention, the SEU 1603 contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs.

[00150] An RE may be defined to employ a range rather than a single character symbol. For example, the RE may reference a character in the range of a – z or 0 – 9. As shown in Figure 16, the SEU 1603 includes two range registers, namely rangelower register 1620 and rangeupper register 1621, to specify the lower range value and an upper range value, respectively, for multiple (e.g., up to four) ranges. The input byte 1606 and the upper and lower range values are provided to a range detection logic 1619 to determine if the input was within the specified range. This information, together with input byte 1606 and the programmed match symbol from symbol register 1622, is provided to the symbol match detection logic (SMDL) 1622 that evaluates the input byte 1606 against the symbol itself. This allows the software to program a state transition on a range, a character, or a combination thereof. This is accomplished by expanding the character definition (e.g., to include range information) and providing additional space for the character definition. For one embodiment, 16 symbol registers of 24 bits each are implemented, with 12 of the 24 bits used to define the extended character and 12 used for a bit-mask (discussed below). Of the 12 bits used for the extended character, 8 are used for the character itself, and four are used to specify whether the extended character has a range.

[00151] SEU 1603 includes a symbol mask register 1623 to indicate a particular bit or bits that is not to be compared. For some applications it may be more efficient to mask a bit of the input data (i.e., to program the evaluation logic such that a particular bit is not considered). For example, ASCII provides an 8-bit character to represent characters a-z (lower case) and A-Z (upper case), with the fifth bit specifying the case. If an RE employed a range of a-z and A-Z, it could be more efficiently implemented by ignoring the case (i.e., masking the fifth bit). That is, by masking the case bit (fifth bit) it would not be necessary to effect a comparison for lower case and a separate comparison for upper case, a single state can complete the comparison.

[00152] SEU 1603 includes a logical operation register 1624 that may be used to indicate state transition upon the occurrence of a matching symbol in conjunction with a logical operator. For example, an RE may be programmed such that transition occurs upon the negative polarity of the evaluation instead of the positive polarity of the evaluation (e.g., transition occurs on "NOT" match instead of match). For one such embodiment, the logical operation register provides 16 bits (i.e., one bit per state) to specify the logical operator "NOT".

ACCEPT STATE DETECTION UNIT

[00153] When the DNS 1625 is enabled, the next state is checked to determine if an accept state has been reached. Accept state detection unit 1610 includes accept state registers 1626 and accept state detection logic (ASDL) 1627. The accept state registers 1626 are programmed with accept states. The ASDL 1627 used the DNS 1625 to determine if the programmed accept state has reached, if so, a hit is recorded in hit register 1628a corresponding to the accept state register 1626. the hit register, then, records the number of hits, this information can be made available externally via register read/write bus 1628b. In accordance with one embodiment of the invention, the ASDU 1610 includes two accept state registers 1626 to facilitate the packing of two REs into a single FSA building block. As described above, two or more REs having a total number of states not greater than the fixed number of states of the FSA building block may be packed into a single FSA building block. Each RE may have unique accept states, and therefore an accept state register should be implemented on the FSA building block for each packed RE. Because each RE may reach accept

states separately, a corresponding hit register should be implemented for each accept state register. For the embodiment shown in Figure 16, two accept state registers 1626 are implemented along with corresponding hit registers 1628a and 1628b. To maintain flexibility, each register is a full 16-bit register, which allows packing REs of various sizes. For example, a 12-state RE may be packed with a 4-state RE, or in the extreme a 15-state RE could be packed with a 1-state RE. If the particular FSA building block is not being packed, the additional accept state register and corresponding hit register are not used.

MATCH LOCATION POINTER

[00154] For some applications, it is useful to determine the location at which a match begins and ends. To effect such determination, a start location register 1629 and an end location register 1630, as well as a byte count 1631, are implemented in the FSA building block in accordance with one embodiment. When the evaluation starts, a byte count 1631 is provided, when a transition of the next state occurs (e.g., a match is initiated), the value of the byte count at that point is latched to the start location register 1629. When, subsequently, the DNS 1625 is enabled, a determination is made as to whether an accept state is reached (e.g., a match is determined), the value of the byte count 1631 at that point is latched to the end location register 1630, thus providing start and end locations for the match.

STATE TRANSITION COUNTER UNIT

[00155] The FSA building block 1600 includes a state transition counter unit (STCU) 1632 that contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs. For example, the counter allows an RE to be programmed that employs state transitions not just upon receipt of a specified symbol, but upon receipt of the specified symbol a specified number of times. So, for example, an RE may be programmed as a b {2, 4} c, which indicates a match when "a" is received followed by the occurrence of "b" from two to four times, followed by "c" (i.e., abbc, abbbc, and abbbbc). A counter trigger state (CTS) register 1633 can be programmed with a trigger state (e.g., state 1, the state corresponding to "b") for the counter 1634. For this example, the CTS register 1633 is programmed to state 1,

the counter lower value (CLV) register 1635 is programmed to 2 (i.e., the minimum number of occurrences for a match), and the counter upper value (CUV) register 1636 is programmed to 4 (i.e., the maximum number of occurrences for a match). The programmed values of the CTS 1633, the CLV 1635, and the CUV 1636, together with the value of the counter 1634, are input to the counter logic 1637. When the conditions of the RE are satisfied, the counter logic output 1638 will be activated. The transition from one state to the next is controlled by the counter logic output 1638, so no transition will occur until the counter logic output is high.

[00156] For one embodiment the CTS register 1633 can be programmed with multiple trigger states to effect more complex REs. For example, an RE programmed as a (b|c) {2, 4} would require programming the states corresponding to "b" and "c" (i.e., states 1 and 2) as trigger states.

[00157] For one embodiment, the trigger state of CTS 1633 can be programmed to an accept state of the RE to count the number of times the RE has hit.

[00158] To effect stitching, the FSA building block 1600 includes a stitch out control unit (SOCU) 1639 with two caller outgoing state (COS) registers 1640 and two corresponding caller's target FSA (CTF) registers 1641. Each COS register is programmed with the states at which to stitch to another FSA building block. The corresponding CTF registers 1641 indicate which FSA building blocks to stitch to (i.e., the callee FSA building blocks). The stitch trigger computation logic (STCL) 1642 receives the stitch state information and the target FSA building block information from the COS registers 1640 and the corresponding CTF registers 1641, respectively, and uses the information to activate FSA startout 1643. FSA startout 1643 is connected to, and activates, the FSA startin 1644 of the callee FSA building blocks. At the callee FSA building blocks, the receiving states selector (RSS) 1645 is programmed to determine which of the callee receiving state (CRS) registers 1646 to access for the callee receiving states. The NSDL 1618 then uses the value in the selected CRS register 1646, the start state 1609, and the DNS 1625 to determine the next state for the callee FSA building block, which is then latched to the node elements 1616. For one embodiment the values in the selected CRS register(s) 1646, the start state 1609, and the DNS 1625 are OR'd to determine the next state.

[00159] Similarly, when the callee FSA building block reaches an accept state contained in an accept state register 1626, it determines which FSA building block to return to by reference to the accept's target FSA (ATF) register 1647. The ASDL 1627 uses the value in the accept state register 1626 and the value in the ATF register 1647 to determine when to activate stitch return out (SRO) 1648. SRO 1648 is connected to, and activates, the stitch return in (SRI) 1649 of the target FSA building blocks, and the evaluation continues at the target FSA building blocks.

[00160] FSA building blocks may be interconnected to provide FSA building block stitching in accordance with one embodiment of the invention. Each FSA building block may be connected to itself via an internal connection.

[00161] Figure 17 illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention. RE processor 1700, shown in Figure 17, includes a number of FSA building blocks 1705, that may be interconnected in groups as described above. For one embodiment, the number of FSA building blocks 1705 may be approximately 1000 – 2000. RE processor 1700 also includes an automata controller 1710 that provides input data to the FSA building blocks 1705. Automata controller 1710 couples the FSA building blocks 1705 to a rule memory 1715 and a context memory 1720, as well as to an on-chip bus and interface 1725, for communication with off-chip memory 1730 and with other system devices through an off-chip interface 1735.

CONTEXT MEMORY

[00162] As discussed above, if the input data is fragmented, then the state (context) of the FSA building block should be saved in order to resume appropriate evaluation when the input data resumes. The context of the FSA building block includes the node element values, the counter values, and potentially, the location registers. Upon resuming the input data, the saved context memory is loaded to the FSA building block so that the evaluation may continue. In accordance with one embodiment, upon interruption of the input data, the automata controller 1710, which is capable of reading from, and writing to, the FSA building block, reads the context from the appropriate registers of the FSA building block, and stores the context, on-chip, in context memory 1720. Upon resumption of the input data, the automata controller

1710 loads the context from context memory 1720 to the FSA building block. The amount of context data is small relative to the programmed registers of the FSA building block. Therefore, by implementing an on-chip context memory, it is possible to efficiently handle multiple concurrent fragmented RE evaluations.

RULES MEMORY

[00163] Initially, the FSA building blocks are programmed with rules that define the relevant REs. Without more, the FSA building blocks could evaluate only those particular REs. However, applications frequently contain more REs than can be practically implemented as FSA building blocks. Embodiments of the invention provide FSA building blocks that are fully programmable and reprogrammable. For one embodiment, additional rules are stored in rule memory 1715. The automata controller 1710 moves rules from the rule memory 1715 into the appropriate FSA building block and vice versa. That is, based upon an externally provided instruction, the automata controller 1710 reprograms particular FSA building blocks with rules stored in rule memory 1715. Storing the additional rules on-chip allows for the rapid reprogramming of the FSA building blocks. The amount of rules that can be practically stored on-chip is at least several times the amount of rules implemented in the on-chip FSA building blocks.

[00164] The interconnection of FSA building blocks in groups allows for the context and rule information to be written to, or read from, the FSA building blocks in parallel. Such interconnection also allows for increasing throughput by concurrently evaluating multiple data input streams. For example, if an application requires only a portion of the available FSA building blocks, then the relevant rules may be loaded repeatedly into the available FSA building blocks and the REs evaluated through multiple data input streams.

[00165] Whereas many alterations and modifications of the present invention will no doubt become apparent to a person of ordinary skill in the art after having read the foregoing description, it is to be understood that any particular embodiment shown and described by way of illustration is in no way intended to be considered limiting. Therefore, references to details of various embodiments are not intended to limit the

scope of the claims, which in themselves recite only those features regarded as essential to the invention.

CLAIMS

We claim:

1. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

2. The programmable rule processor defined in Claim 1 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.

3. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer;
 - search registers and search execution hardware coupled to the plurality of search registers and coupled to receive search parameters from one or both of the decoder and the general purpose register file to perform one or more contextual searches on content in the search registers in response to executing one or more of the set of instructions; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to

executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

4. The processor defined in Claim 3 wherein either results from performing one or more contextual searches by the search execution hardware are subsequently used by the state machine unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one contextual search.

5. The processor defined in Claim 3 wherein the search execution hardware performs at least one of the one or more contextual searches via parallel pattern matching in response to executing one or more search instructions specifying the one or more pattern searches and presenting one or more patterns to the content in the search registers.

6. The rule processor defined in Claim 5 wherein the search execution hardware comprises:

a search array coupled to the plurality of search registers, wherein content in the plurality of search registers is replicated and stored in the search array; and

a sorter coupled to the search array to perform the one or more operations in response to information specified by one or more search instructions.

7. The processor defined in Claim 3 wherein the state machine execution hardware comprises a state machine evaluation unit.

8. The rule processor defined in Claim 3 further comprising a memory to store the one or more search instructions to be applied to data in the search registers or to be applied to be evaluated by the state machine execution hardware.

9. The rule processor defined in Claim 3 further comprising an instruction sequencer for applying one or more search instructions to the search execution engine and the state machine execution hardware.
10. The rule processor defined in Claim 3 wherein at least one search instruction includes a field that specifies a parameter to use to control the search or a pointer into a memory that stores the parameter to control the search.
11. The rule processor defined in Claim 10 wherein the pointer points to a general purpose register.
12. The programmable rule processor defined in Claim 3 wherein state machines being evaluated are finite state automata to detect regular expressions on input data.
13. The rule processor defined in Claim 3 wherein at least one of the one or more search instructions specifies a pattern that is to be searched against the content in the plurality of search registers and zero or more search parameters.
14. The rule processor defined in Claim 13 wherein one parameter specifies a portion of the pattern to be masked to enable a subset of the pattern to be searched against the content in the search registers.
15. The rule processor defined in Claim 14 wherein the portion of the pattern to be masked is specified by a mask vector to mask off specific bytes in the pattern.
16. The rule processor defined in Claim 14 wherein the zero or more parameters specify starting and ending locations that constitute a range of the content within the search registers within which the search execution engine is to constrain a search.

17. The rule processor defined in Claim 3 wherein the one or more search instructions specify at least one pattern, range control, and program control flow.
18. A programmable rule processor comprising:
a general purpose register file;
a plurality of search registers;
a plurality of state machine registers;
a plurality of execution units;
an instruction sequencer to provide instructions;
a decoder coupled to the general purpose register file, the plurality of search registers, the plurality of state machine registers, and the plurality of execution units, to decode a set of instructions specified by the instruction sequencer and provide the decoded instructions to one or more execution units and one or more of the plurality of search registers and plurality of state machine registers for execution thereby based on an opcode in each instruction in the set of instructions.
19. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a state machine evaluation unit.
20. The programmable rule processor defined in Claim 18 wherein at least one of the execution units evaluates state machines represented by data in the state machine registers.
21. The programmable rule processor defined in Claim 20 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.
22. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a sort array.

23. The processor defined in Claim 18 wherein two of the execution unit comprise a state machine evaluation unit and search execution hardware, and further wherein either results from processing data by the search execution hardware are subsequently used by the state machine evaluation unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one search.

24. The processor defined in Claim 18 further comprising a branch unit to branch to another set of one or more instructions based on results of data processing involving one or more of the state machine registers and the search registers.

25. A process for performing contextual searches using a rule processor, the process comprising:

fetching a first rule from a memory on the rule processor;

decoding the first rule to identify whether search parameters are located in the first rule or a general purpose register file in the rule processor;

executing one or more search operations on values in a plurality of search registers in the rule processor using the search parameters obtained from either or both of the first rule and the general purpose register file, the plurality of search registers storing content therein;

generating search results of executing the one or more search operations;

fetching a second rule from the memory;

evaluating one or more state machines with respect to data identified by the search results using state machine execution hardware in the rule processor according to parameters obtained from either or both of the first rule and the general purpose register file.

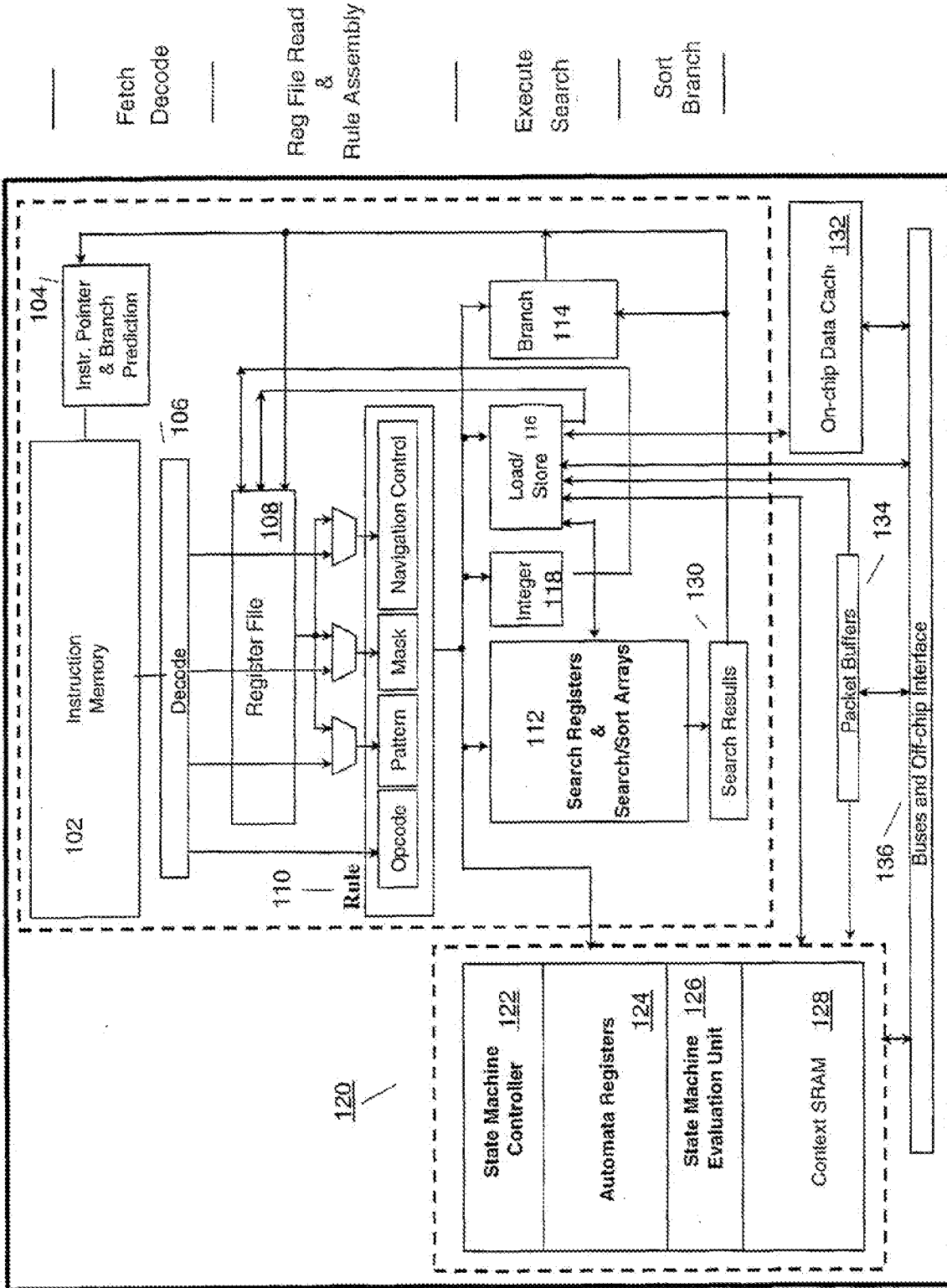


Figure 1: Rule Processor Microarchitecture

204

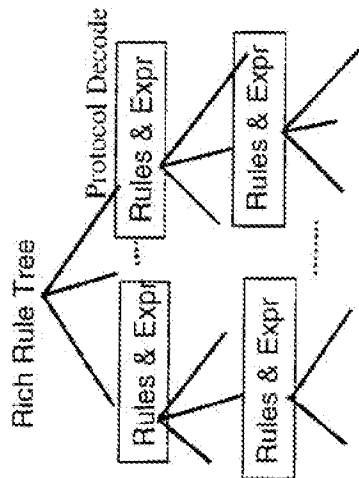
Code Fragment for UriClass: User Search Register Apparatus

```

// Parse the Request Line
methodStartLoc = ..... (0, docSize, space)
methodEndLoc = ..... (0, docSize, space)
uriArgsStartLoc = ..... (methodEndLoc, docSize, space)
uriArgsEndLoc = ..... (uriArgsStartLoc, docSize, space)
.....
methodIsGet = .....
methodIsPost = ..... (methodStartLoc, methodEndLoc, "GET")
methodIsPost = ..... (methodStartLoc, methodEndLoc, "POST")
IF (methodIsGet > docSize) & (methodIsPost > docSize) return;
.....
(uriArgsStartLoc, uriEndLoc, UriGroup);
.....

```

202



Content Analysis

206

UriGroup REs: User Search Register Apparatus

```

"X"
"Y"
"Z"
.....

```

Figure 2

System Interfaces

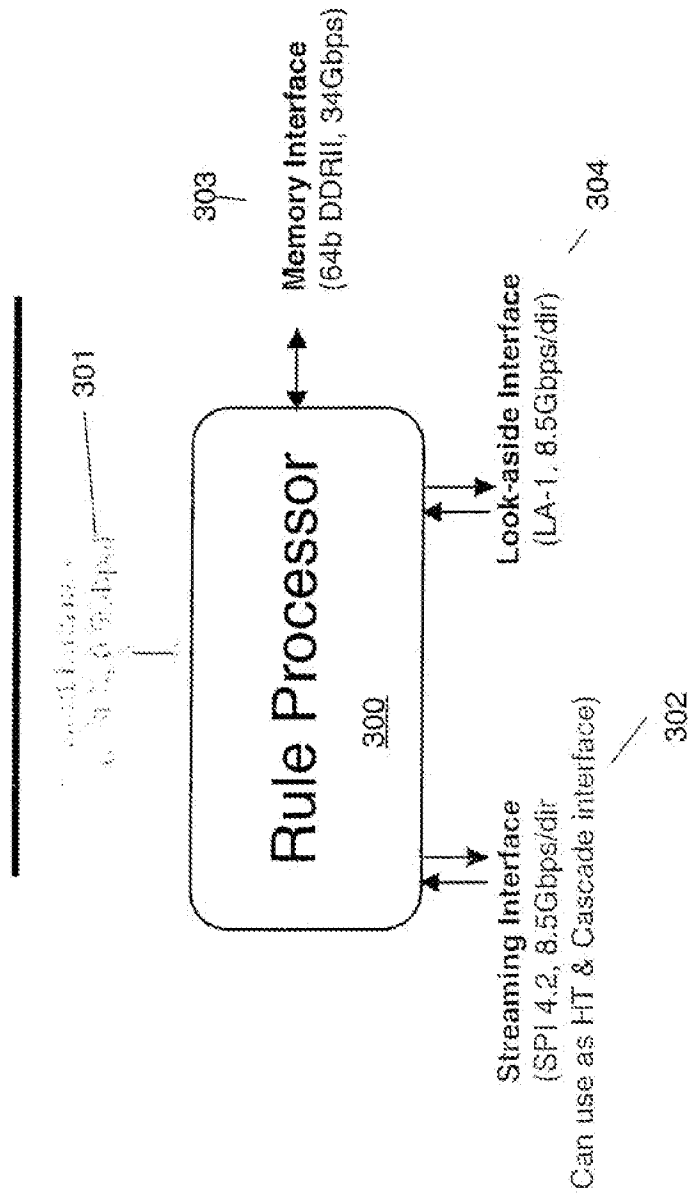


Figure 3

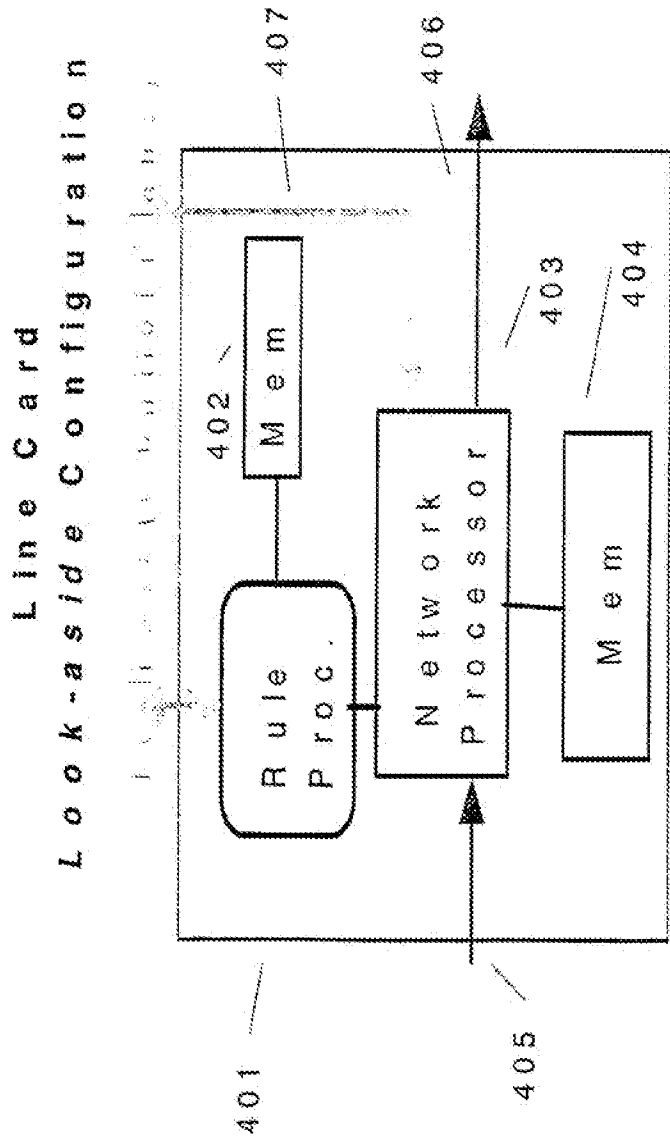


Figure 4

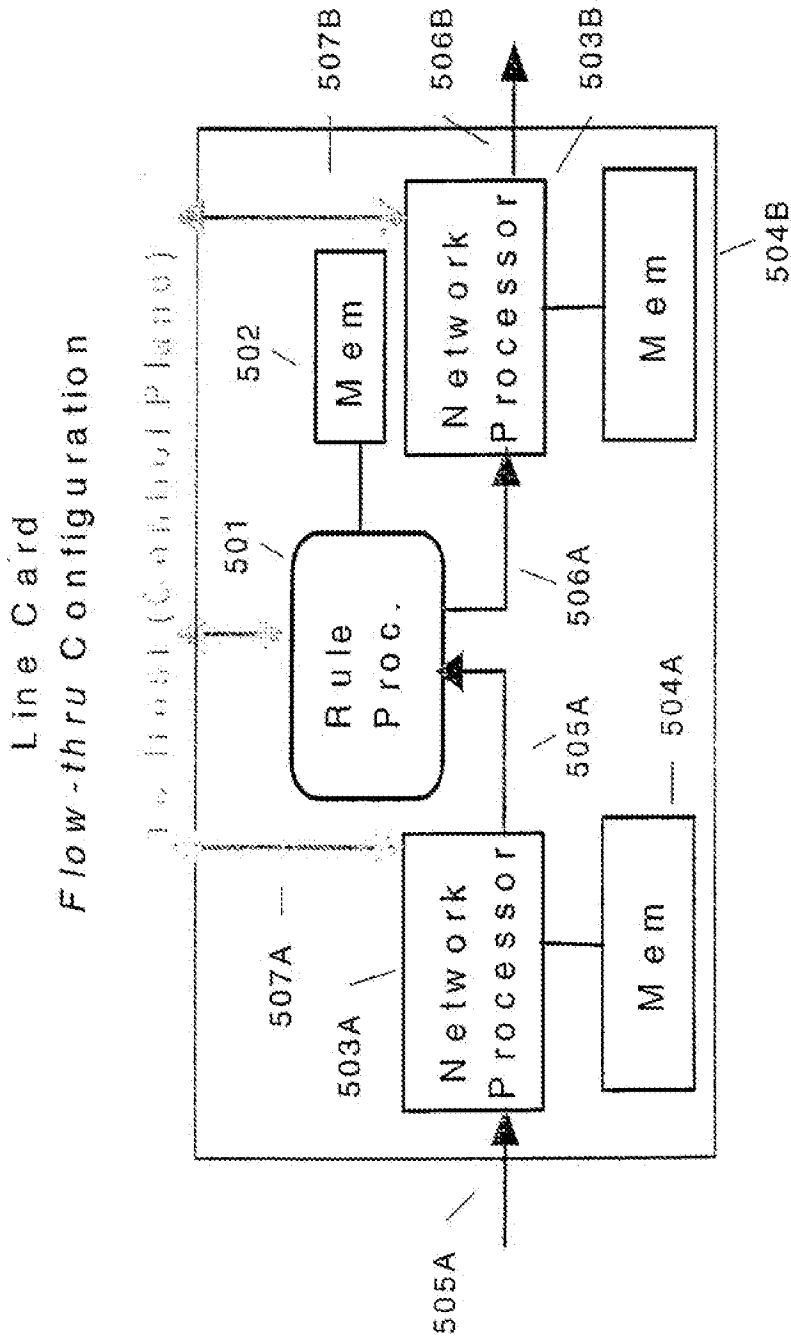


Figure 5

S e r v e r C o - P r o c e s s o r
C o n f i g u r a t i o n

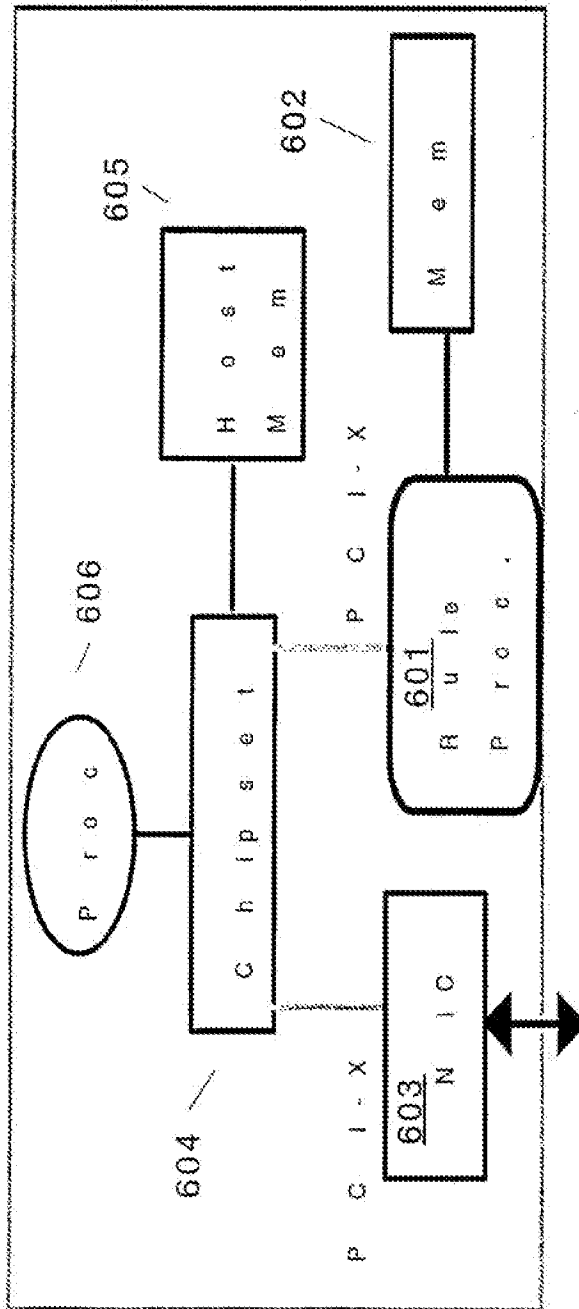


Figure 6

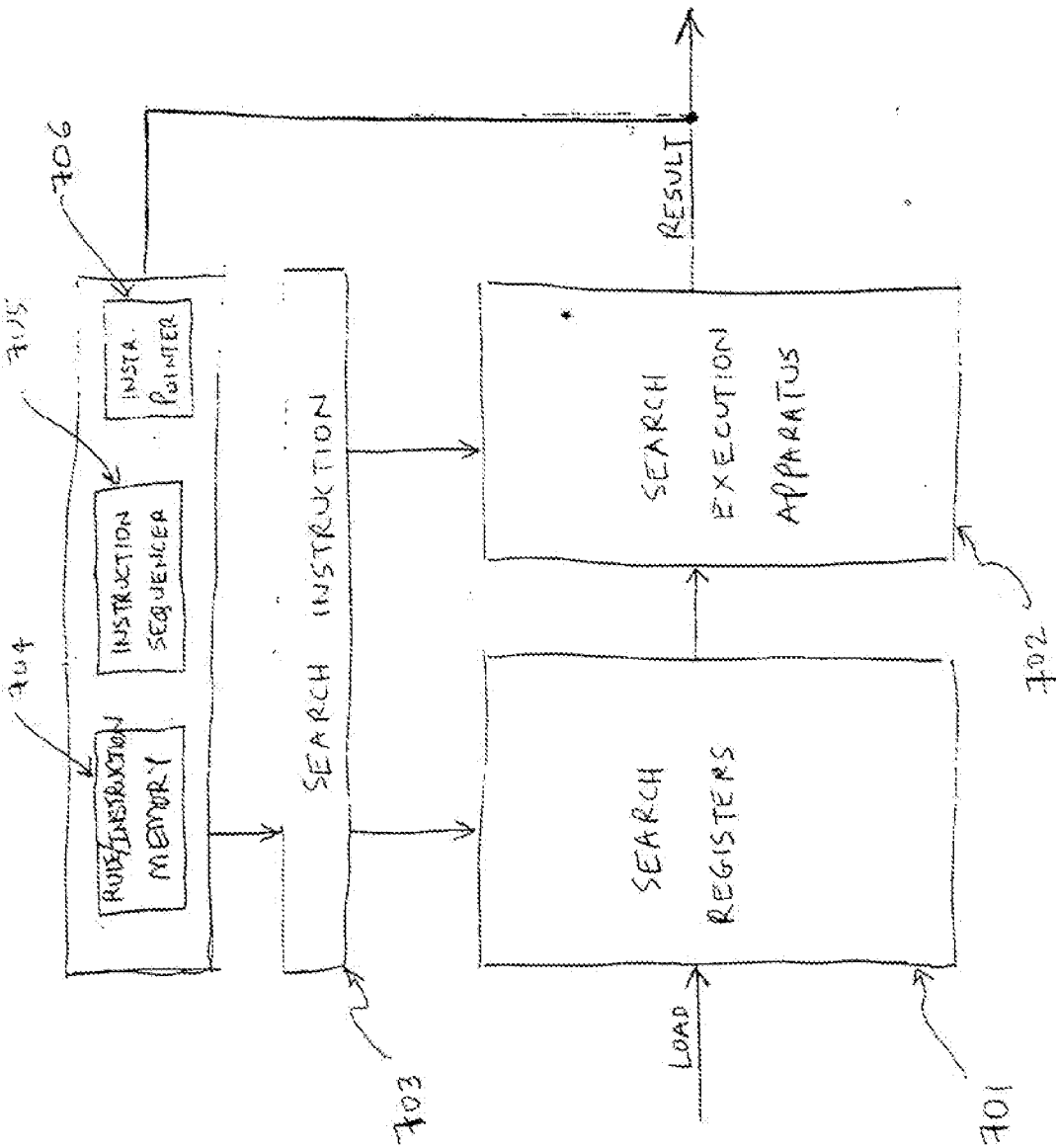


FIGURE 7

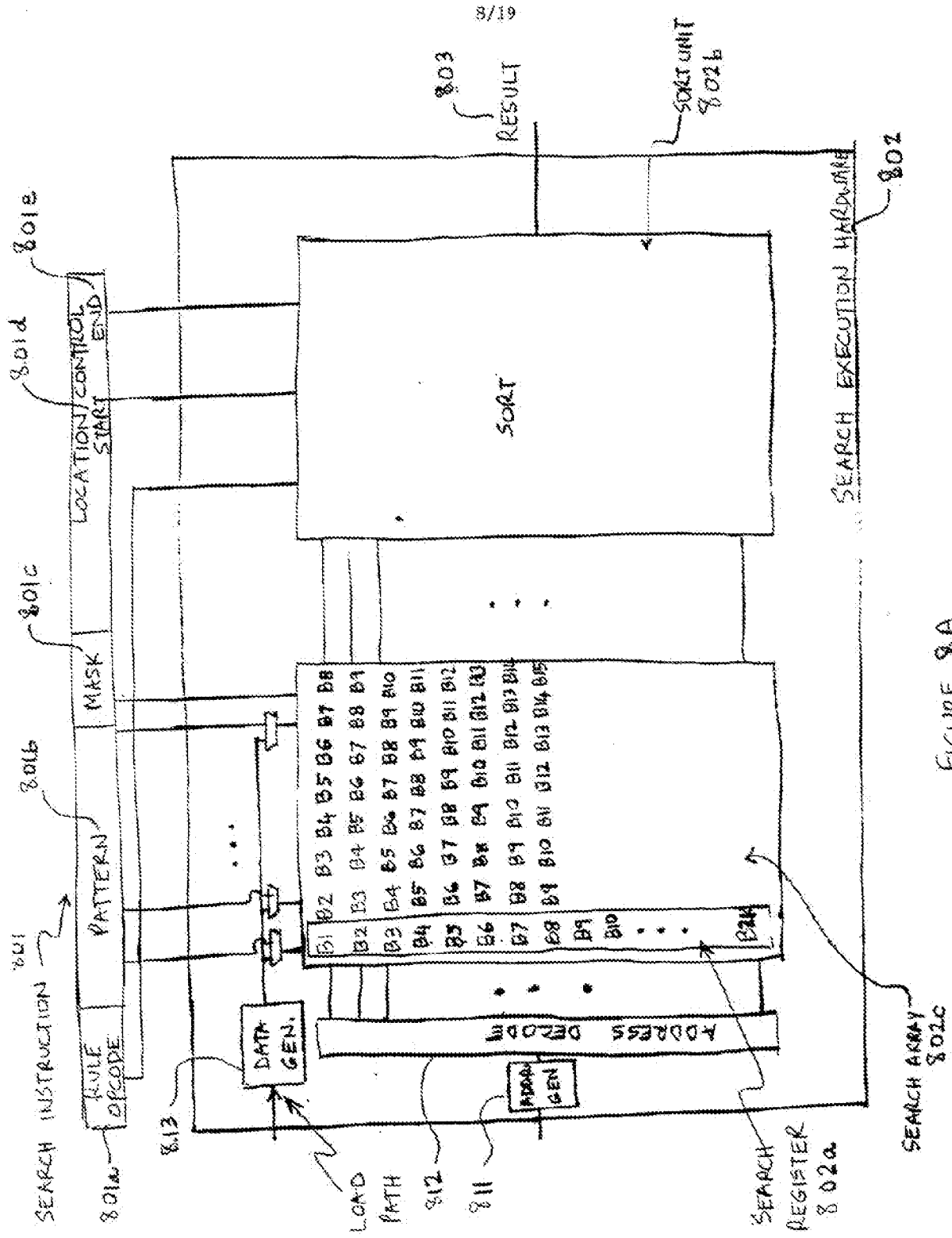


FIGURE 8A

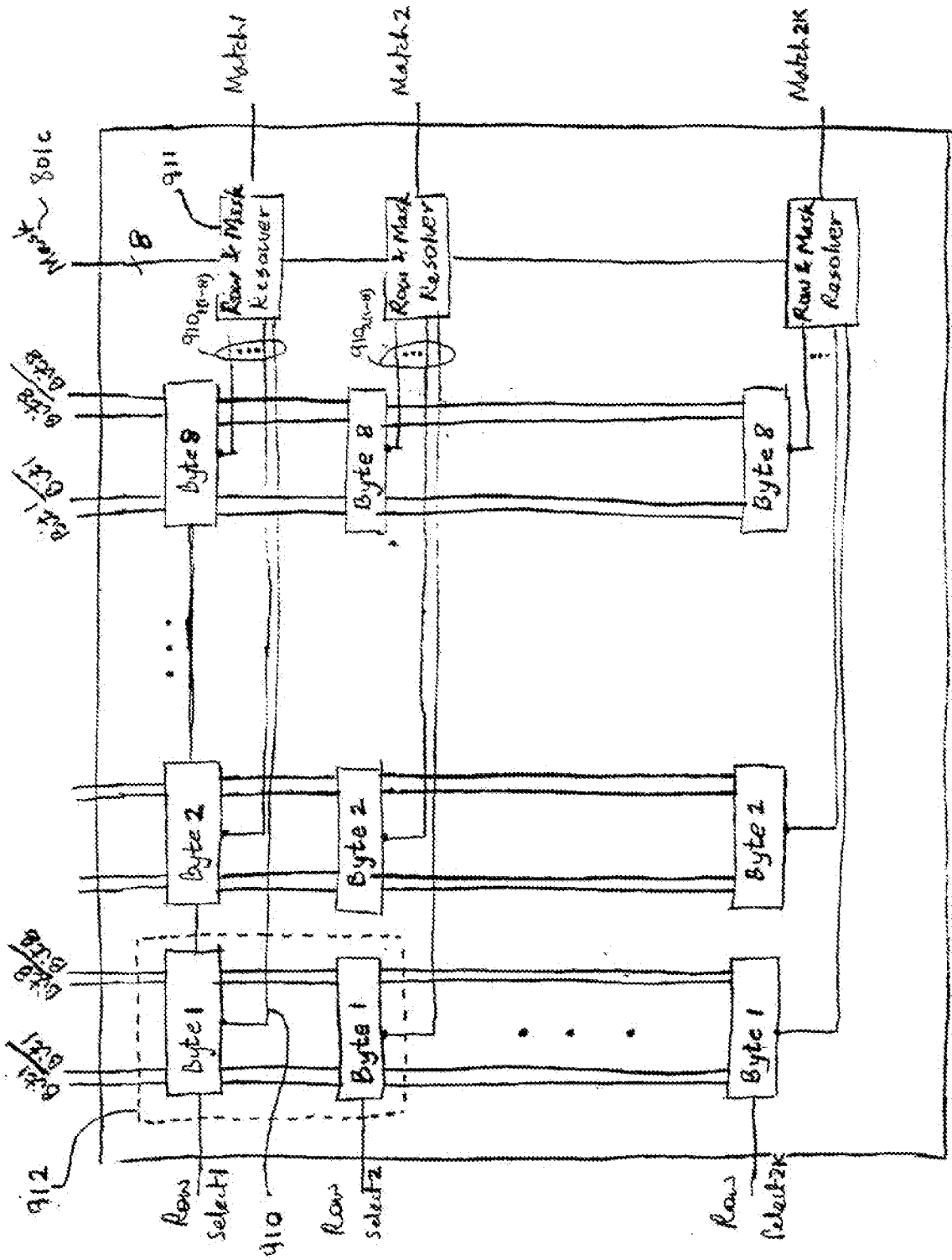
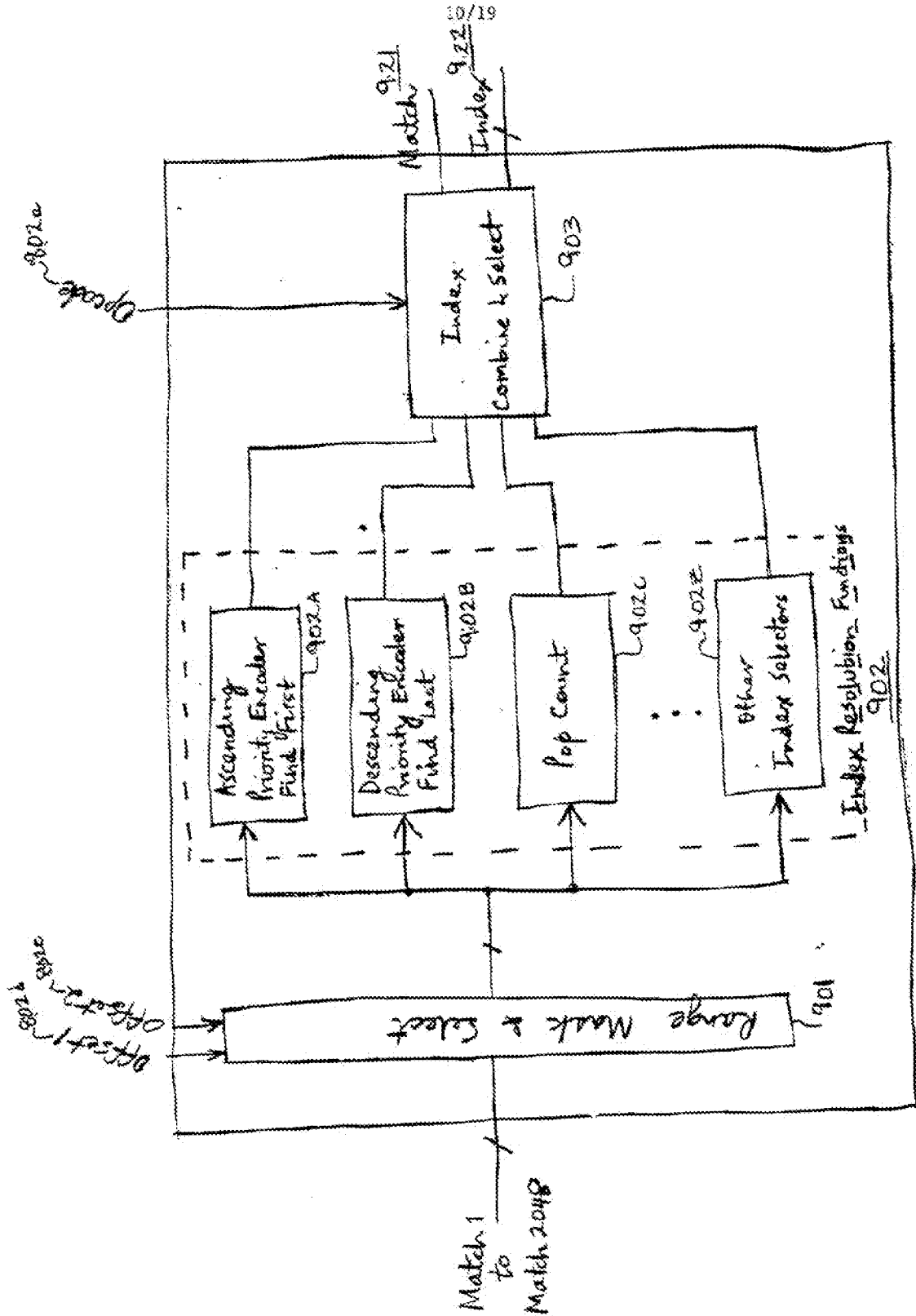


FIGURE 8B

FIGURE A



11/19

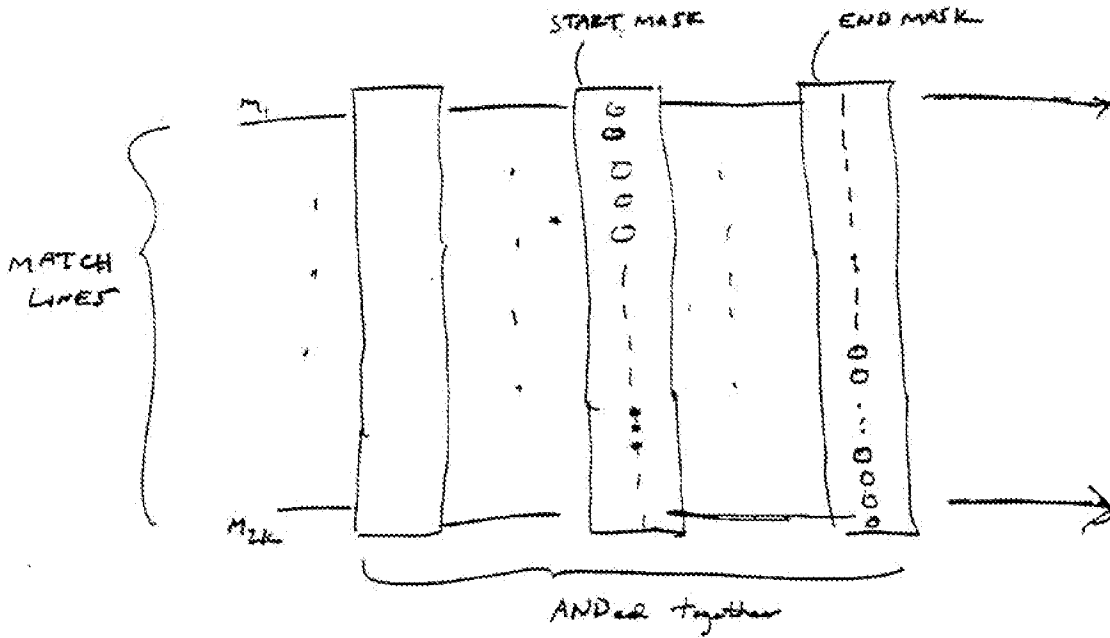


Figure 9B

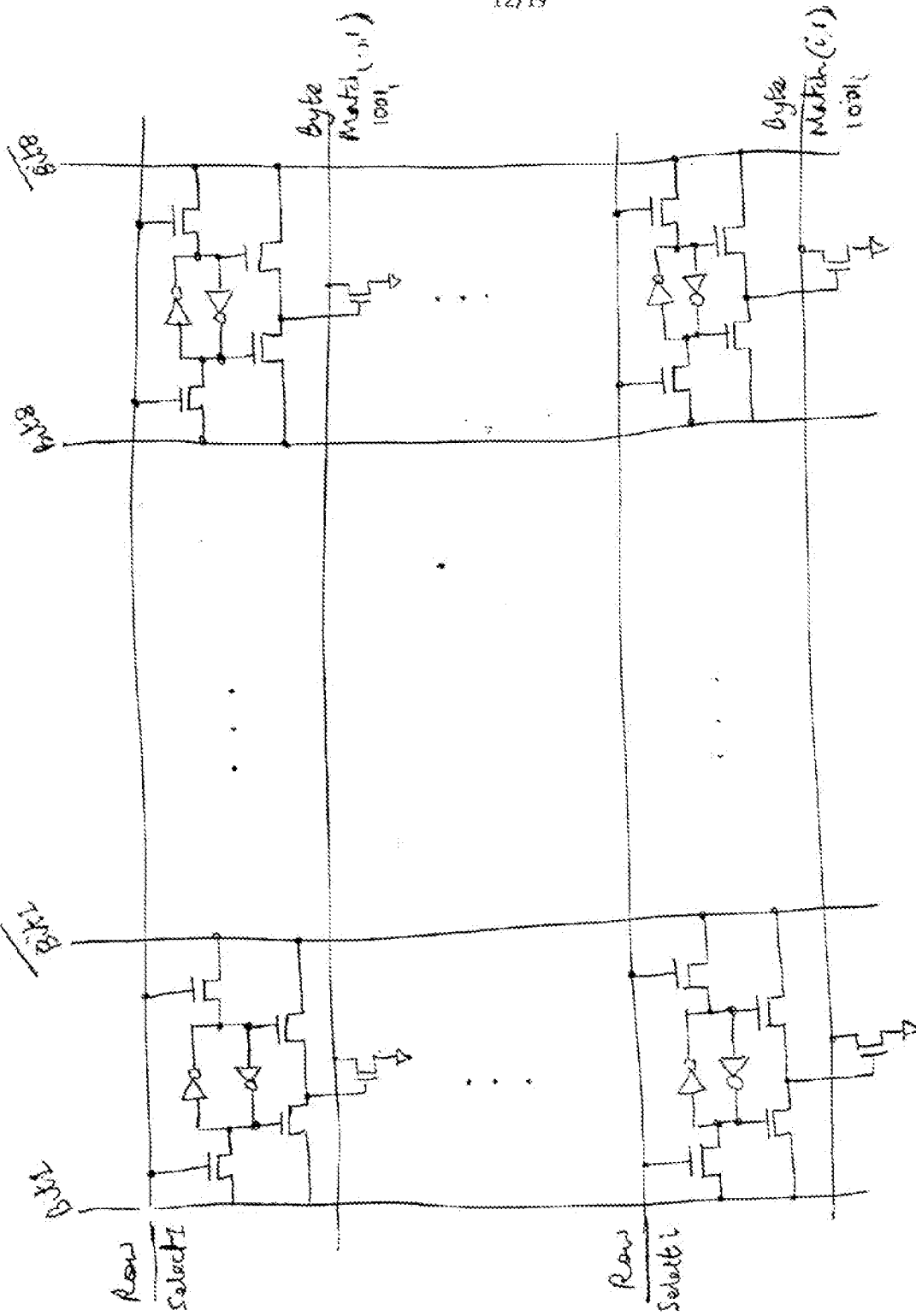
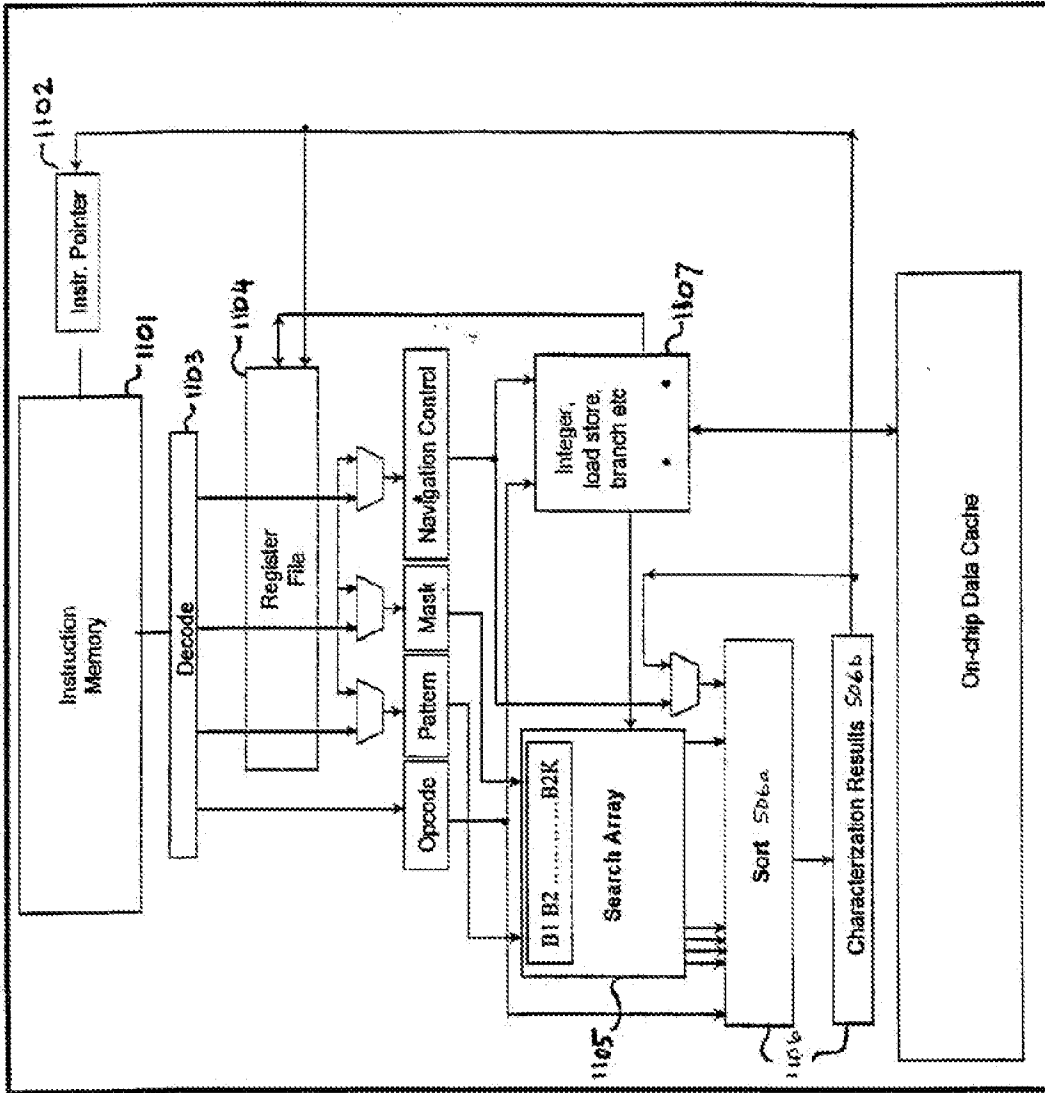


FIGURE 10

Microarchitecture Diagram



Fetch ~ 1108

Reg File Read & Rule Assembly ~ 1109

Execute/Search ~ 1110

Sort & Branch ~ 1111

1102

Figure 11

Example pseudo-code and Rule Engine micro-code

Pseudo-code

FIND ("cp /bin/sh /usr/spool/mail/root" BEFORE "chmod 4755 (\$?) AND "touch") BEFORE "mail"

Micro-code for an exemplary Rule Engine

	Opcode	Pattern	Mask	Start Offset	Start Offset Indirect	End Offset	End Offset Indirect	Result Register	Branch Address
1	FIND_FIRST_FORWARD	"cp /bin/"	0xFF	0x03D	0	0x800	0	A	0xB
2	FIND_FORWARD_ANCHORED	"sh /usr/"	0xFF	<A + 8>	1	0x800	0	A	0xB
3	FIND_FORWARD_ANCHORED	"spool/mail"	0xFF	<A + 8>	1	0x800	0	A	0xB
4	FIND_FORWARD_ANCHORED	"ll/root"	0xFE	<A + 8>	1	0x800	0	A	0xB
5	FIND_FIRST_FORWARD	"chmod 47"	0xFF	<A + 7>	1	0x800	0	A	0xB
6	FIND_FORWARD_ANCHORED	"55 (\$"	0xF8	<A + 8>	1	0x800	0	A	0xB
7	FIND_FIRST_FORWARD	"touch"	0xF8	0x03D	0	0x800	0	B	0xB
8	CMP(B+5, A+5)_BRANCH(10)	-	-	-	-	-	-	-	0xA
9	FIND_FIRST_FORWARD	"mail"	0xF0	<A + 5>	1	0x800	0	C	0xB
10	FIND_FIRST_FORWARD	"mail"	0xF0	<B + 5>	1	0x800	0	C	0xB

FIGURE 1a

Execution of example micro-code: pipeline diagram

Clock 14	-	-	-	10
Clock 13	-	-	10	-
Clock 12	-	10	-	-
Clock 11	10	-	-	-
Clock 10	-	-	-	8
Clock 9	-	-	8	7
Clock 8	-	8	7	6
Clock 7	8	7	6	5
Clock 7	7	6	5	4
Clock 6	6	5	4	3
Clock 5	5	4	3	2
Clock 4	4	3	2	1
Clock 3	3	2	1	-
Clock 2	2	1	-	-
Clock 1	1	-	-	-
	Fetch	Assemble	Search/ Execute	Sort & Branch

1301

FIGURE 13

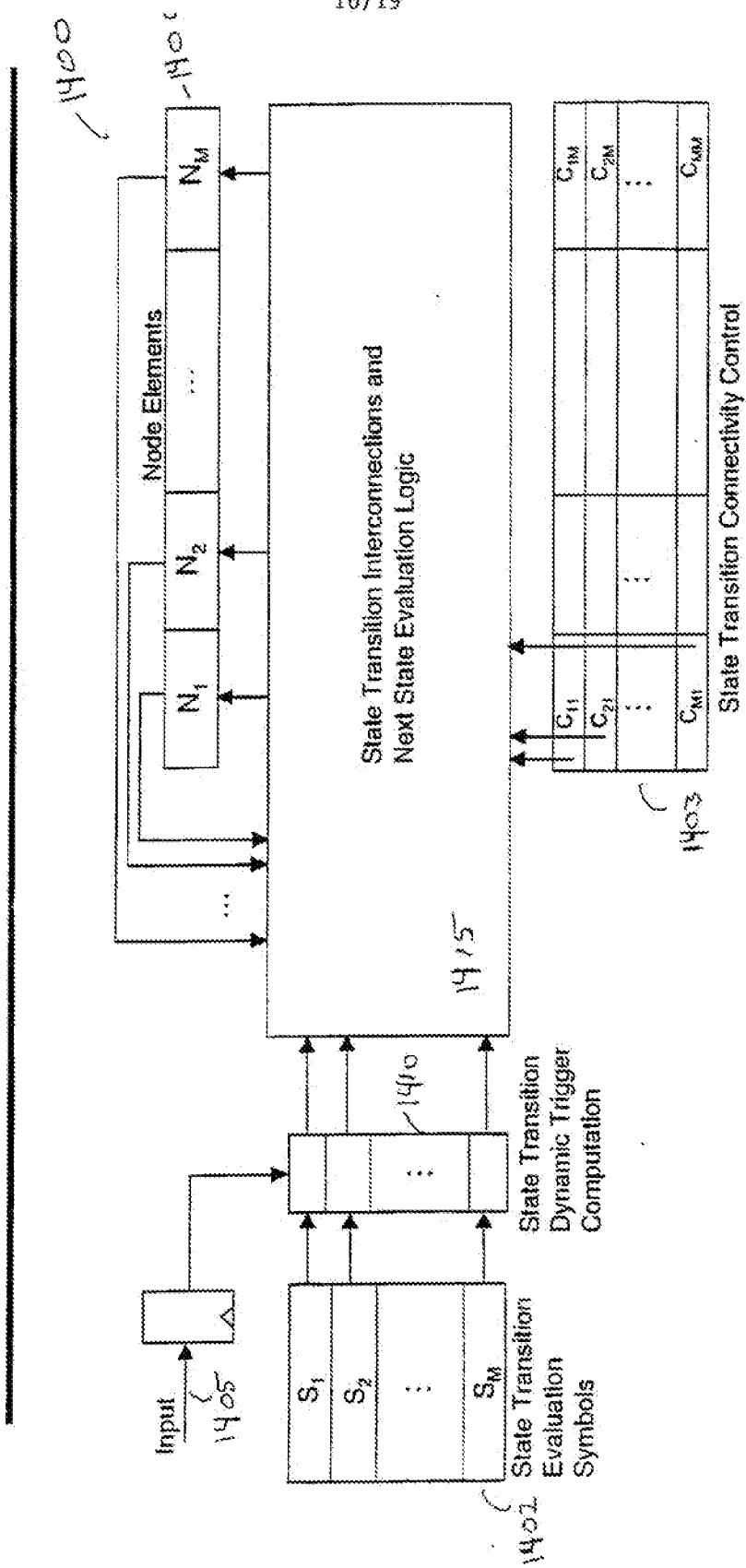


Fig. 14

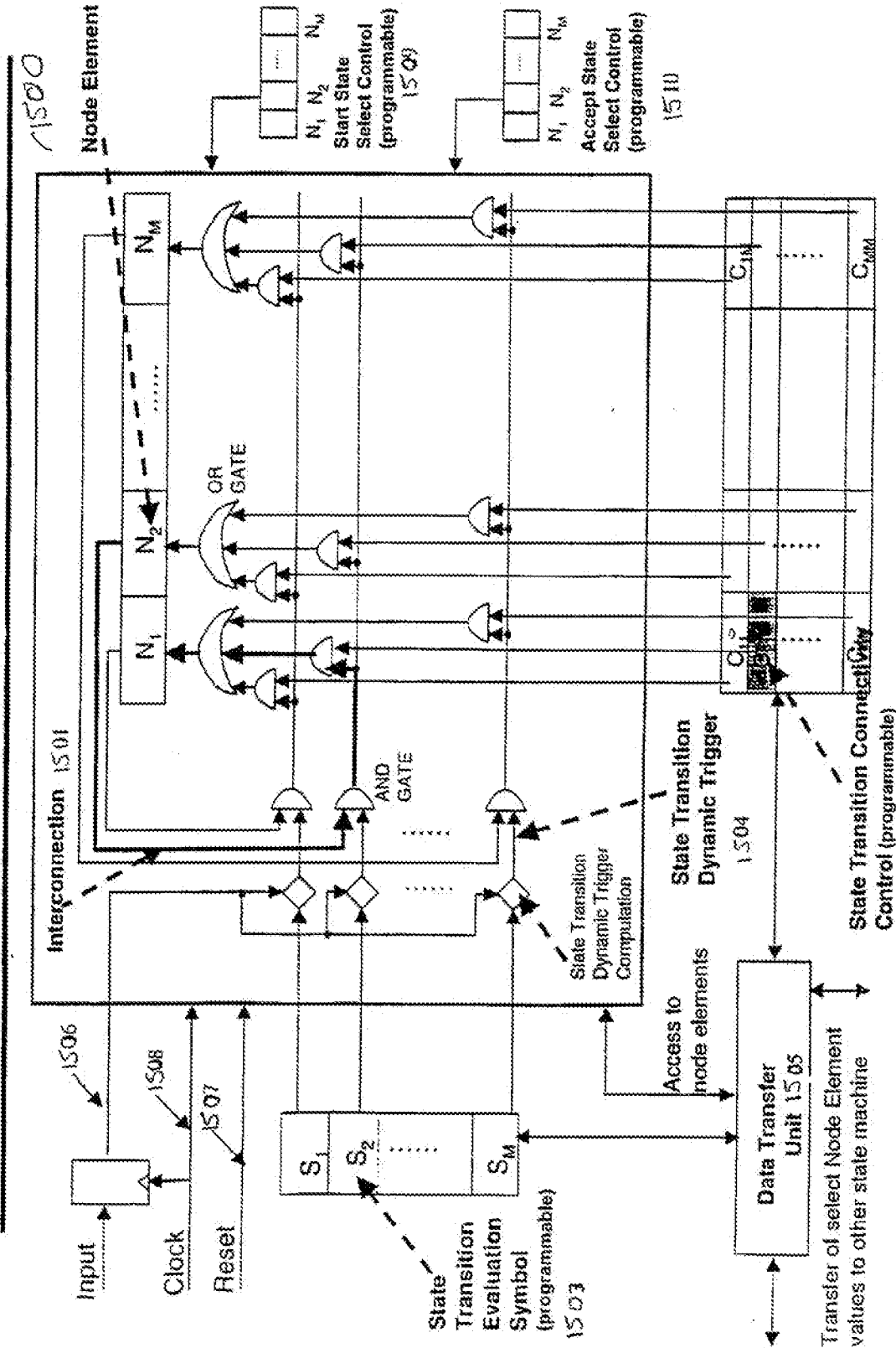


Fig. 15

FSA Building Block

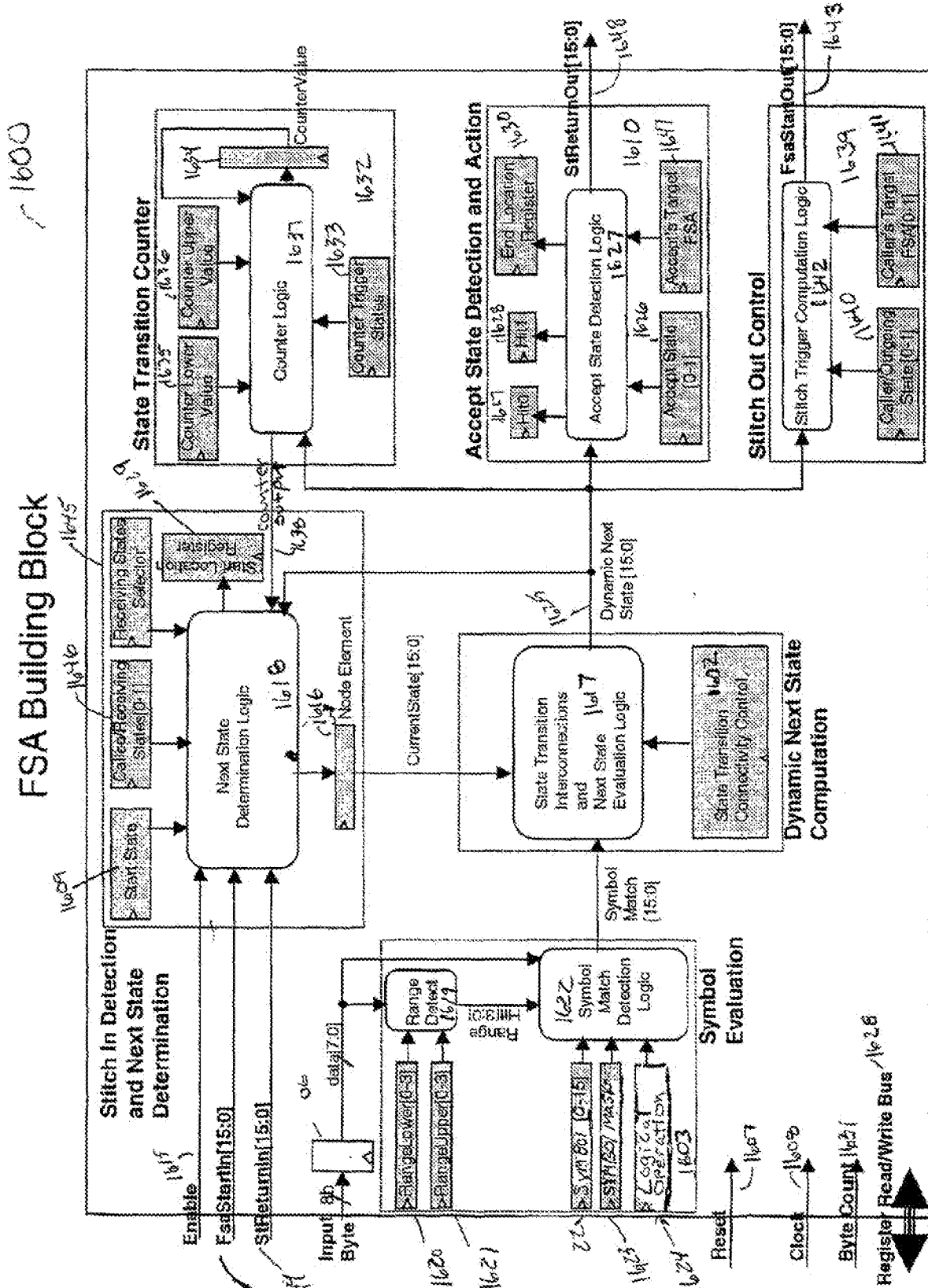


Fig. 16

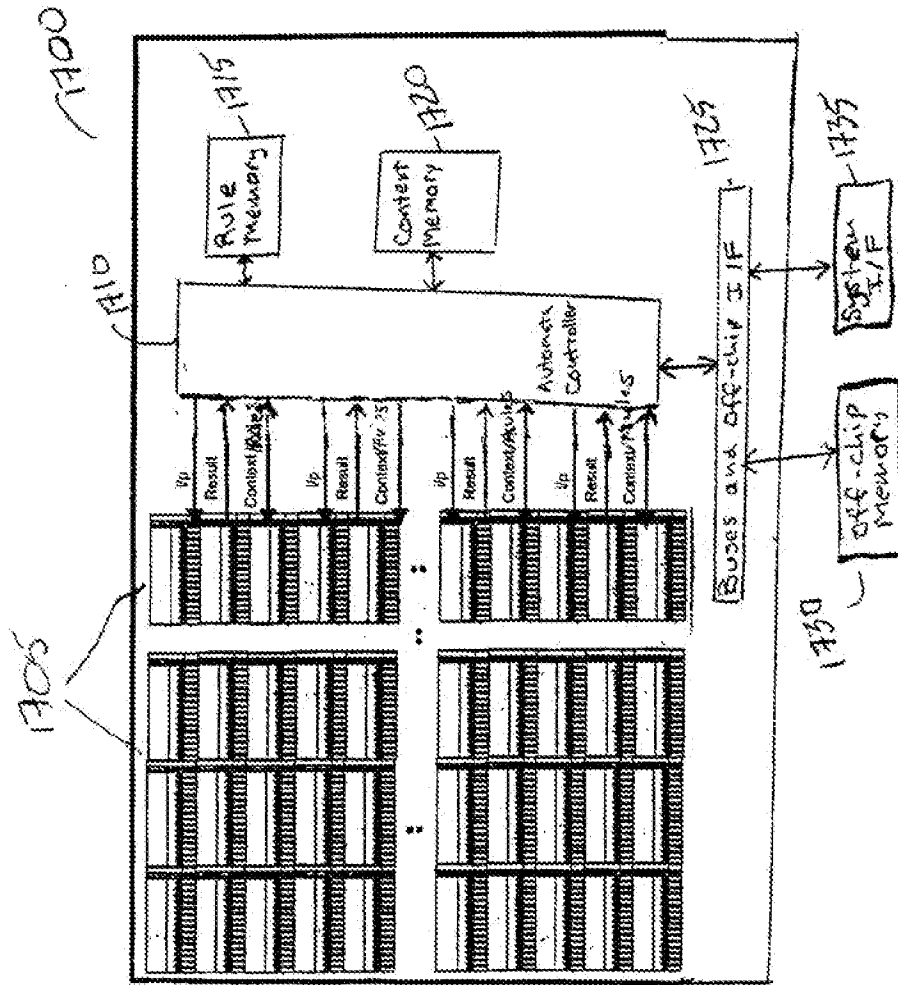


Fig. 17

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/000409

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06F17/30		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 G06F G05B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the International search (name of data base and, where practical, search terms used) EPO-Internal, INSPEC, IBM-TDB		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A A A	US 6 212 625 B1 (RUSSELL RICHARD G) 3 April 2001 (2001-04-03) abstract column 2, line 55 - column 3, line 11 column 5, line 6 - column 5, line 25 column 6, line 57 - column 7, line 21 figures 1-6 US 6 327 508 B1 (MERGARD JIM) 4 December 2001 (2001-12-04) abstract column 2, line 29 - column 2, line 50 column 4, line 46 - column 5, line 46 EP 0 488 297 A (HITACHI LTD ; HITACHI MAXELL (JP)) 3 June 1992 (1992-06-03) the whole document ----- -/--	1,2 3-25 3-25 3-25
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Date of the actual completion of the International search <p style="text-align: center; font-size: large;">1 June 2004</p>	Date of mailing of the International search report <p style="text-align: center; font-size: large;">09/06/2004</p>	
Name and mailing address of the ISA European Patent Office, P.B. 5616 Patentlaan 2 NL - 3280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo.nl, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center; font-size: large;">Abbing, R</p>	

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 101 376 A (NOGUCHI KOUKI ET AL) 31 March 1992 (1992-03-31) abstract column 1, line 31 - column 3, line 12 figures 1,10,12	3-5, 18, 23, 25
A	US 5 452 451 A (AKIZAWA MITSURU ET AL) 19 September 1995 (1995-09-19) the whole document	3-5, 18, 23, 25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/US2004/000409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6212625	B1	03-04-2001	NONE
US 6327508	B1	04-12-2001	NONE
EP 0488297	A	03-06-1992	JP 2960533 B2 06-10-1999 JP 4205174 A 27-07-1992 DE 69131954 D1 09-03-2000 DE 69131954 T2 05-10-2000 EP 0488297 A2 03-06-1992 US 5497488 A 05-03-1996
US 5101376	A	31-03-1992	JP 3130994 A 04-06-1991 KR 159941 B1 01-02-1999 US 5036486 A 30-07-1991
US 5452451	A	19-09-1995	JP 2825009 B2 18-11-1998 JP 3017780 A 25-01-1991 JP 2880199 B2 05-04-1999 JP 3131969 A 05-06-1991 US 5497488 A 05-03-1996

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(51)Int.Cl.

G06F 15/16

G06F 9/445

G06F 13/00

(21)Application number : 07-349164

(71)Applicant : SUN MICROSYST INC

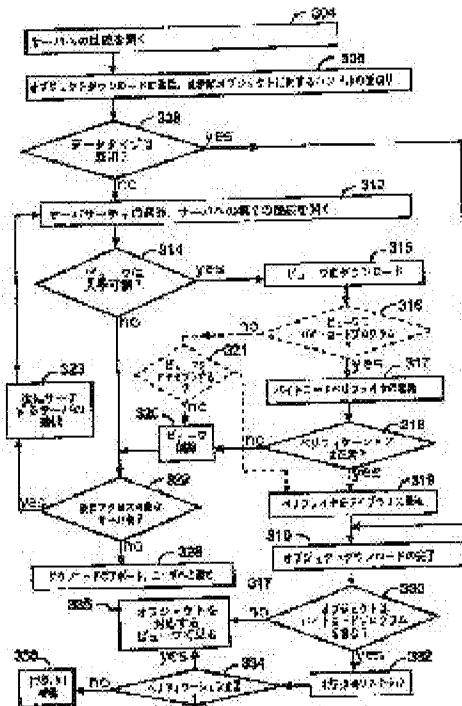
(22)Date of filing : 20.12.1995

(72)Inventor : GOSLING JAMES A

(30)Priority

Priority number : 94 359884 Priority date : 20.12.1994 Priority country : US

(54) DISTRIBUTED COMPUTER SYSTEM AND OPERATION METHOD THEREFOR



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a distributed computer system provided with a computer for automatically clown-loading the viewer of an object to be referred to and verifying the maintainability of a loaded program and the operation method.

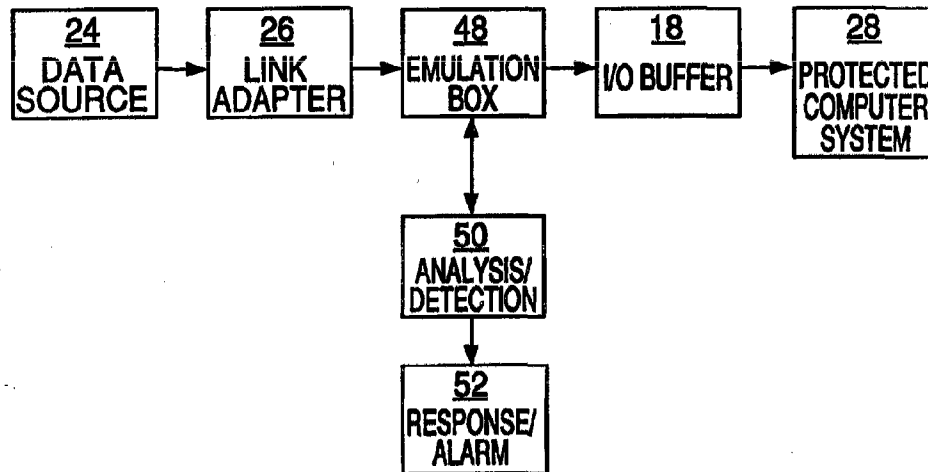
SOLUTION: At the time of loading data (object) stored in another server or the like through a network and referring to them, the viewer corresponding to the object is automatically searched, and in the case that the appropriate viewer is found in the other server or the like, verification is performed so as to confirm the maintainability before activating the viewer. Especially, importance is placed in the verification relating to the use of a stack and a data type to the program written in a byte code language.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : G06F 11/00, 17/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 95/33237 (43) International Publication Date: 7 December 1995 (07.12.95)</p>
<p>(21) International Application Number: PCT/US95/06659 (22) International Filing Date: 30 May 1995 (30.05.95) (30) Priority Data: 08/252,622 1 June 1994 (01.06.94) US (71) Applicant: QUANTUM LEAP INNOVATIONS INC. [US/US]; 410 Briarcliff Road, Briarcliff Manor, NY 10510 (US). (72) Inventors: SCHNURER, John; P.O. Box 446, Yellow Springs, OH 45387 (US). KLEMMER, Timothy, J.; 410 Briarcliff Road, Briarcliff Manor, NY 10510 (US). (74) Agent: AMARAL, Anthony, Jr.; Reid & Priest L.L.P., 40 West 57th Street, New York, NY 10019 (US).</p>		<p>(81) Designated States: CA, CN, DE, GB, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i></p>

(54) Title: COMPUTER VIRUS TRAP



(57) Abstract

A computer virus trapping device (10) is described that detects and eliminates computer viruses before they can enter a computer system and wreck havoc on its files, peripherals, etc. The trapping device (10) creates a virtual world that simulates the host computer system (28) intended by the virus to infect. The environment is made as friendly as possible to fool a computer virus into thinking it is present on the host (28), its intended target system. Within this virtual world, the virus is encouraged to perform its intended activity. The invention is able to detect any disruptive behaviour occurring within this simulated host computer system. It is further able to remove (52) the virus from the data stream before it is delivered to the host (28) and/or take any action previously instructed by a user (38).

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COMPUTER VIRUS TRAP

BACKGROUND OF THE INVENTION

The computer virus problem that exists today had its beginnings sometime in the late 1980s. At that time computer viruses were a novelty and plagued mainly DOS and Macintosh computers. Today, almost every Fortune 500 company has experienced computer viruses with the current rate being about one virus incident every 2 to 3 months.

The term computer virus is applied in common and legal usage to software, code, code blocks, code elements and code segments which perform certain functions in the digital computer environment. Code is intended to mean the digital instructions which the computer responds to. Non damaging or legitimate software, code, code blocks, code segments and code elements that serve a useful purpose would not be considered a virus.

Computer viruses have been known to cause physical harm to computer hardware in addition to erasing and destroying data. While rare, there have been cases of viruses that have made calls to disk drive heads actually scoring the media; still others have been discovered that ramped up the scan rate on a monitor causing failure. Most viruses do not, however, intentionally cause explicit physical harm and they are discovered before they are triggered to cause damage to data and files. However, it is after discovery that the real cost of viruses becomes apparent in connection with their detection and removal. In an average computer site this might entail searching 1000 PCs and 35,000 diskettes. If the software engineer misses even one instance of the virus, other computers will be re-infected and the clean up search must be repeated all over again.

A common misconception is that there are good viruses and bad viruses. Some viruses are claimed to be benign because they do not have a malicious

trigger event and cannot do intentional harm. However, this misses the point that the problems computer viruses cause are mainly due to the trigger events. It is a fact that computer viruses replicate. This by itself is harmful because it necessitates a search to clean up all instances of the viruses in a computer installation.

The damage caused by viruses, not so much due to erased files or data, but in the cost of detection, removal and also the accompanying lowered worker productivity can be very high. It has been calculated that the average computer site will spend on the order of about \$250,000 on a computer virus cleanup. It has been estimated that computer viruses will cost U.S. computer users over a billion dollars in 1994 alone.

The problem will grow exponentially due to the advent of the Information Super Highway. The increased connectivity among individuals, companies and government will allow a computer virus to create havoc. Currently disjoint computer systems that perform various functions that we take for granted today, such as, banking, telecommunications, radio, information databases, libraries and credit might meld together in the future. Thus, computer viruses, unchecked, could have a crippling effect on our society.

A virus can only cause trouble when it enters a system and finds a location on which to act. In a general sense, the virus must perform an intended function or a function the user or operator did not intend, expect, compensate for or otherwise protect against. Some examples of malicious virus activity are: changing names of files making it difficult for the user to access the files, moving a file to a new location, deleting files, interfering with working programs (i.e. causing all the words on a screen to fall to the bottom of the screen in a heap), replicating themselves and clogging up the system making it nonfunctional or waiting for a predetermined time period or after a certain number of toggle operations such as boot, access, cursor movements, mouse clicks, etc. before acting.

More felonious type viruses are those that have been released to cause ruin or impairment of a system for the purposes of sabotage, espionage, financial gain or to impair a competing business. Some examples include: creating a trap door which allows access to an unauthorized user for any purpose such as espionage, dumping files or erasure, navigation programs which find routes into systems, password cracking programs, modifying the executable segment of legitimate programs and attaching themselves to a code block and travel to another site.

In addition to traditional PCs and networks being vulnerable to virus infections, embedded control systems often used in industrial process control settings are also vulnerable. These systems control machinery, motors, industrial robots and process data from sensors. Because embedded systems are vulnerable to viruses just as PCs are, the results are potentially quite damaging. The smooth flow of a factory or assembly line could be devastated by a virus' uncontrolled behavior.

There are many possible ways for a virus to act on a computer system. All computers go through a boot procedure in which the Basic Input Output System (BIOS) and/or other resident system tools perform a variety of startup tasks such as, finding drives, testing memory and the system, initiating system files, loading DOS or other Operating System (OS) and bringing up an initial startup program. The system performs certain housekeeping tasks such as establishing various links among other functions. A computer system of any utility is complex enough that someone writing a virus has a myriad of opportunities and possibilities in which to cause trouble and interfere with the proper operation of the system.

The most common solution to the virus problem is to employ anti-virus software that scans, detects and eliminates viruses from computer systems. These programs work by searching a storage medium such as a hard disk drive or floppy diskette for known patterns of various viruses. However, there are

problems associated with this method of virus elimination. The software can only scan for known viruses which have an identifiable pattern that can be detected using repetitive string searches. To protect against new viruses frequent upgrades must be distributed. In addition, for the program to detect a virus it must already have infected that computer. The virus might have done some damage or even replicated itself and spread before it is detected. Also, the program must be run often to provide effective protection against viruses especially on systems where programs and data are transferred frequently between computers via diskettes.

In addition further liabilities, pratfalls and limitations to the current breed of anti-virus software solutions exist. This software breaks down into 3 categories: scanners, monitors, CRC's. Scanners as previously mentioned work off of databases of known strings. These databases are in constant need of updates. Monitors are memory resident programs monitoring the computer for questionable behavior. Monitors suffer from high rates of false positives, and they occupy and take a large portion of the limited conventional memory of a PC. CRC's are error checking programs that generate a unique "signature" in the form of a 2-byte number for each and every file to be protected. CRC programs either place the "signature" in the file itself or in a separate file. CRC programs suffer from the fact that they are easy to identify and thus easily tricked into recreating a "signature" for an infected file. Further, Scanners & Monitors & CRC programs must be run on the PC in question. Often this is a time consuming chore. These programs usually must have full control of the PC to operate further inconveniencing the user because he must wait for the scanner to finish before he can begin his normal work. The other critical concept is that the anti-virus software is run on the PC in question. It is subject to the limitations and liabilities of the operating system and may already be running on an infected PC without knowing it. The invention takes a unique approach by performing

its logic outside of the PC, not inconveniencing the user and is more effective because the invention's hardware guarantees a clean uninfected start.

Another possible solution is to increase computer security to the point where viruses cannot enter the system. Login/password control and encryption do not effect computer viruses. With encryption, detection and elimination is made more difficult because the virus along with good data is encrypted, only becoming decrypted when it attempts to replicate. Clearly, this is quite burdensome and expensive to implement.

Another possible solution is to avoid computer bulletin boards, both the commercial type such as, Compuserve, Prodigy, the Internet and Usenet, and the private, local, small type. However, this will not prevent viruses from spreading because most viruses do not result from software or data downloaded from information databases or computer bulletin boards. The operators of both commercial on-line services and private bulletin boards are very careful to keep viruses off their systems. They are constantly searching and scanning anything that is uploaded to their systems before making it available to their subscribers. In addition, most computer viruses of the boot track type do not spread through download data or software. The majority of viruses are spread through diskettes. There are known instances of commercial software being distributed after being infected by a virus. There are known instances of viruses being distributed unwittingly by diskette manufacturers on blank diskettes. There are no rules for which diskettes are more likely to be free from viruses.

Thus, there is a long felt need for a device that can search for, detect and eliminate viruses before they ever enter into a computer system that is transparent to a user and effective against all viruses in existence today and those not yet created.

SUMMARY OF THE INVENTION

One characteristic of almost all viruses is that on their own they are not capable of crossing from one computer OS to another. This is because different

computer systems in use today have different internal instructions or command sets. The language perfectly acceptable and intelligible to one OS does not have any correlation to another. An analogy to humans would be two people speaking different languages not being able to communicate. Although there might exist identical words present in both languages it is statistically very unlikely for a misinterpreted or cross over string of words or set of computer instructions (i.e. a virus) to convey a significant amount of information or be able to effectively execute a series of instructions. It is even more unlikely for this misinterpreted or cross over string of words or series of instructions to migrate from one language or system to another language or system and still be able to convey any useful information or execute a series of commands.

The present invention utilizes this characteristic of viruses to create an impenetrable barrier through which a virus cannot escape. The use of a foreign operating system guarantees the invention a high degree of safety and impenetrability. While the inventors recognize that such invention can be built without the use of a foreign operating system, such a version of the invention would lack any creditable degree of security. In addition, without the use of a foreign operating system the invention itself risks contamination. A foreign operating system different from the one being protected is introduced into the data stream before the data arrives at the computer system to be protected. To illustrate: if a program written for DOS will not run as intended on a Macintosh neither will a virus. A foreign operating system in order to complete its operation must provide an emulation of the target computer operating system (disk drives, memory configuration, ports, etc.). The virus is therefor fooled into thinking it is resident on the target computer system it was intending to infect. It is here, while the virus is resident within the emulated target operating system, that the virus is encouraged to infect files, destroy data and wreak havoc. It is here that the invention diverges from all other strategies in virus-detection and prevention. All other strategies are defensive in nature: they mark

files to detect unwarranted changes, they scan for unintended behavior in an attempt to prevent the virus from performing its damage. The present invention takes an offensive strategy by encouraging the virus to infect and destroy files.

The most critical behavior of a virus that computer users to prevent is the virus ability to replicate. Once a virus has erased a file, made a hard drive inoperable, it is detected. Once the virus has done anything considered malicious, it usually is detected. At this point anti-virus software and hardware must be brought in and run to detect and clean files. Prior to its performing this malicious act, a virus must replicate. If it does not replicate, it cannot grow and stay alive. If it has the ability to replicate, it can travel from PC to floppy to PC to network, etc. It is this behavior of viruses to replicate that the present invention preys on. The virus is encouraged to act within this cross platform generated emulation so that it can be detected. It is this use of cross platform technology and offensive strategy that allows a virus to be detected at any level before any damage occurs to the protected system. It is in the emulation that the invention can detect the virus and in the use of transplatform logic/environment that it can safely contain the virus. Where the virus can get around DOS or MAC scanners or Operating System or BIOS, it cannot infiltrate and contaminate the foreign operating system.

A foreign operating system is chosen based on its ability to monitor and watch any emulations, and for being able to manipulate elements within the emulation (files, falsifying BIOS information, creating sham peripherals), and for the sheer speed and computational horsepower.

The inventors recognize that it can be done without a transplatform, but it will be slow and absolutely unsafe. The use of a foreign operating system can be likened to the use of lead walls and glass walls and mechanical arms used by people manipulating radioactive materials in labs. While it is certainly possible to pick up radioactivity with one's bare hands, it is not highly recommended or is

it safe. While the invention can be had without the use of a foreign operating system, it is not highly recommended nor is it safe.

A primary object of the present invention is to provide a virus detection system to detect and eliminate viruses at their most basic level by simulating the host's environment by creating a virtual world to fool the virus into thinking it is resident on the host so as to allow disruptive behavior to be detected and the virus destroyed without harm to the host.

Another object of the present invention is to provide a virus detection system able to detect and trap viruses at any level using in a way other than performing string searches through memory or files to detect viruses.

Yet another object of the present invention is to provide a virus detection system able to detect as of yet unknown viruses thereby obviating the need for software updates to keep the detection device current.

Still another object of the present invention is to minimize the down time of the host computer system in the event a virus is detected.

Still another object of the invention is to record at the user's discretion the virus to another media for transferal to virus analysis groups. The object is to feed the virus to an internal analysis to compare against a know, previously acquired attempt, such as a trapdoor or file change, or industrial espionage or sabotage code, etc.

Still another object is to record from which incoming source the virus came, i.e., modem, which digiboard channel, internet, Compuserve, LAN station/Userid, WAN line, etc.

Another object is to alert system administration of the attack.

BRIEF DESCRIPTION OF THE DRAWINGS

Serving to illustrate exemplary embodiments of the invention are the drawings of which:

Fig 1 is a high level functional block diagram of the preferred embodiment of the present invention.

Fig. 2 is a functional block diagram of the preferred embodiment of the present invention;

Fig. 3 is a functional block diagram showing the application of the present invention in a local area networking environment;

Fig. 4 is a functional block diagram showing the application of the present invention in a telecommunications networking environment;

Fig. 5 is a high level software logic diagram showing the operating steps of the present invention;

Figs. 6A to 6C together comprise a high level flow chart of the operating steps of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In order to afford a complete understanding of the invention and an appreciation of its advantages, a description of a preferred embodiment of the present invention in a typical operating environment is presented below.

Operating on the principle that a virus cannot cross operating systems, the present invention creates a virtual world for a potential virus. An OS that emulates the system to be protected provides a friendly familiar environment for the virus. The virus is encouraged to act in this virtual world created for it. The results of the virus' disruptive behavior can be detected and consequently the virus can be flagged and eliminated or stored and further analyzed. This scheme is based on the assumptions that almost all viruses are executable in nature, no user would try to purposely communicate a destructive virus to another and that it is possible to identify executable instructions in an environment where the instruction cannot possibly operate.

Shown in Figures 1 and 2 are functional block diagrams of the virus trapping device 10. The Central Processing Unit (CPU) 12 can be any computing device (i.e. Intel, Motorola, Paramid, National Semiconductor or Texas Instruments microprocessor, multiple chip set CPUs, board level CPUs, etc.). The Transputer is particularly well suited because almost all PCs in use

today employ CPUs other than the Transputer. A guide to the application and programming of the Transputer can be found in *The Transputer Handbook*, by Mark Hopkins, copyright 1989 INMOS Ltd. and *The Transputer Databook*, by Mark Hopkins, 3rd Edition copyright 1992 INMOS Ltd. Italy. As a typical microprocessor circuit design, EPROM 14 holds the operating software for the CPU 12. RAM 16 provides a temporary storage facility for the CPU 12 to execute the virus detection software. Link adapters 20 provide physical connections to interface the virus trapping device 10 to the outside world. The trap device 10 is not limited to two link adapters, any number could be implemented to handle a multitude of input data streams. The device 10 reads an incoming data stream from one or more outside sources. An example of a communication link 24 are a Local Area Network (LAN) (i.e. Novell), Wide Area Network (WAN) (i.e. networked LANs), the telephone network (i.e. Modems), radio frequency (RF) type cellular network or some type of data storage device (i.e. floppy diskette, hard disk, tape, CD-ROM, magneto-optical, etc.). The communication link 24 provides an incoming data stream for the device 10 to operate on. Diskettes are commonly used to transfer data and programs from one computer to another, thus making it a common entry point into the system for viruses. An input/output (I/O) interface 18 provides a means for the virus trapping device 10 to communicate with the computer system being protected 28.

The application of the virus trapping device 10 in a typical operating environment is shown in Figure 3. The file server 42 is the computer system to be protected. The virus trapping device 10 is placed in the data stream that connects the file server 42 to other workstations 38. The hubs 40 serve to connect the workstations 38 into a LAN and the modems 36 serve to connect remote workstations 38 to the file server 42. In this scenario, all traffic to and from the file server 42 is monitored for viruses by the trap 10.

Another application of the trapping device 10 is shown in Figure 4. In this scenario, data traffic passing through the telecommunications network 34 is protected from viruses. A user might have a mainframe file server 30 at a remote site connected to the telephone network 34. Nodes 32 located in the telephone company's central offices perform access and cross connect functions for customers' data traffic. To prevent the spread of a virus through the network, the trapping device 10 is placed in front of each node 32. Data traffic between workstations 38 connected to the telephone network 34 via modems 36 and the mainframe file server 30 is constantly checked for viruses because the traffic must pass through the virus trapping device 10.

Operation of the virus trapping device 10 is as follows. The trapping device 10 monitors the data stream that enters from the outside world, such as from the communications link 24. All data is treated as data whether it is actually data (i.e. data files) or instructions (i.e. executables) as it passes over the link 24. At this point the actual instructions have not been executed but rather they are in the process of being transmitted for execution. While in this state of transmission, emulation means 48, controlled by the CPU 12, provide a friendly environment for a potential virus. The data is put into the emulation chamber 48 where the virus is fooled into acting as if it were really present on the host system. It is desired that any disruptive behavior the virus is capable of displaying take place in emulation chamber 48 such as replicating, attacking another program or destroying data. In this virtual world the virus has complete access to its environment. It is at this point that analysis and detection means 50 controlled by the CPU 12 catches the virus in the act of self replication and prevents it from infecting the host system. The virus cannot escape the emulation box 48 because the box exists in a foreign operating environment with no access to critical files, keyboard, screen, etc. Access to the real world is completely blocked.

Upon startup of the trapping device 10, the emulation software is read from EPROM 14 and executed. When a user turns on his workstation 38, a connection is established between the workstation 38 and the file server 30 (or 42). A connection session is created in the RAM 16 of the CPU 12. In like fashion, a session is created for each user.

As the user at a workstation 38 runs commands and moves file about, data is ultimately written to and read from the file server 30. The trapping device 10 splits the data into two paths. One path connects directly to the protected computer system 28 without modification. Data over the other path is written into the emulation box or virtual world created for each user. The write is performed in this box just as it would have been performed on the file server 30, protected computer 28 or workstation 38. Changes in data and time are simulated to trigger time sensitive viruses, fooling them as to the actual data and time. If the environment changes, it is checked to determine whether simply data was written or whether executable code was written.

Once the executable is inside the emulation box, a Cyclic Redundancy Check (CRC) is made of the Interrupt Request table (IRQ). Also, CRCs are generated on all files that are placed in the emulation box. The CRC is an error detection and correction code widely used in the computer and engineering fields. Other aspects of the environment, such as available memory, are saved too. All information saved is stored outside of the emulation box where it cannot be altered by a virus. The executable is forced to run.

If absolutely nothing happens, a self replicating virus does not exist. If anything within the environment changes (i.e. size of files, sudden attempts to write to other executables in the emulation box, etc.) it is determined that a virus does exist and is attempting to self replicate itself.

The first step is to determine whether the IRQ table was modified. The second step is to determine if another program was written to. Many programs attach themselves to IRQs (i.e. network shell programs, mouse drivers, some

print drivers, communication and fax drivers). However, none of these programs will try to write code to other executables. No legitimate program will attempt direct changes to the File Allocation Table (FAT) or other internal OS disk area. They typically pass their changes (or writes) through standard well behaved DOS interrupts (INTs) (i.e. INT 21). Or, for example, in the case of file repair programs (i.e. Norton Utilities) which do at times write directly to the FAT, they will also not grab IRQs. It is the combination of grabbing one or more IRQs and attempting changes to either the FAT or executables that allows virus activity to be detected.

In the architecture of the IBM PC, for example, IRQs are prioritized and have different dedicated purposes. IRQ 0 is the system clock, IRQ 1 is the keyboard, etc. Almost no program needs to grab IRQ 0 having the highest priority, however a virus must. A virus must grab the highest priority IRQ because if it had a lower IRQ, then a conventional anti-virus program can get in at a higher priority and make the virus more vulnerable to detection. Many viruses grab several IRQs, allowing a virus to be detected by its 'signature'. In addition, most programs except viruses return to DOS about 95% or more of the memory they used for execution upon exiting or receiving an unload instruction. Therefore the following activities, monitored in the virtual environment created in the emulation box, can be used to detect viruses: attachment to IRQs, which IRQs have been attached, whether multiple IRQs have been attached, changes to the FAT, changes to executables, changes to the environment, changes to memory and any Terminate and Stay Resident (TSR) activity after the unload command has been issued and the program should have terminated.

In addition a further series of checks can then be initiated: check the "hard drive" and look for additional sectors or blocks being marked "bad" which were good before or vice versa. Has the program attached itself to the internal clock and is it incrementing its own internal clock? Have any of the error-checking algorithm results changed?

Upon detection of a virus by the analysis and detection means 50, response/alarm means 52 can execute any number of user definable optional commands such as messaging or beeping a system administrator, notifying the sender and receiver of the file or program, deleting the file, writing to a specially prepared floppy drive, calling a pager with a virus message or shutting down a network segment. A logic flow diagram showing the operating steps the trap device 10 performs is shown in Figures 6A to 6C.

A high level logic diagram of the software is shown in Figure 5. The input data stream is generated by communication links 24. Link adapters 20 convert the data input stream from a hardware and software protocol specific to the particular communication link (i.e. X.25, Novell IPX/SPX, Microsoft NetBEUI, etc.) to a common protocol understandable by the CPU 12. After protocol conversion, the data packets are disassembled into a data stream having a common data format the CPU 12 is able to understand. The data is then processed and analyzed for the presence of virus activity. Following processing, data packets are re-assembled and converted to its original hardware and software protocol by the I/O Interface 18 before being output to the protected computer system 28.

The trap device 10 passes data directly through to the host system in addition to simultaneously processing it. This is to reduce the processing delays associated with sending large data files to the host system and having the trap device 10 process this data before the host receives it. The entire contents of a large file except for the final write command or the file close command is transmitted to the host. If no virus is detected, the write or close command is issued. If a virus is detected, the write or close is never issued and the response/alarm means 52 takes appropriate action.

It is clear that the above description of the preferred embodiment in no way limits the scope of the present invention which is defined by the following claims.

What is claimed is:

1. A computer virus trapping device comprising:

link adapter means connected to a source of data input for converting external protocols into a data format understood by said trapping device;

emulation means connected to said link adapter means for accepting said data stream from said link adapter means; said emulation means providing an environment isolated from a protected computer system that simulates the architecture of said protected computer system whereby a computer virus is coaxed into performing its intended activity; and

detection means for monitoring said emulation means and determining when said computer virus either has performed or is performing its said intended activity.

2. The device of claim 1, whereby said emulation means comprises processing means suitably programmed to create a virtual world for said computer virus that simulates said protected computer system.

3. The device of claim 2, whereby said processing means comprises a microcomputer circuit, temporary and permanent data storage and an I/O interface.

4. A computer virus trapping device comprising:

link adapter means connected to a source of data input for converting external protocols into a data format understood by said trapping device;

emulation means connected to said link adapter means for accepting said data stream from said link adapter means; said emulation means providing an environment isolated from a protected computer system that simulates the architecture of said protected computer system whereby a computer virus is coaxed into performing its

intended activity;

detection means for monitoring said emulation means and determining when said computer virus either has performed or is performing its said intended activity; and

response means responsive to said detection means to take action according to preset user instructions upon said detection means determining said computer virus exists.

5. A computer virus trapping device comprising:

link adapter means connected to a source of data input for bidirectionally converting external protocols into a converted data format understood by said trapping device;

emulation means connected to said link adapter means for accepting said data stream from said link adapter means; said emulation means providing an environment isolated from a protected computer system and simulating the architecture of said protected computer system so as to coax a computer virus into performing its intended activity;

detection means for monitoring said emulation means and determining when said computer virus either has performed or is performing its said intended activity;

response means responsive to said detection means to take action according to preset user instructions upon said detection means determining said computer virus exists; and

I/O buffer means for reassembling said converted data back into said external data stream protocol and delivering said data stream to said protected computer system.

6. The device of claim 5, whereby said emulation means comprises microprocessor means programmed to simulate the environment of said protected computer system.

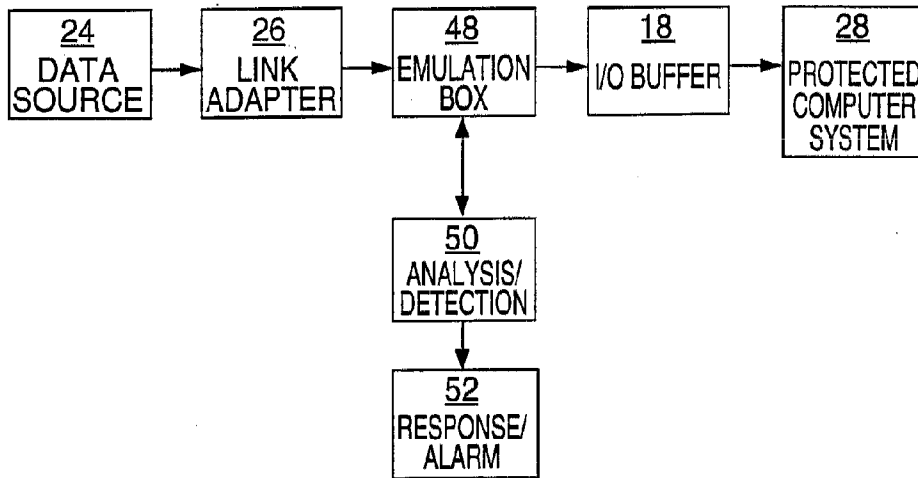


FIG. 1

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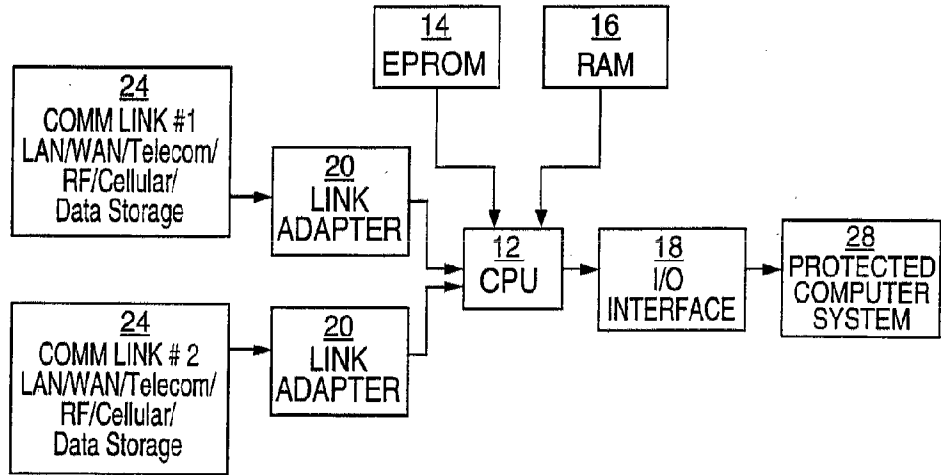


FIG. 2

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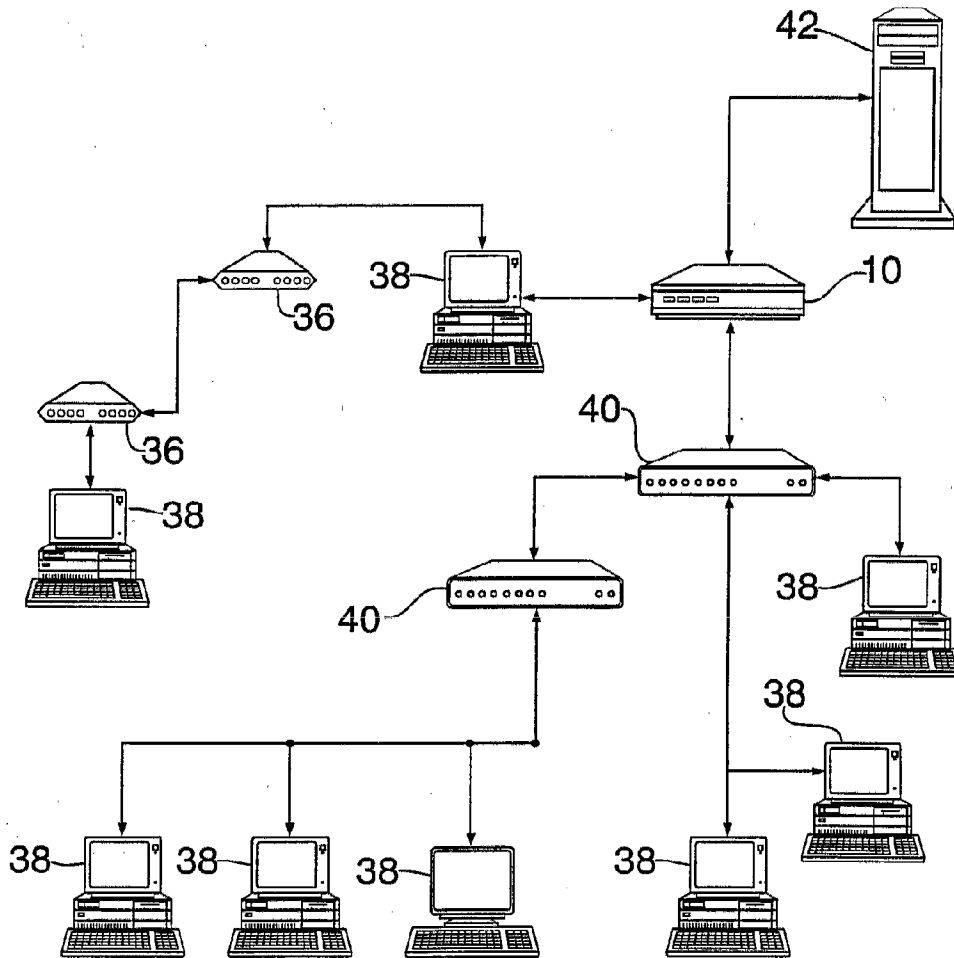


FIG. 3

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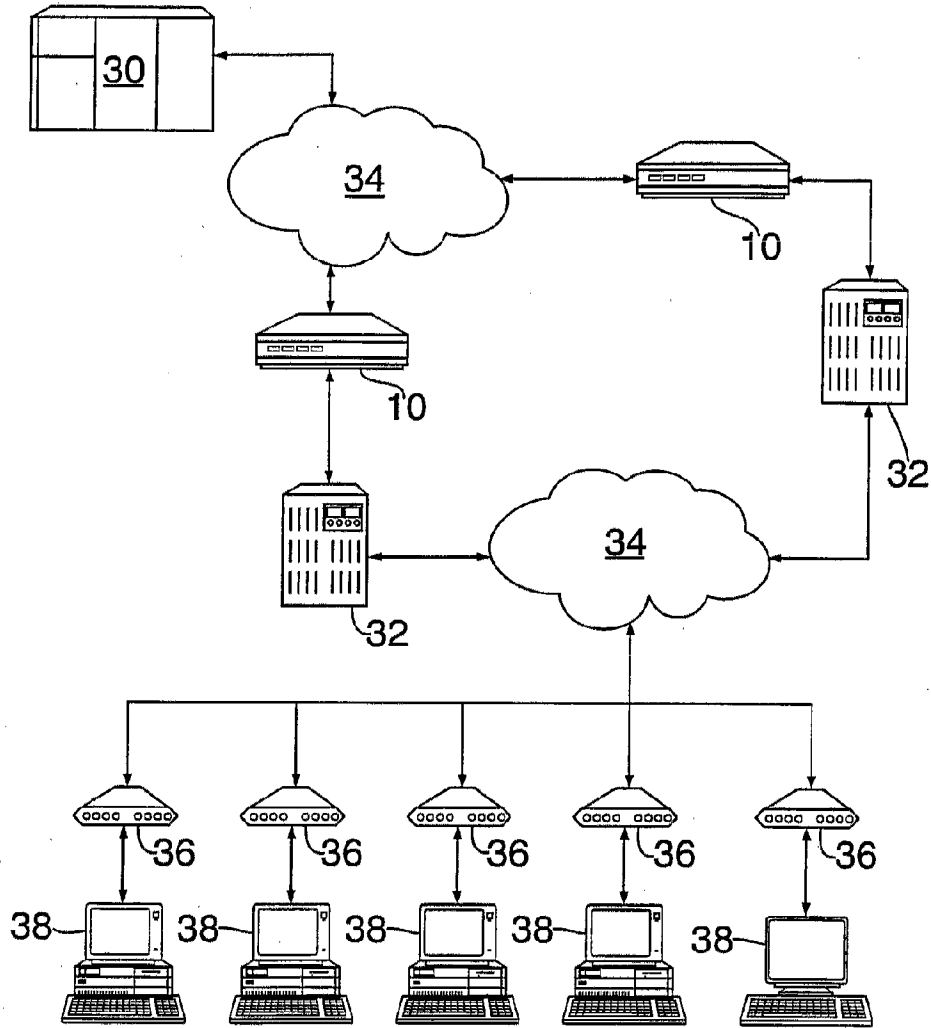


FIG. 4

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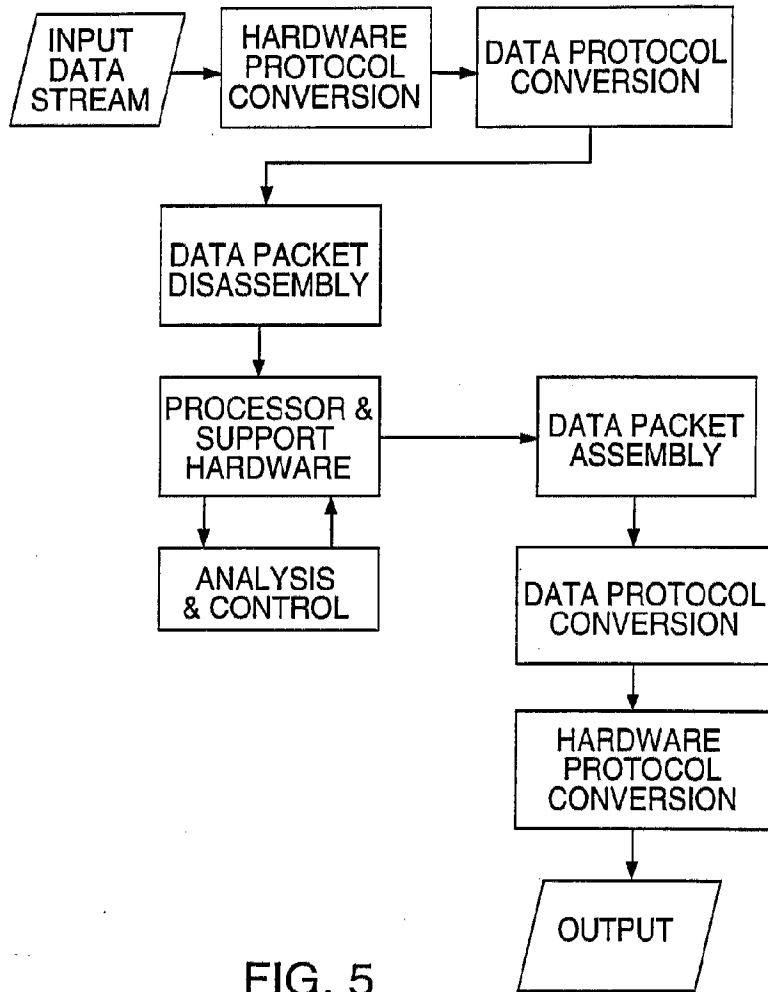


FIG. 5

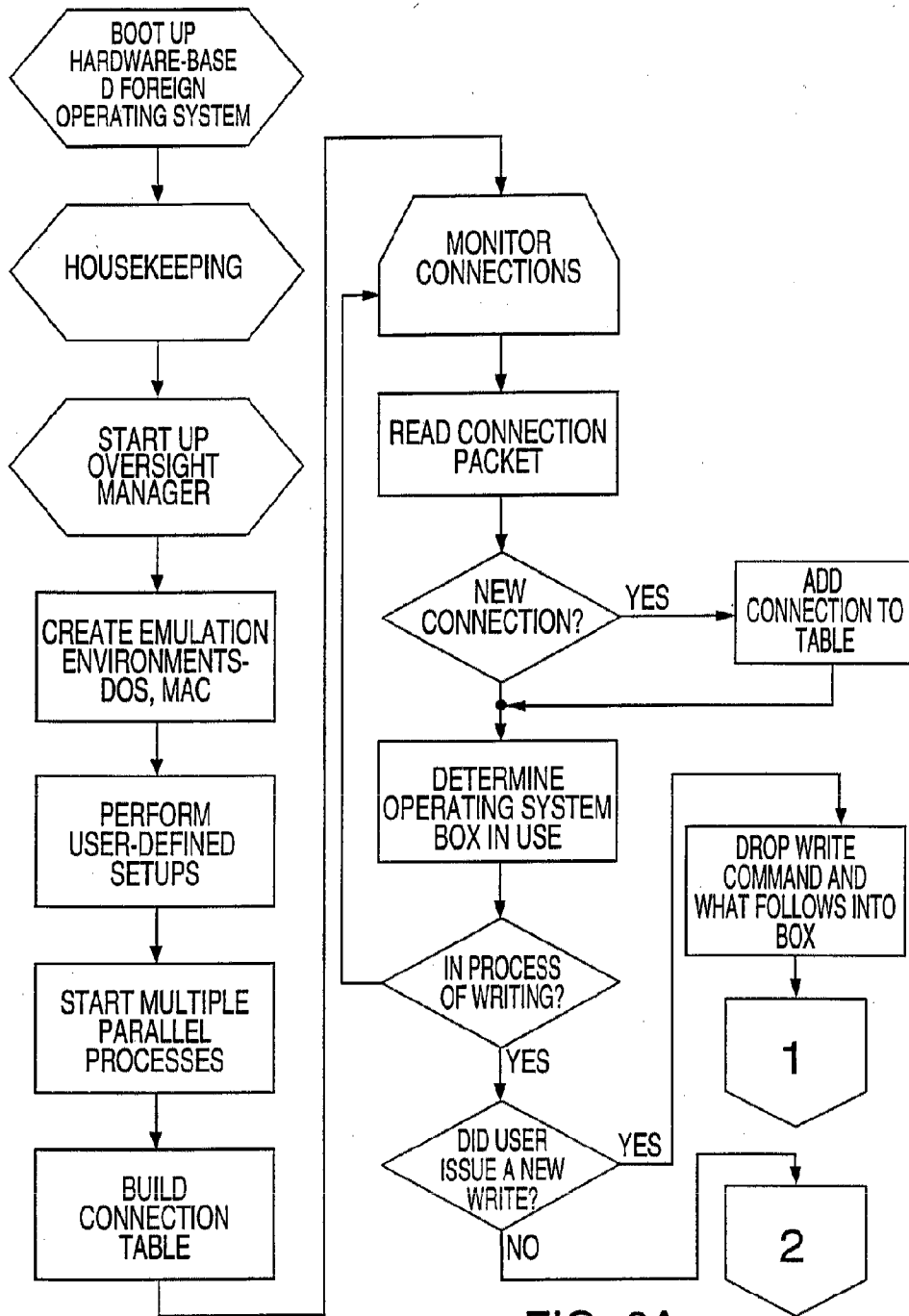


FIG. 6A

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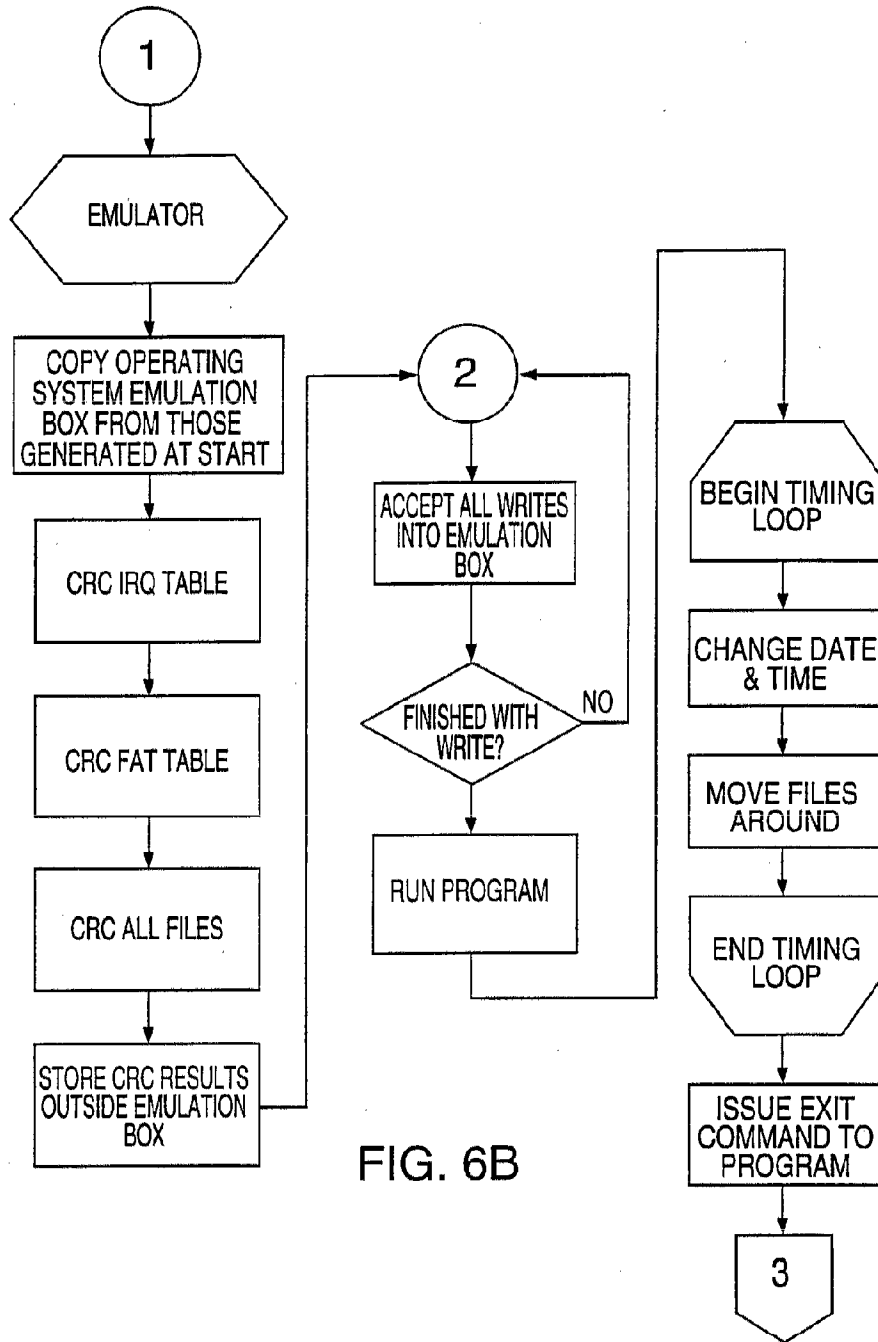


FIG. 6B

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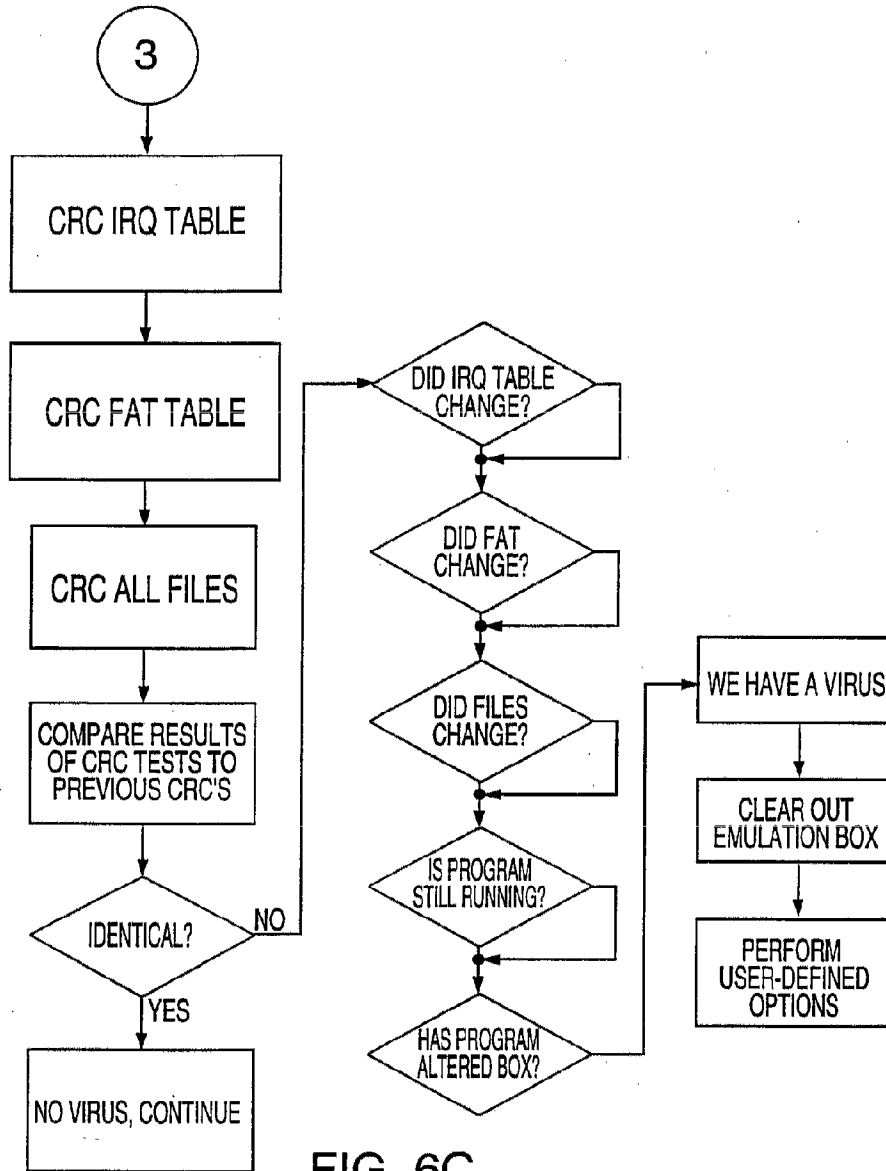


FIG. 6C

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/06659

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(6) : G06F 11/00, 17/00 US CL : 395/500 According to International Patent Classification (IPC) or to both national classification and IPC</p>																													
<p>B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 395/500, 575; 371/16.2, 23</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) APS, DIALOG,</p>																													
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X,P</td> <td>US, A, 5,398,196 (CHAMBERS) 14 March 1995, col. 3, lines 38-63, col. 4, lines 1-14, 58-et seq. and the claims.</td> <td>1-6</td> </tr> <tr> <td>A, E</td> <td>US, A, 5,440,723(ARNOLD ET AL) 08 August 1995, see the entire document.</td> <td>1-6</td> </tr> <tr> <td>A</td> <td>US, A, 5,274,815 (TRISSEL ET AL) 28 December 1993, see the entire document.</td> <td>1-6</td> </tr> <tr> <td>A,P</td> <td>US, A, 5,359,659 (ROSENTHAL) 25 October 1994, see the entire document.</td> <td>1-6</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X,P	US, A, 5,398,196 (CHAMBERS) 14 March 1995, col. 3, lines 38-63, col. 4, lines 1-14, 58-et seq. and the claims.	1-6	A, E	US, A, 5,440,723(ARNOLD ET AL) 08 August 1995, see the entire document.	1-6	A	US, A, 5,274,815 (TRISSEL ET AL) 28 December 1993, see the entire document.	1-6	A,P	US, A, 5,359,659 (ROSENTHAL) 25 October 1994, see the entire document.	1-6												
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<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>*T</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>*A</td> <td></td> <td>document defining the general state of the art which is not considered to be part of particular relevance</td> </tr> <tr> <td>*E</td> <td></td> <td>earlier document published on or after the international filing date</td> </tr> <tr> <td>*L</td> <td></td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)</td> </tr> <tr> <td>*O</td> <td></td> <td>document referring to an oral disclosure, use, exhibition or other means</td> </tr> <tr> <td>*P</td> <td></td> <td>document published prior to the international filing date but later than the priority date claimed</td> </tr> <tr> <td></td> <td>*X</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td></td> <td>*Y</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td></td> <td>*G</td> <td>document member of the same patent family</td> </tr> </table>			* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	*A		document defining the general state of the art which is not considered to be part of particular relevance	*E		earlier document published on or after the international filing date	*L		document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)	*O		document referring to an oral disclosure, use, exhibition or other means	*P		document published prior to the international filing date but later than the priority date claimed		*X	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone		*Y	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art		*G	document member of the same patent family
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<p>Date of the actual completion of the international search 08 AUGUST 1995</p>		<p>Date of mailing of the international search report 13 SEP 1995</p>																											
<p>Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230</p>		<p>Authorized officer AYNI MOHAMED <i>B. Xander for</i> Telephone No. (703) 305-9694</p>																											

Form PCT/ISA/210 (second sheet)(July 1992)*

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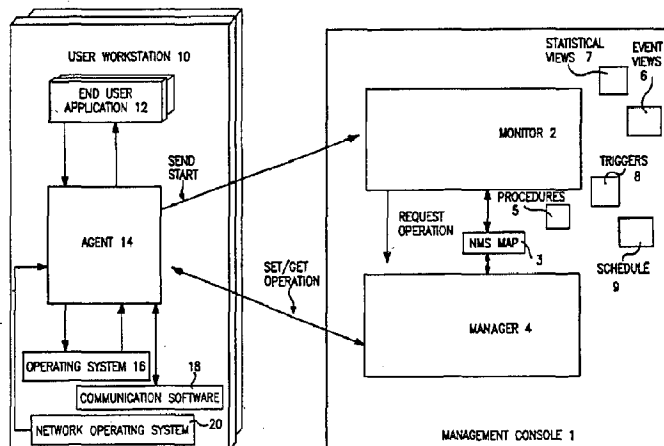


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : G06F 11/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 95/27249 (43) International Publication Date: 12 October 1995 (12.10.95)</p>
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<p>(21) International Application Number: PCT/US95/04109 (22) International Filing Date: 3 April 1995 (03.04.95) (30) Priority Data: 08/223,221 5 April 1994 (05.04.94) US (71) Applicant: INTEL CORPORATION [US/US]; 2200 Mission College Boulevard, Santa Clara, CA 95052 (US). (72) Inventor: TOUBOUL, Shlomo; 42495 Kefar Haim (IL). (74) Agents: SALTER, James, H. et al.; Blakely, Sokoloff, Taylor & Zafman, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025-1026 (US).</p>	<p>(81) Designated States: AM, AT, AT (Utility model), AU, BB, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
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(54) Title: METHOD AND APPARTUS FOR MONITORING AND CONTROLLING PROGRAMS IN A NETWORK



(57) Abstract

A system for monitoring and controlling at least one program capable of being executed on any one of at least two workstations in a network. The network includes at least one agent module (14) resident on each of the at least two workstations (10) and a management console (1) connected to each of the at least two workstations (10). The system includes modules for identifying an event occurring with respect to a program executing on one of the at least two workstations (10), modules for sending an alert to the management console (1) which identifies the event, memory for storing a plurality of triggers (8), each of the triggers (8) adapted to cause an action to be taken within the network, memory for storing at least one procedure (5) comprising at least one of the plurality of triggers (8), and modules for sending at least one of the procedures (5) from the management console (1) to the agent module (14) resident on the one of the at least two workstations (10) in response to receipt of the alert. A method is also provided for monitoring and controlling programs capable of being executed on any of at least two workstations (10) in a network.



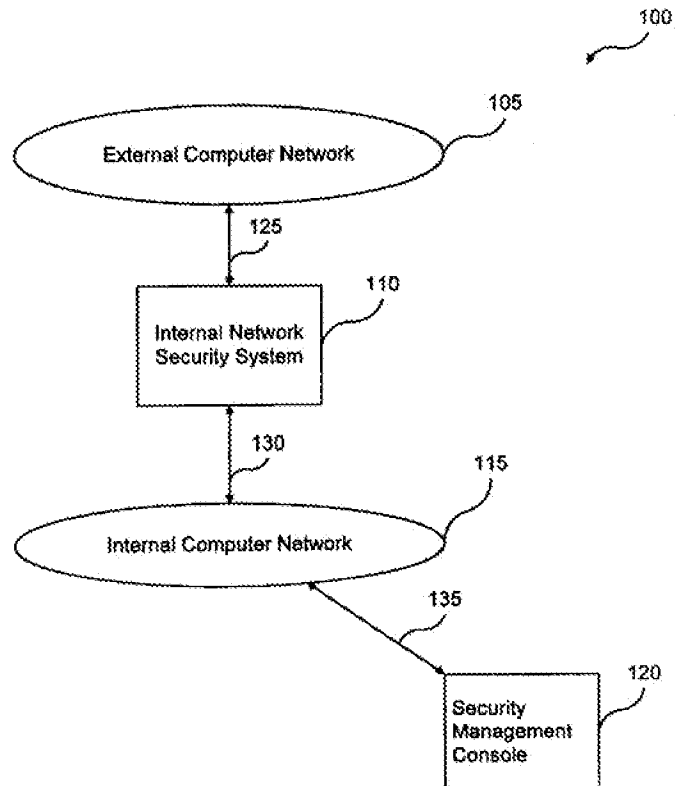
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(54) Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

(57) Abstract

A system protects a computer from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, or a specific security policy to be applied based on the client or the group to which the client belongs. The system uses an ID generator to compute a Downloadables ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components. Further, the security policy may indicate several tests to perform, including (1) a comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.



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SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK
FROM HOSTILE DOWNLOADABLES

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

This invention relates generally to computer networks, and more particularly provides a system and method for protecting a computer and a network from hostile Downloadables.

2. Description of the Background Art

10 The Internet is currently a collection of over 100,000 individual computer networks owned by governments, universities, nonprofit groups and companies, and is expanding at an accelerating rate. Because the Internet is public, the Internet has become a major source of many system damaging and system fatal application programs, commonly referred to as "viruses."

15 Accordingly, programmers continue to design computer and computer network security systems for blocking these viruses from attacking both individual and network computers. On the most part, these security systems have been relatively successful. However, these security systems are not configured to recognize computer viruses which have been attached to or configured as Downloadable application programs, commonly
20 referred to as "Downloadables." A Downloadable is an executable application program, which is downloaded from a source computer and run on the destination computer. Downloadable is typically requested by an ongoing process such as by an Internet browser or web engine. Examples of Downloadables include Java™ applets designed for use in the Java™ distributing environment developed by Sun Microsystems, Inc., JavaScript scripts also

developed by Sun Microsystems, Inc., ActiveX™ controls designed for use in the ActiveX™ distributing environment developed by the Microsoft Corporation, and Visual Basic also developed by the Microsoft Corporation. Therefore, a system and method are needed to protect a network from hostile Downloadables.

5

SUMMARY OF THE INVENTION

The present invention provides a system for protecting a network from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, a specific security policy to be applied based on the client or the group to which the client belongs, or a specific policy to be applied based on the client/group and on the particular Downloadable received. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components.

Further, the security policy may indicate several tests to perform, including (1) a comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and untrusted URLs.

Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

The present invention further provides a method for protecting a computer from suspicious Downloadables. The method comprises the steps of receiving a Downloadable,
5 comparing the Downloadable against a security policy to determine if the security policy has been violated, and discarding the Downloadable if the security policy has been violated.

It will be appreciated that the system and method of the present invention may provide computer protection from known hostile Downloadables. The system and method of the present invention may identify Downloadables that perform operations deemed suspicious.
10 The system and method of the present invention may examine the Downloadable code to determine whether the code contains any suspicious operations, and thus may allow or block the Downloadable accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

15 FIG. 1 is a block diagram illustrating a network system, in accordance with the present invention;

FIG. 2 is a block diagram illustrating details of the internal network security system of FIG. 1;

20 FIG. 3 is a block diagram illustrating details of the security program and the security database of FIG. 2;

FIG. 4 is a block diagram illustrating details of the security policies of FIG. 3;

FIG. 5 is a block diagram illustrating details of the security management console of FIG. 1;

FIG. 6A is a flowchart illustrating a method of examining for suspicious Downloadables, in accordance with the present invention;

FIG. 6B is a flowchart illustrating details of the step for finding the appropriate security policy of FIG. 6A;

5 FIG. 6C is a flowchart illustrating a method for determining whether an incoming Downloadable is to be deemed suspicious;

FIG. 7 is a flowchart illustrating details of the FIG. 6 step of decomposing a Downloadable; and

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for
10 identifying a Downloadable.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram illustrating a network system 100, in accordance with the present invention. The network system 100 includes an external computer network 105, such
15 as the Wide Area Network (WAN) commonly referred to as the Internet, coupled via a communications channel 125 to an internal network security system 110. The network system 100 further includes an internal computer network 115, such as a corporate Local Area Network (LAN), coupled via a communications channel 130 to the internal network computer system 110 and coupled via a communications channel 135 to a security
20 management console 120.

The internal network security system 110 examines Downloadables received from external computer network 105, and prevents Downloadables deemed suspicious from reaching the internal computer network 115. It will be further appreciated that a Downloadable is deemed suspicious if it performs or may perform any undesirable operation.

or if it threatens or may threaten the integrity of an internal computer network 115 component. It is to be understood that the term "suspicious" includes hostile, potentially hostile, undesirable, potentially undesirable, etc. Security management console 120 enables viewing, modification and configuration of the internal network security system 110.

5

FIG. 2 is a block diagram illustrating details of the internal network security system 110, which includes a Central Processing Unit (CPU) 205, such as an Intel Pentium[®] microprocessor or a Motorola Power PC[™] microprocessor, coupled to a signal bus 220. The internal network security system 110 further includes an external communications interface 10
210 coupled between the communications channel 125 and the signal bus 220 for receiving Downloadables from external computer network 105, and an internal communications interface 225 coupled between the signal bus 220 and the communications channel 130 for forwarding Downloadables not deemed suspicious to the internal computer network 115. The external communications interface 210 and the internal communications interface 225
15 may be functional components of an integral communications interface (not shown) for both receiving Downloadables from the external computer network 105 and forwarding Downloadables to the internal computer network 115.

Internal network security system 110 further includes Input/Output (I/O) interfaces 215 (such as a keyboard, mouse and Cathode Ray Tube (CRT) display), a data storage
20 device 230 such as a magnetic disk, and a Random-Access Memory (RAM) 235, each coupled to the signal bus 220. The data storage device 230 stores a security database 240, which includes security information for determining whether a received Downloadable is to be deemed suspicious. The data storage device 230 further stores a users list 260 identifying the users within the internal computer network 115 who may receive Downloadables, and an

event log 245 which includes determination results for each Downloadable examined and runtime indications of the internal network security system 110. An operating system 250 controls processing by CPU 205, and is typically stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution. A security program 255 controls examination of incoming Downloadables, and also may be stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution by CPU 205.

FIG. 3 is a block diagram illustrating details of the security program 255 and the security database 240. The security program 255 includes an ID generator 315, a policy finder 317 coupled to the ID generator 315, and a first comparator 320 coupled to the policy finder 317. The first comparator 320 is coupled to a logical engine 333 via four separate paths, namely, via Path 1, via Path 2, via Path 3 and via Path 4. Path 1 includes a direct connection from the first comparator 320 to the logical engine 333. Path 2 includes a code scanner coupled to the first comparator 320, and an Access Control List (ACL) comparator 330 coupling the code scanner 325 to the logical engine 333. Path 3 includes a certificate scanner 340 coupled to the first comparator 320, and a certificate comparator 345 coupling the certificate scanner 340 to the logical engine 333. Path 4 includes a Uniform Resource Locator (URL) comparator 350 coupling the first comparator 320 to the logical engine 333. A record-keeping engine 335 is coupled between the logical engine 333 and the event log 245.

The security program 255 operates in conjunction with the security database 240, which includes security policies 305, known Downloadables 307, known Certificates 309 and Downloadable Security Profile (DSP) data 310 corresponding to the known Downloadables 307. Security policies 305 includes policies specific to particular users 260

and default (or generic) policies for determining whether to allow or block an incoming Downloadable. These security policies 305 may identify specific Downloadables to block, specific Downloadables to allow, or necessary criteria for allowing an unknown Downloadable. Referring to FIG. 4, security policies 305 include policy selectors 405, 5 access control lists 410, trusted certificate lists 415, URL rule bases 420, and lists 425 of Downloadables to allow or to block per administrative override.

Known Downloadables 307 include lists of Downloadables which Original Equipment Manufacturers (OEMs) know to be hostile, of Downloadables which OEMs know to be non-hostile, and of Downloadables previously received by this security program 10 255. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by each known Downloadable 307, and may also include the respective arguments of these operations. An identified argument of an operation is referred to as "resolved." An unidentified argument is referred to as "unresolved." DSP data 310 is described below with reference to the code scanner 325.

15 The ID generator 315 receives a Downloadable (including the URL from which it came and the userID of the intended recipient) from the external computer network 105 via the external communications interface 210, and generates a Downloadable ID for identifying each Downloadable. The Downloadable ID preferably includes a digital hash of the complete Downloadable code. The ID generator 315 preferably prefetches all components 20 embodied in or identified by the code for Downloadable ID generation. For example, the ID generator 315 may prefetch all classes embodied in or identified by the Java™ applet bytecode to generate the Downloadable ID. Similarly, the ID generator 315 may retrieve all components listed in the .INF file for an ActiveX™ control to compute a Downloadable ID. Accordingly, the Downloadable ID for the Downloadable will be the same each time the ID

generator 315 receives the same Downloadable. The ID generator 315 adds the generated Downloadable ID to the list of known Downloadables 307 (if it is not already listed). The ID generator 315 then forwards the Downloadable and Downloadable ID to the policy finder 317.

5 The policy finder 317 uses the userID of the intended user and the Downloadable ID to select the specific security policy 305 that shall be applied on the received Downloadable. If there is a specific policy 305 that was defined for the user (or for one of its super groups) and the Downloadable, then the policy is selected. Otherwise the generic policy 305 that was defined for the user (or for one of its super groups) is selected. The policy finder 317
10 then sends the policy to the first comparator 320.

The first comparator 320 receives the Downloadable, the Downloadable ID and the security policy 305 from the policy finder 317. The first comparator 320 examines the security policy 305 to determine which steps are needed for allowing the Downloadable. For example, the security policy 305 may indicate that, in order to allow this Downloadable, it
15 must pass all four paths, Path 1, Path 2, Path 3 and Path 4. Alternatively, the security policy 305 may indicate that to allow the Downloadable, the it must pass only one of the paths. The first comparator 320 responds by forwarding the proper information to the paths identified by the security policy 305.

20 Path 1

In path 1, the first comparator 320 checks the policy selector 405 of the security policy 305 that was received from the policy finder 317. If the policy selector 405 is either "Allowed" or "Blocked," then the first comparator 320 forwards this result directly to the logical engine 333. Otherwise, the first comparator 320 invokes the comparisons in path2

and/or path 3 and/or path 4 based on the contents of policy selector 405. It will be appreciated that the first comparator 320 itself compares the Downloadable ID against the lists of Downloadables to allow or block per administrative override 425. That is, the system security administrator can define specific Downloadables as "Allowed" or "Blocked."

5 Alternatively, the logical engine 333 may receive the results of each of the paths and based on the policy selector 405 may institute the final determination whether to allow or block the Downloadable. The first comparator 320 informs the logical engine 333 of the results of its comparison.

10 Path 2

In path 2, the first comparator 320 delivers the Downloadable, the Downloadable ID and the security policy 305 to the code scanner 325. If the DSP data 310 of the received Downloadable is known, the code scanner 325 retrieves and forwards the information to the ACL comparator 330. Otherwise, the code scanner 325 resolves the DSP data 310. That is,
15 the code scanner 325 uses conventional parsing techniques to decompose the code (including all prefetched components) of the Downloadable into the DSP data 310. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by a specific Downloadable 307, and may also include the respective arguments of these operations. For example, DSP data 310 may include a READ from a specific file, a
20 SEND to an unresolved host, etc. The code scanner 325 may generate the DSP data 310 as a list of all operations in the Downloadable code which could ever be deemed potentially hostile and a list of all files to be accessed by the Downloadable code. It will be appreciated that the code scanner 325 may search the code for any pattern, which is undesirable or suggests that the code was written by a hacker.

An Example List of Operations Deemed Potentially Hostile

- File operations: READ a file, WRITE a file;
- Network operations: LISTEN on a socket, CONNECT to a socket, SEND data,
5 RECEIVE data, VIEW INTRANET;
- Registry operations: READ a registry item, WRITE a registry item;
- Operating system operations: EXIT WINDOWS, EXIT BROWSER, START
PROCESS/THREAD, KILL PROCESS/THREAD, CHANGE PROCESS/THREAD
PRIORITY, DYNAMICALLY LOAD A CLASS/LIBRARY, etc.; and
- 10 • Resource usage thresholds: memory, CPU, graphics, etc.

In the preferred embodiment, the code scanner 325 performs a full-content inspection. However, for improved speed but reduced security, the code scanner 325 may examine only a portion of the Downloadable such as the Downloadable header. The code scanner 325 then
15 stores the DSP data into DSP data 310 (corresponding to its Downloadable ID), and sends the Downloadable, the DSP data to the ACL comparator 330 for comparison with the security policy 305.

The ACL comparator 330 receives the Downloadable, the corresponding DSP data and the security policy 305 from the code scanner 325, and compares the DSP data against
20 the security policy 305. That is, the ACL comparator 330 compares the DSP data of the received Downloadable against the access control lists 410 in the received security policy 305. The access control list 410 contains criteria indicating whether to pass or fail the Downloadable. For example, an access control list may indicate that the Downloadable fails

if the DSP data includes a WRITE command to a system file. The ACL comparator 330 sends its results to the logical engine 333.

Path 3:

5 In path 3, the certificate scanner 340 determines whether the received Downloadable was signed by a certificate authority, such as VeriSign, Inc., and scans for a certificate embodied in the Downloadable. The certificate scanner 340 forwards the found certificate to the certificate comparator 345. The certificate comparator 345 retrieves known certificates 309 that were deemed trustworthy by the security administrator and compares the found
10 certificate with the known certificates 309 to determine whether the Downloadable was signed by a trusted certificate. The certificate comparator 345 sends the results to the logical engine 333.

Path 4:

15 In path 4, the URL comparator 350 examines the URL identifying the source of the Downloadable against URLs stored in the URL rule base 420 to determine whether the Downloadable comes from a trusted source. Based on the security policy 305, the URL comparator 350 may deem the Downloadable suspicious if the Downloadable comes from an untrustworthy source or if the Downloadable did not come from a trusted source. For
20 example, if the Downloadable comes from a known hacker, then the Downloadable may be deemed suspicious and presumed hostile. The URL comparator 350 sends its results to the logical engine 333.

The logical engine 333 examines the results of each of the paths and the policy selector 405 in the security policy 305 to determine whether to allow or block the Downloadable. The policy selector 405 includes a logical expression of the results received from each of the paths. For example, the logical engine 333 may block a Downloadable if it fails any one of the paths, i.e., if the Downloadable is known hostile (Path 1), if the Downloadable may request suspicious operations (Path 2), if the Downloadable was not signed by a trusted certificate authority (Path 3), or if the Downloadable did come from an untrustworthy source (Path 4). The logical engine 333 may apply other logical expressions according to the policy selector 405 embodied in the security policy 305. If the policy selector 405 indicates that the Downloadable may pass, then the logical engine 333 passes the Downloadable to its intended recipient. Otherwise, if the policy selector 405 indicates that the Downloadable should be blocked, then the logical engine 333 forwards a non-hostile Downloadable to the intended recipient to inform the user that internal network security system 110 discarded the original Downloadable. Further, the logical engine 333 forwards a status report to the record-keeping engine 335, which stores the reports in event log 245 in the data storage device 230 for subsequent review, for example, by the MIS director.

FIG. 5 is a block diagram illustrating details of the security management console 120, which includes a security policy editor 505 coupled to the communications channel 135, an event log analysis engine 510 coupled between communications channel 135 and a user notification engine 515, and a Downloadable database review engine 520 coupled to the communications channel 135. The security management console 120 further includes computer components similar to the computer components illustrated in FIG. 2.

The security policy editor 505 uses an I/O interface similar to I/O interface 215 for enabling authorized user modification of the security policies 305. That is, the security policy editor 505 enables the authorized user to modify specific security policies 305 corresponding to the users 260, the default or generic security policy 305, the Downloadables to block per administrative override, the Downloadables to allow per administrative override, the trusted certificate lists 415, the policy selectors 405, the access control lists 410, the URLs in the URL rule bases 420, etc. For example, if the authorized user learns of a new hostile Downloadable, then the user can add the Downloadable to the Downloadables to block per system override.

The event log analysis engine 510 examines the status reports contained in the event log 245 stored in the data storage device 230. The event log analysis engine 510 determines whether notification of the user (e.g., the security system manager or MIS director) is warranted. For example, the event log analysis engine 510 may warrant user notification whenever ten (10) suspicious Downloadables have been discarded by internal network security system 110 within a thirty (30) minute period, thereby flagging a potential imminent security threat. Accordingly, the event log analysis engine 510 instructs the user notification engine 515 to inform the user. The user notification engine 515 may send an e-mail via internal communications interface 220 or via external communications interface 210 to the user, or may display a message on the user's display device (not shown).

FIG. 6A is a flowchart illustrating a method 600 for protecting an internal computer network 115 from suspicious Downloadables. Method 600 begins with the ID generator 315 in step 602 receiving a Downloadable. The ID generator 315 in step 604 generates a Downloadable ID identifying the received Downloadable, preferably, by generating a digital

hash of the Downloadable code (including prefetched components). The policy finder 317 in step 606 finds the appropriate security policy 305 corresponding to the userID specifying intended recipient (or the group to which the intended recipient belongs) and the Downloadable. The selected security policy 305 may be the default security policy 305.
5 Step 606 is described in greater detail below with reference to FIG. 6B.

The first comparator 320 in step 608 examines the lists of Downloadables to allow or to block per administrative override 425 against the Downloadable ID of the incoming Downloadable to determine whether to allow the Downloadable automatically. If so, then in step 612 the first comparator 320 sends the results to the logical engine 333. If not, then the
10 method 600 proceeds to step 610. In step 610, the first comparator 620 examines the lists of Downloadables to block per administrative override 425 against the Downloadable ID of the incoming Downloadable for determining whether to block the Downloadable automatically. If so, then the first comparator 420 in step 612 sends the results to the logical engine 333. Otherwise, method 600 proceeds to step 614.

15 In step 614, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 4. If not, then method 600 jumps to step 618. If so, then the URL comparator 350 in step 616 compares the URL embodied in the incoming Downloadable against the URLs of the URL rules bases 420, and then method 600 proceeds to step 618.

20 In step 618, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 2. If not, then method 600 jumps to step 620. Otherwise, the code scanner 235 in step 626 examines the DSP data 310 based on the Downloadable ID of the incoming Downloadable to determine whether the Downloadable has been previously decomposed. If so, then method 600 jumps to step 630.

Otherwise, the code scanner 325 in step 628 decomposes the Downloadable into DSP data. Downloadable decomposition is described in greater detail with reference to FIG. 7. In step 630, the ACL comparator 330 compares the DSP data of the incoming Downloadable against the access control lists 410 (which include the criteria necessary for the Downloadable to fail or pass the test).

In step 620, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 3. If not, then method 600 returns to step 612 to send the results of each of the test performed to the logical engine 333. Otherwise, the certificate scanner 622 in step 622 scans the Downloadable for an embodied certificate. The certificate comparator 345 in step 624 retrieves trusted certificates from the trusted certificate lists (TCL) 415 and compares the embodied certificate with the trusted certificates to determine whether the Downloadable has been signed by a trusted source. Method 600 then proceeds to step 612 by the certificate scanner 345 sending the results of each of the paths taken to the logical engine 333. The operations of the logical engine 333 are described in greater detail below with reference to FIG. 6C. Method 600 then ends.

One skilled in the art will recognize that the tests may be performed in a different order, and that each of the tests need not be performed. Further, one skilled in the art will recognize that, although path 1 is described in FIG. 6A as an automatic allowance or blocking, the results of Path 1 may be another predicate to be applied by the logical engine 333. Further, although the tests are shown serially in FIG. 6A, the tests may be performed in parallel as illustrated in FIG. 3.

FIG. 6B is a flowchart illustrating details of step 606 of FIG. 6A (referred to herein as method 606). Method 606 begins with the policy finder 317 in step 650 determining whether security policies 305 include a specific security policy corresponding to the userID and the Downloadable. If so, then the policy finder 317 in step 654 fetches the
5 corresponding specific policy 305. If not, then the policy finder 317 in step 652 fetches the default or generic security policy 305 corresponding to the userID. Method 606 then ends.

FIG. 6C is a flowchart illustrating details of a method 655 for determining whether to allow or to block the incoming Downloadable. Method 655 begins with the logical engine
10 333 in step 660 receiving the results from the first comparator 320, from the ACL comparator 330, from the certificate comparator 345 and from the URL comparator 350. The logical engine 333 in step 662 compares the results with the policy selector 405 embodied in the security policy 305, and in step 664 determines whether the policy selector 405 confirms the pass. For example, the policy selector 405 may indicate that the logical
15 engine 333 pass the Downloadable if it passes one of the tests of Path 1, Path 2, Path 3 and Path 4. If the policy selector 405 indicates that the Downloadable should pass, then the logical engine 333 in step 666 passes the Downloadable to the intended recipient. In step 668, the logical engine 333 sends the results to the record-keeping engine 335, which in turn stores the results in the event log 245 for future review. Method 655 then ends. Otherwise,
20 if the policy selector 405 in step 664 indicates that the Downloadable should not pass, then the logical engine 333 in step 670 stops the Downloadable and in step 672 sends a non-hostile substitute Downloadable to inform the user that the incoming Downloadable has been blocked. Method 655 then jumps to step 668.

FIG. 7 is a flowchart illustrating details of step 628 of FIG. 6A (referred to herein as method 628) for decomposing a Downloadable into DSP data 310. Method 628 begins in step 705 with the code scanner 325 disassembling the machine code of the Downloadable. The code scanner 325 in step 710 resolves a respective command in the machine code, and in
5 step 715 determines whether the resolved command is suspicious (e.g., whether the command is one of the operations identified in the list described above with reference to FIG. 3). If not, then the code scanner 325 in step 725 determines whether it has completed decomposition of the Downloadable, i.e., whether all operations in the Downloadable code have been resolved. If so, then method 628 ends. Otherwise, method 628 returns to step
10 710.

Otherwise, if the code scanner 325 in step 715 determines that the resolved command is suspect, then the code scanner 325 in step 720 decodes and registers the suspicious command and its command parameters as DSP data 310. The code scanner 325 in step 720 registers the commands and command parameters into a format based on command class
15 (e.g., file operations, network operations, registry operations, operating system operations, resource usage thresholds). Method 628 then jumps to step 725.

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable. Method 800 begins with the ID generator 315 in step 810 receiving a Downloadable from the external computer network 105. The ID generator 315 in
20 step 820 may fetch some or all components referenced in the Downloadable code, and in step 830 includes the fetched components in the Downloadable code. The ID generator 315 in step 840 performs a hashing function on at least a portion of the Downloadable code to generate a Downloadable ID. The ID generator 315 in step 850 stores the generated

Downloadable ID in the security database 240 as a reference to the DSP data 310. Accordingly, the Downloadable ID will be the same for the identical Downloadable each time it is encountered.

5 The foregoing description of the preferred embodiments of the invention is by way of example only, and other variations of the above-described embodiments and methods are provided by the present invention. For example, although the invention has been described in a system for protecting an internal computer network, the invention can be embodied in a system for protecting an individual computer. Components of this invention may be
10 implemented using a programmed general purpose digital computer, using application specific integrated circuits, or using a network of interconnected conventional components and circuits. The embodiments described herein have been presented for purposes of illustration and are not intended to be exhaustive or limiting. Many variations and modifications are possible in light of the foregoing teaching. The system is limited only by
15 the following claims.

1 WHAT IS CLAIMED IS:

2

3 1. A computer-based method, comprising the steps of:
4 receiving a Downloadable;
5 comparing the Downloadable against a security policy to determine if the
6 security policy has been violated; and
7 discarding the Downloadable if the security policy has been violated.

8

9 2. The method of claim 1, further comprising the steps of decomposing the
10 Downloadable into Downloadable security profile data, and comparing the
11 Downloadable security profile data against the security policy.

12

13 3. The method of claim 1, further comprising the steps of scanning for a
14 certificate and comparing the certificate against a trusted certificate.

15

16 4. The method of claim 1, further comprising the step of comparing the URL
17 from which the Downloadable originated against a known URL.

18

19 5. The method of claim 4, wherein the known URL is a trusted URL.

20

21 6. The method of claim 4, wherein the known URL is an untrusted URL.

22

23 7. The method of claim 1, wherein the Downloadable includes a Java™ applet.

24

25 8. The method of claim 1, wherein the Downloadable includes an ActiveX™
26 control.

27

28 9. The method of claim 1, wherein the Downloadable includes a JavaScript™
29 script.

30

31 10. The method of claim 1, wherein the Downloadable includes a Visual Basic
32 script.

33

34 11. The method of claim 1, wherein
35 the Downloadable is addressed to a client; and
36 the security policy includes a default security policy to be applied regardless of
37 the client to whom the Downloadable is addressed.

38

39 12. The method of claim 1, wherein
40 the Downloadable is addressed to a client; and
41 the security policy includes a specific security policy to be applied if the
42 Downloadable is addressed to the client.

43

44 13. The method of claim 1, wherein
45 the Downloadable is addressed to a client belonging to a group; and
46 the security policy includes a specific security policy to be applied if the client
47 belongs to a particular group.

48

49 14. The method of claim 1,
50 wherein the Downloadable is addressed to a client; and
51 further comprising, after discarding the Downloadable, the step of sending a
52 substitute non-hostile Downloadable to the client for informing the client.

53

54 15. The method of claim 1, further comprising, after discarding the Downloadable,
55 the step of recording the violation in an event log.

56

57 16. The method of claim 1, further comprising the step of computing a
58 Downloadable ID to identify the Downloadable.

59

60 17. The method of claim 16, further comprising the steps of fetching components
61 identified by the Downloadable and including the fetched components in the
62 Downloadable.

63

64 18. The method of claim 17, further comprising the step of performing a hashing
65 function on the Downloadable.

66

67 19. The method of claim 17, further comprising the step of fetching all
68 components identified by the Downloadable.

69

70 20. The method of claim 1 further comprising the step of examining the intended
71 recipient userID to determine the appropriate security policy.

72

73 21. The method of claim 1, further comprising the step of examining the
74 Downloadable to determine the appropriate security policy.

75

76 22. The method of claim 20, wherein the appropriate security policy includes the
77 default security policy.

78

79 23. The method of claim 26, further comprising the step of including a previously
80 received Downloadable as a known Downloadable.

81

82 24. The method of claim 23, wherein the security policy identifies a
83 Downloadable to be blocked per administrative override.

84

85 25. The method of claim 23, wherein the security policy identifies a
86 Downloadable to be allowed per administrative override.

87

88 26. The method of claim 1, further comprising the step of comparing the
89 Downloadable against a known Downloadable.

90

91 27. The method of claim 26, wherein the known Downloadable is hostile.

92

93 28. The method of claim 26, wherein the known Downloadable is non-hostile.

94

95 29. The method of claim 2, wherein the security policy includes an access control
96 list and further comprising the step of comparing the Downloadable security profile
97 data against the access control list.

98

99 30. The method of claim 1, further comprising the step of informing a user upon
100 detection of a security policy violation.

101

102 31. A system, comprising:

103 a security policy;

104 an interface for receiving a Downloadable; and

105 a comparator, coupled to the interface, for applying the security policy to the

106 Downloadable to determine if the security policy has been violated.

107

108 32. The system of claim 31, wherein the Downloadable includes a Java™ applet.

109

110 33. The system of claim 31, wherein the Downloadable includes ActiveX™
111 control.

112

113 34. The system of claim 31, wherein the Downloadable includes a JavaScript™
114 script.

115

116 35. The system of claim 31, wherein the Downloadable includes a Visual Basic
117 script.

118

119 36. The system of claim 31, wherein
120 the Downloadable is addressed to a client; and
121 the security policy includes a default security policy to be applied regardless of
122 the client to whom the Downloadable is addressed.

123

124 37. The system of claim 31, wherein
125 the Downloadable is addressed to a client; and
126 the security policy includes a specific security policy to be applied if the
127 Downloadable is addressed to the client.

128

129 38. The system of claim 31, wherein
130 the Downloadable is addressed to a client belonging to a group; and
131 the security policy includes a specific security policy to be applied if the client
132 belongs to a particular group.

133

134 39. The system of claim 31, further comprising an ID generator coupled to the
135 interface for computing a Downloadable ID identifying the Downloadable.

136

137 40. The system of claim 39, wherein the ID generator prefetches all components of
138 the Downloadable and uses all components to compute the Downloadable ID.

139

140 41. The system of claim 40, wherein the ID generator computes the digital hash of
141 all the prefetched components.

142

143 42. The system of claim 31, further comprising a policy finder for finding the
144 security policy.

145

146 43. The system of claim 42, wherein the policy finder finds the security policy
147 based on the user.

148

149 44. The system of claim 42 wherein the policy finder finds the security policy
150 based on the user and the Downloadable.

151

152 45. The system of claim 42, wherein the policy finder obtains the default security
153 policy.

154

155 46. The system of claim 31 wherein the comparator examines the security policy
156 to determine which tests to apply.

157

158 47. The system of claim 46 wherein the comparator compares the Downloadable
159 against a known Downloadable.

160

161 48. The system of claim 47, wherein the known Downloadable is hostile.

162

163 49. The system of claim 47, wherein the known Downloadable is non-hostile.

164

165 50. The system of claim 31, wherein the security policy identifies a Downloadable
166 to be blocked per administrative override.

167

168 51. The system of claim 31, wherein the security policy identifies a Downloadable
169 to be allowed per administrative override.

170

171 52. The system of claim 31, wherein
172 the Downloadable is addressed to a client; and
173 the comparator sends a substitute non-hostile Downloadable to the client for
174 informing the client.

175

176 53. The system of claim 31, further comprising a code scanner coupled to the
177 comparator for decomposing the Downloadable into Downloadable security profile
178 data.

179

180 54. The system of claim 53, further comprising an ACL comparator coupled to the
181 code scanner for comparing the Downloadable security profile data against an access
182 control list.

183

184 55. The system of claim 31, further comprising a certificate scanner coupled to the
185 comparator for examining the Downloadable for a certificate.

186

187 56. The system of claim 55, further comprising a certificate comparator coupled to
188 the certificate scanner for comparing the certificate against a trusted certificate.

189

190 57. The system of claim 31, further comprising a URL comparator coupled to the
191 comparator for comparing the URL from which the Downloadable originated against
192 a known URL.

193

194 58. The system of claim 57, wherein the known URL identifies an untrusted URL.

195

196 59. The system of claim 57, wherein the known URL identifies a trusted URL.

197

198 60. The system of claim 31, further comprising a logical engine for responding to
199 the results of the comparison.

200

201 61. The system of claim 31, wherein the logical engine responds according to the
202 security policy.

203

204 62. The system of claim 31, further comprising a record-keeping engine coupled
205 to the comparator for recording results in an event log.

206

207 63. A system, comprising:

208 means for receiving a Downloadable;

209 means for comparing the Downloadable against a security policy to determine
210 if the security policy has been violated; and

211 means for discarding the Downloadable if the security policy has been
212 violated.

213

- 214 64. A computer-readable storage medium storing program code for causing a
215 computer to perform the steps of:
216 receiving a Downloadable;
217 comparing the Downloadable against a security policy to determine if the
218 security policy has been violated; and
219 discarding the Downloadable if the security policy has been violated.
220
- 221 65. A computer-based method for generating a Downloadable ID to identify a
222 Downloadable, comprising the steps of:
223 selecting Downloadable code;
224 performing a function on the selected Downloadable code to generate the
225 Downloadable ID; and
226 storing the Downloadable ID.
227
- 228 66. The method of claim 65, wherein the function includes a hashing function

67. The method of claim 65, wherein the Downloadable code includes a reference to a Downloadable component, and further comprising the step of fetching the component.

5

68. The method of claim 67, wherein the component includes the first component referenced by the Downloadable code.

69. The method of claim 65, wherein the selected Downloadable code includes all
10 of the code included in and identified by the Downloadable.

70. The method of claim 67, further comprising the step of fetching all components referenced by the Downloadable.

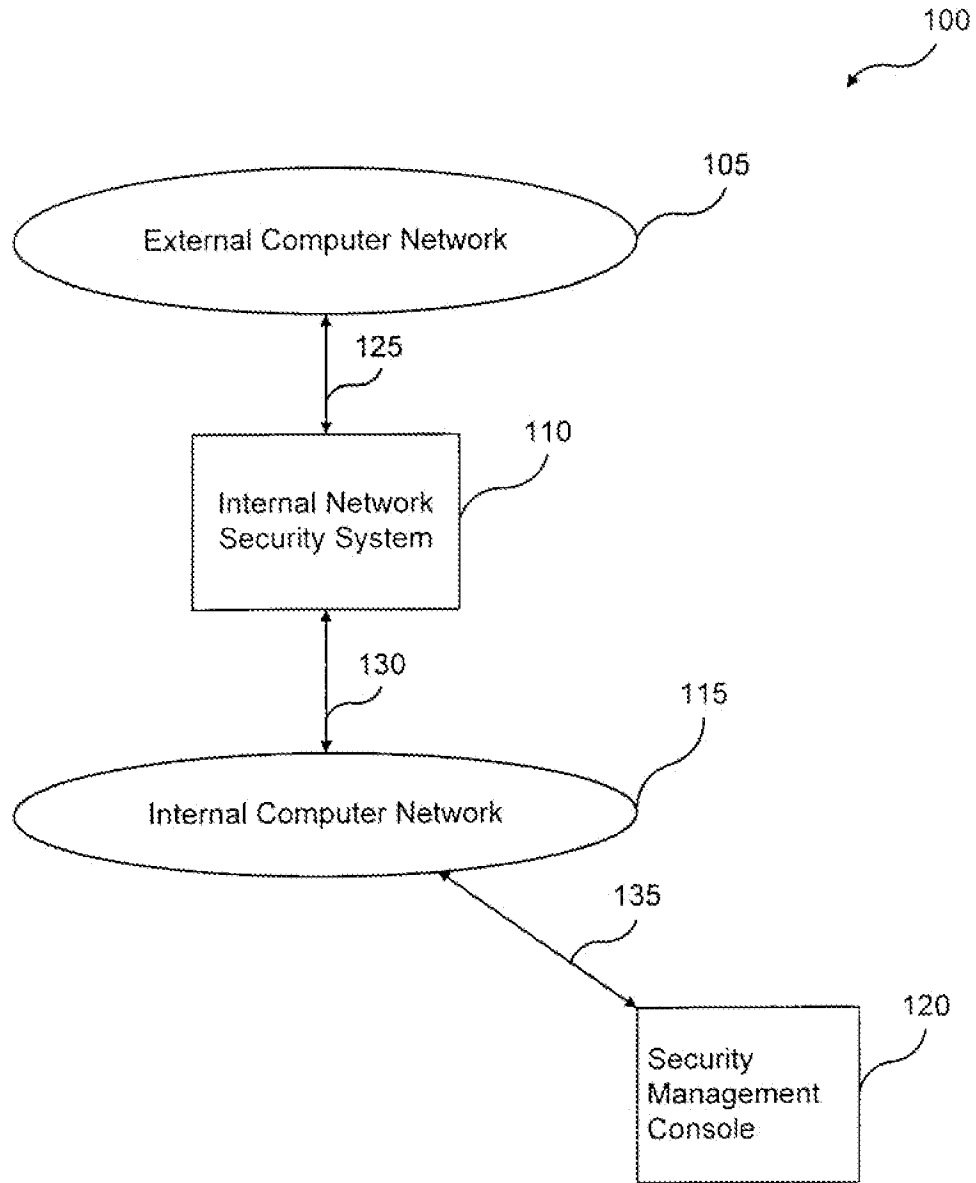


FIG. 1

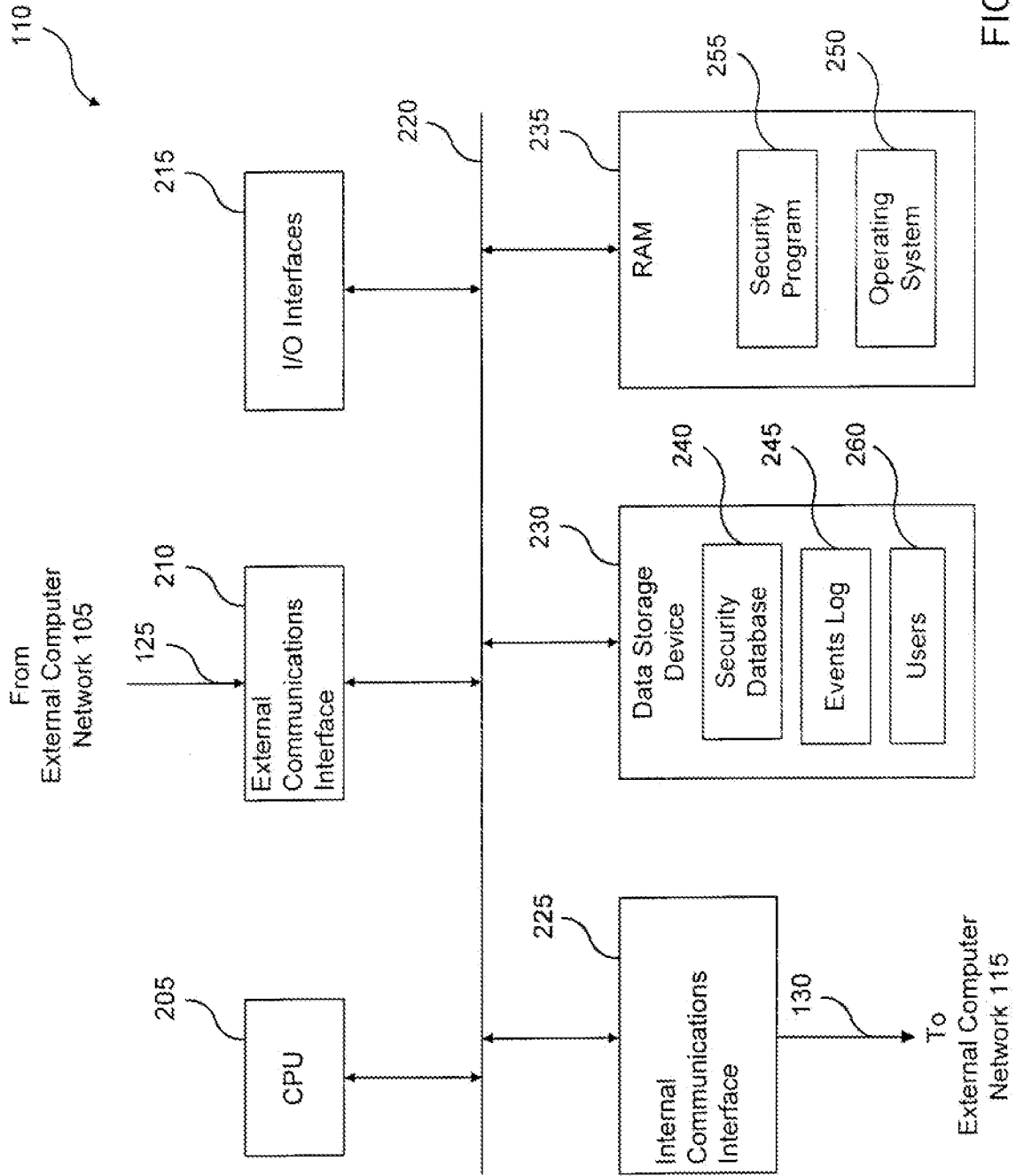


FIG. 2

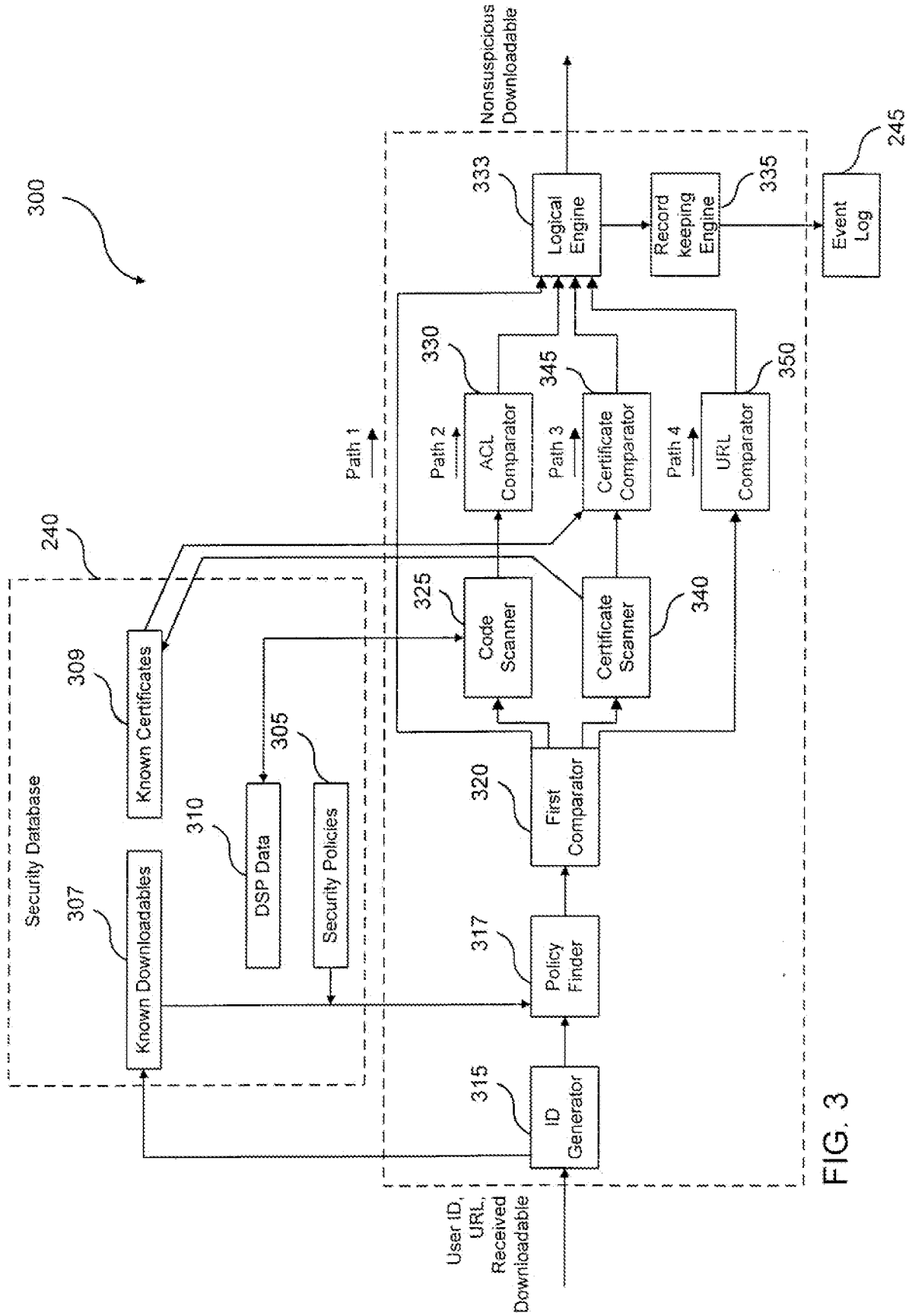


FIG. 3

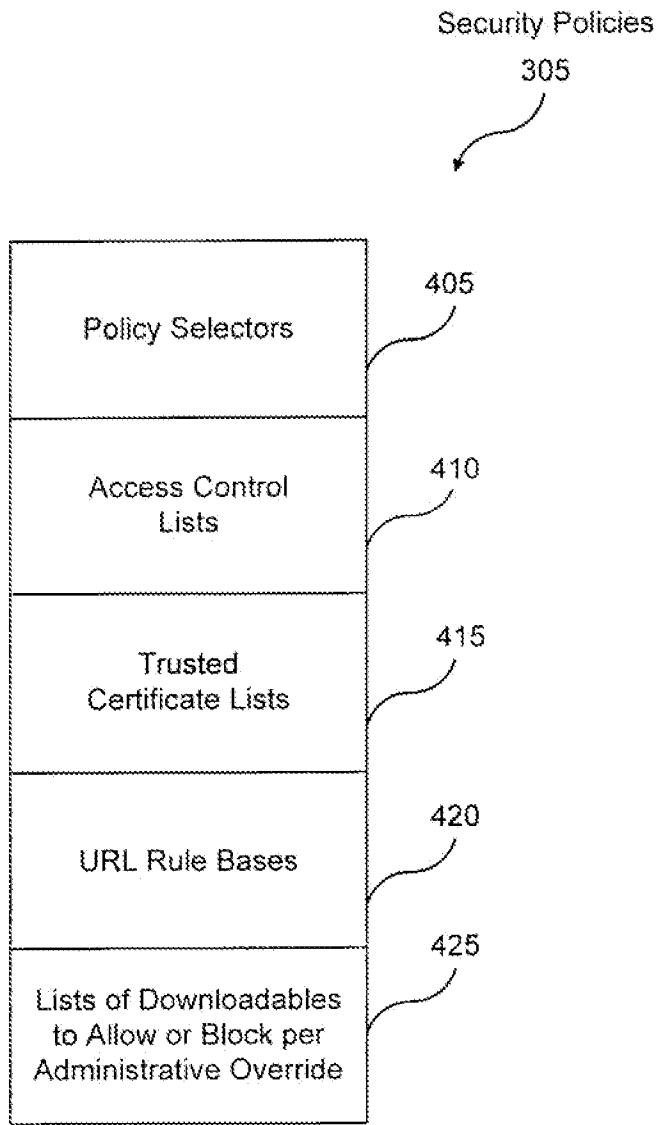


FIG. 4

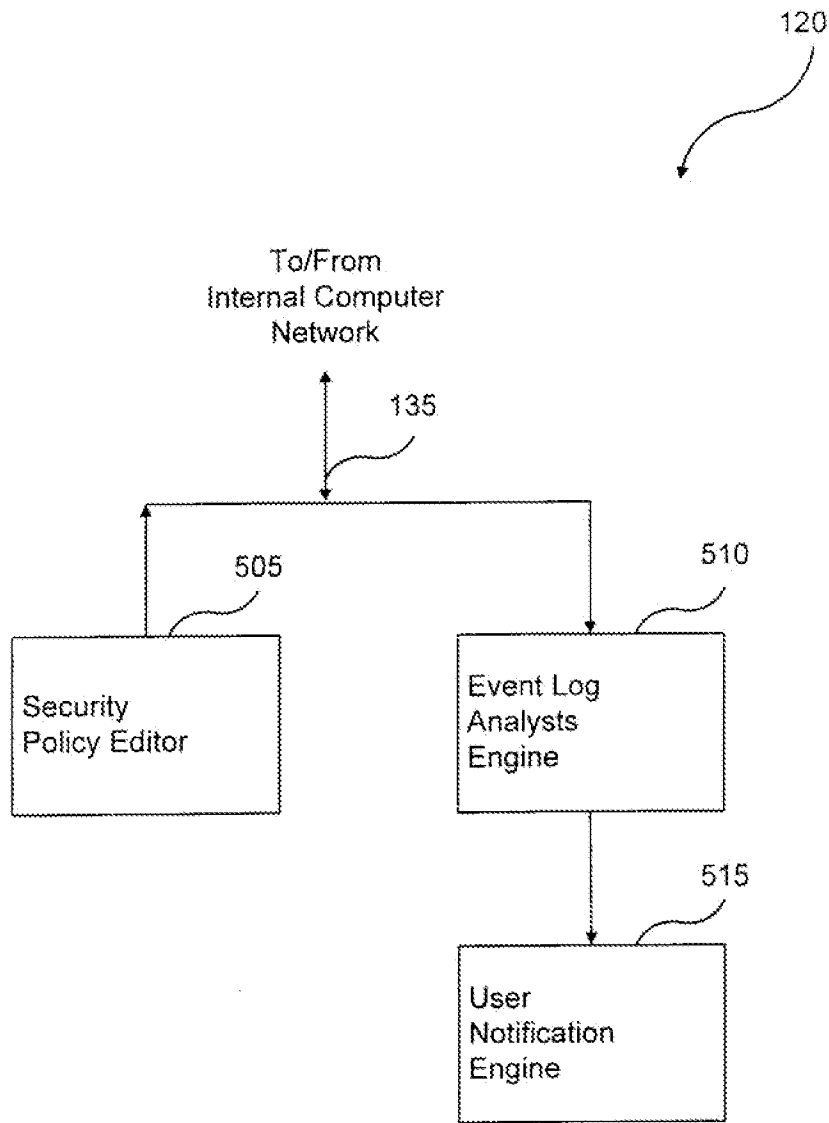


FIG. 5

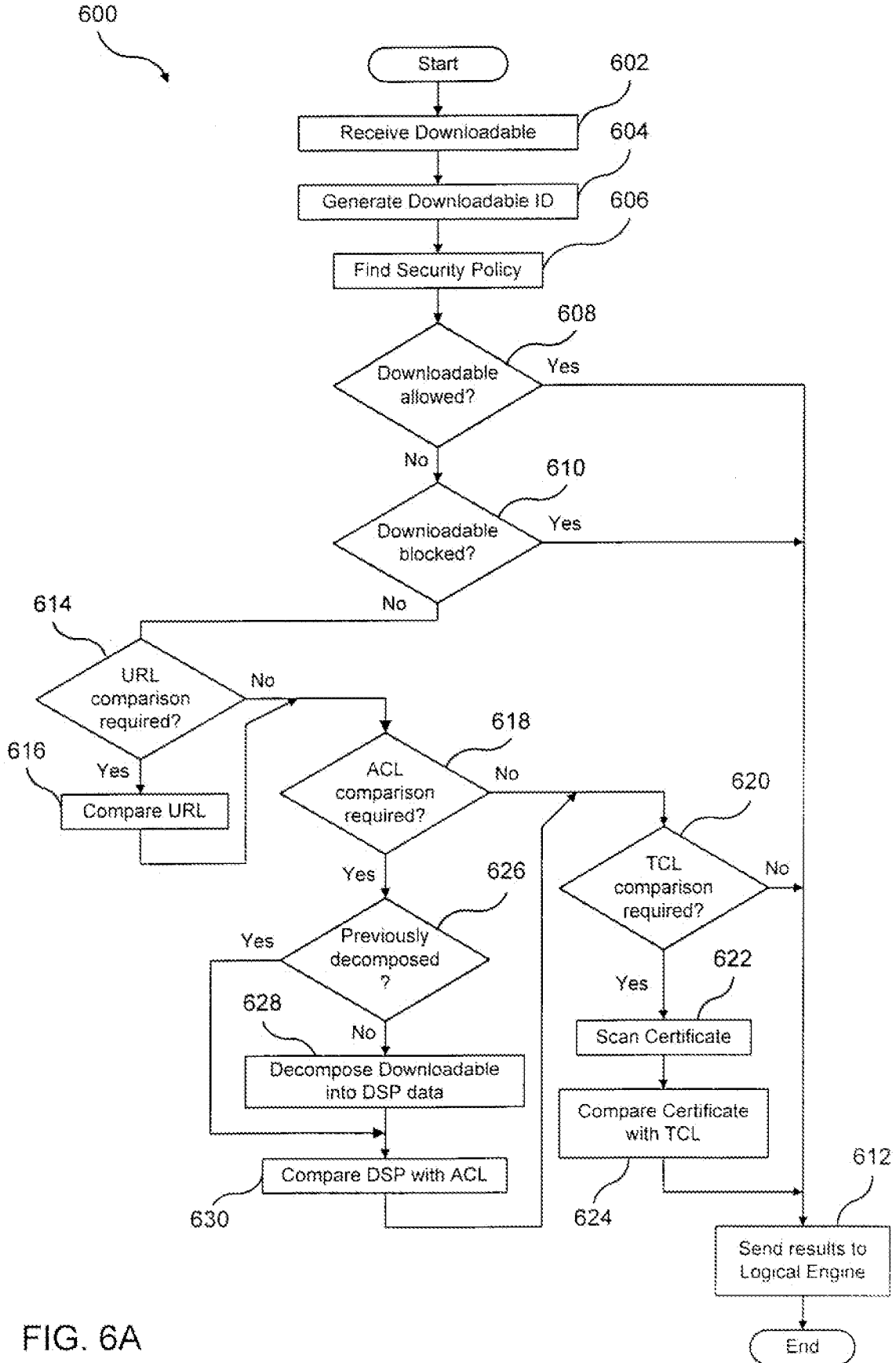


FIG. 6A

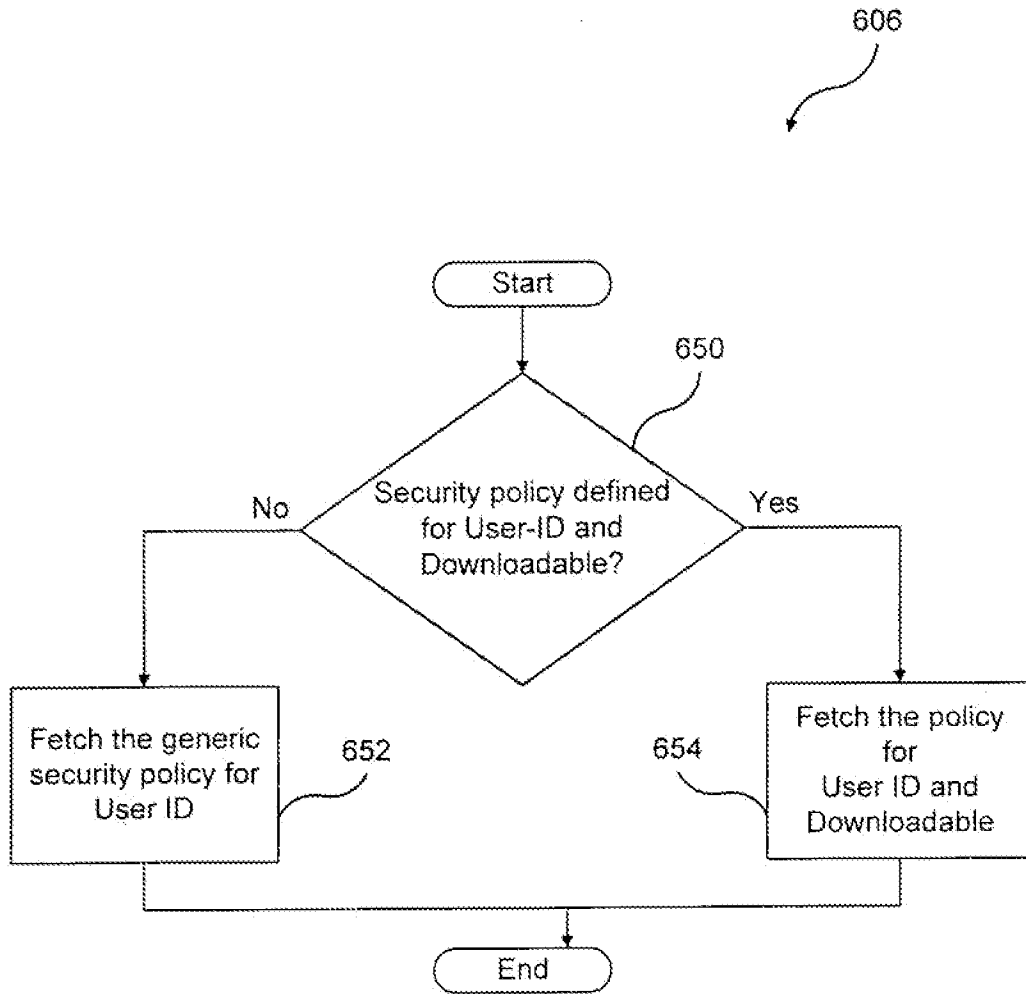


FIG. 6B

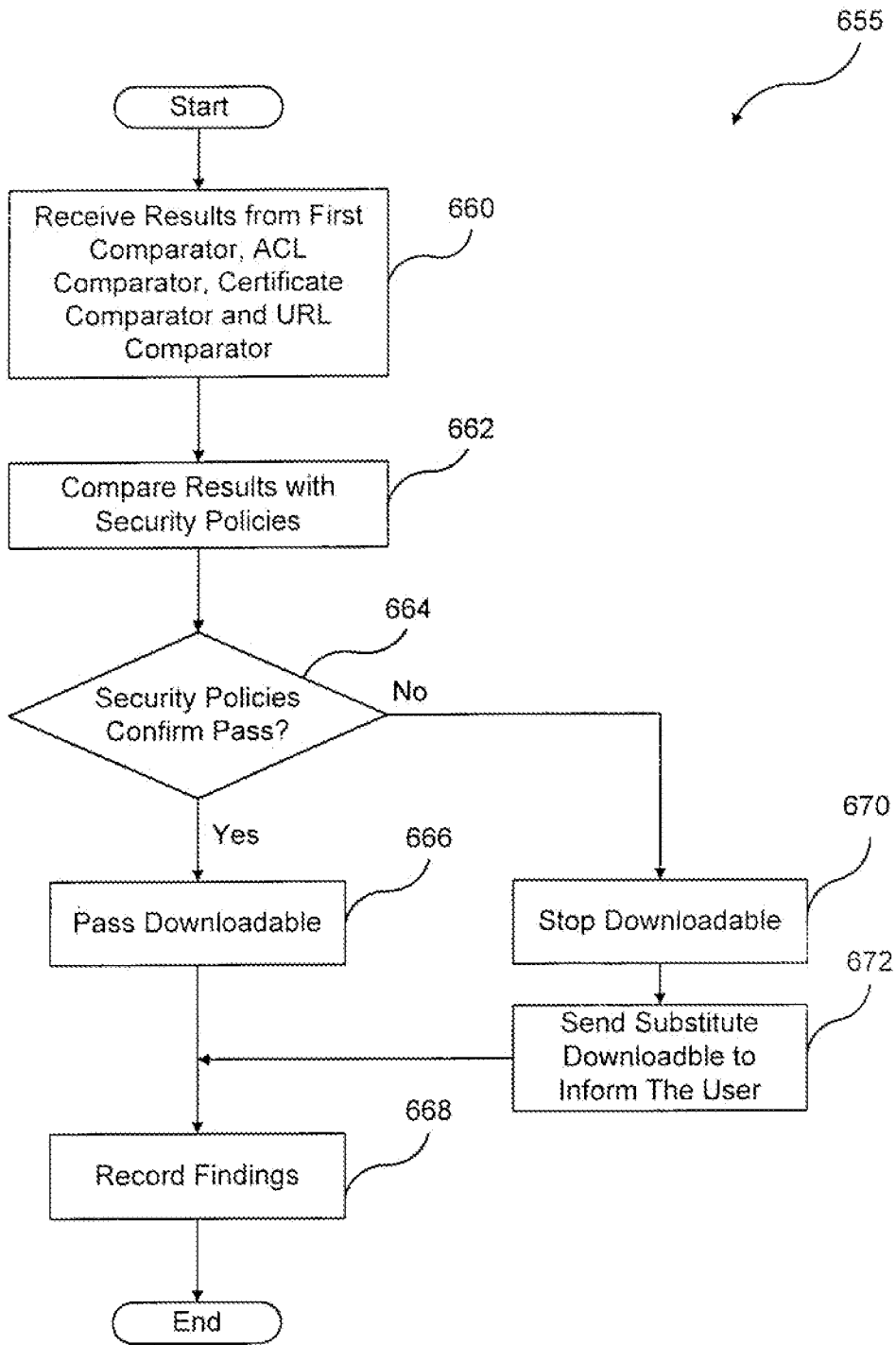


FIG. 6C

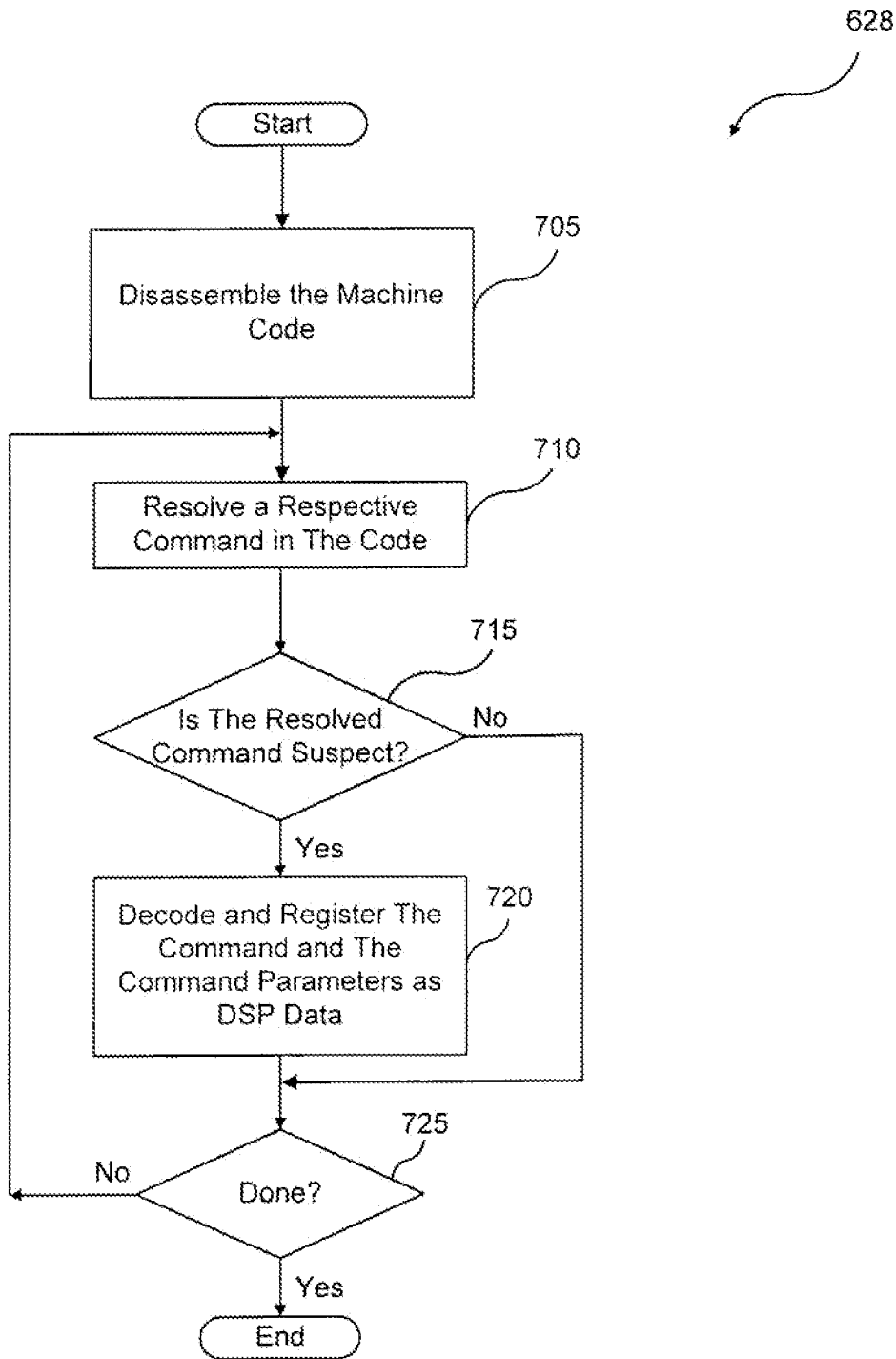


FIG. 7

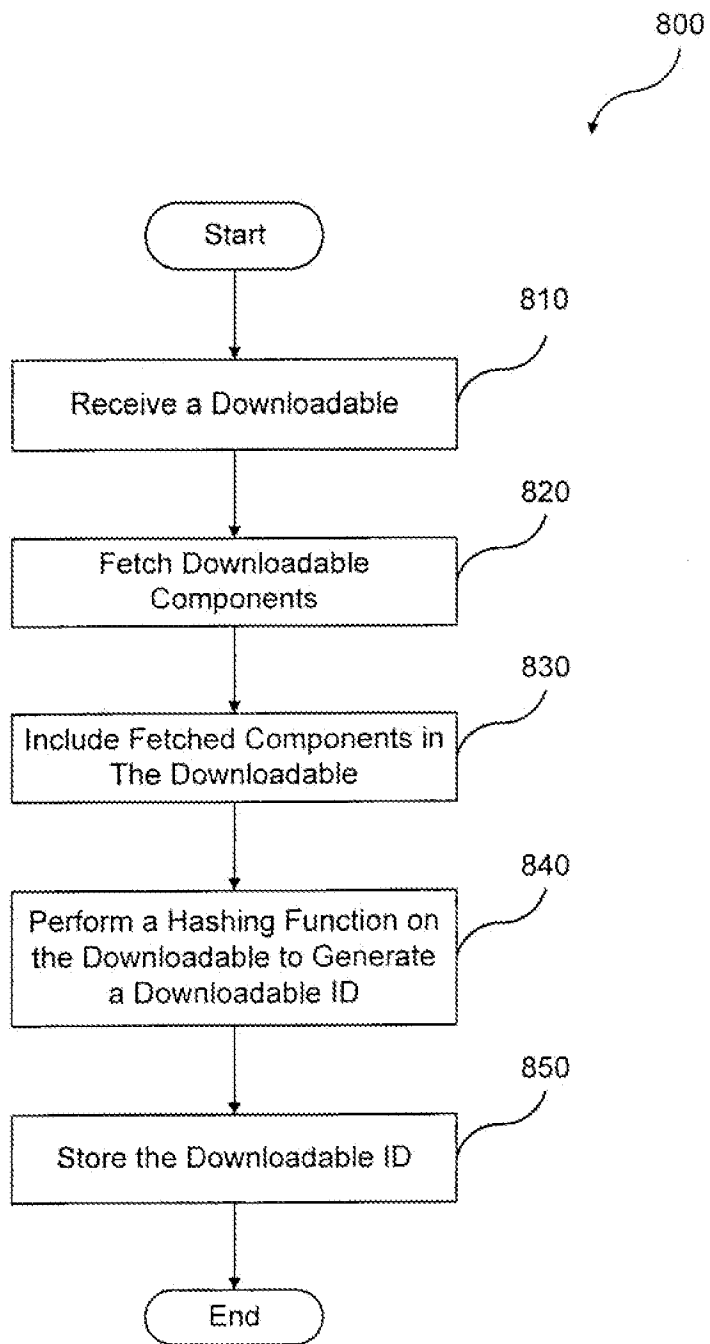


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB97/01626

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(6) : G06F 19/00, 15/18, 9/44
 US CL : 395/187.01, 186, 188.01, 200.48, 200.59, 10
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 395/187.01, 186, 188.01, 200.48, 200.59, 10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 5,572,643 A (JUDSON) 05 November 1996, col. 2, lines 12-53, col. 3, lines 48-67, col. 4, lines 5-51, col. 7, lines 1-13	1-70
X	US 5,077,677 A (MURPHY ET AL) 31 December 1991, COL. 2, LINES 60-66, COL. 19, LINES 8-16	10, 35
X,E	US 5,692,047 A (MCMANIS) 25 November 1997, col. 3, lines 14-29.	66

Further documents are listed in the continuation of Box C. See patent family annex.

<p>* Special categories of cited documents:</p> <p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*B* earlier document published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>*G* document member of the same patent family</p>
--	---

Date of the actual completion of the international search 25 MARCH 1998	Date of mailing of the international search report 14 MAY 1998
--	--

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer PIERRE EDDY ELISCA <i>Jon Bell</i> Telephone No. (703) 305-3987
---	--

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL05/00915

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(7) : G06F 11/30
 US CL : 726/22, 23, 24
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 726/22, 23, 24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,487,666 B1 (SHANKLIN et al) 26 November 2002, see entire document	1-43

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search 05 February 2006 (05.02.2006)	Date of mailing of the international search report 05 MAR 2006
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Ayaz Sheikh Telephone No. 703-305-3900

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL05/00915

Continuation of B. FIELDS SEARCHED Item 3:

BRS (files: USPAT, US PGPUB, USOCR, DERWENT, IBM TDB, JPO, EPO)

search terms: token, signature, expression, trait, rule, policy, exploit, malicious, suspicious, attack, intrusion, parse, parsed, parser, parsing

PATENT COOPERATION TREATY

REC'D 07 MAR 2006
WIPO PCT

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
TALLY EITAN
EITAN LAW GROUP
P.O. BOX 2081
INDUSTRIAL ZONE
HERZLIA, 46120
ISRAEL

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference		Date of mailing (day/month/year)
P-9039-PC		03 MAR 2006
FOR FURTHER ACTION See paragraph 2 below		
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/IL05/00915	24 August 2005 (24.08.2005)	30 August 2004 (30.08.2004)
International Patent Classification (IPC) or both national classification and IPC		
IPC(7): G06F 11/30 and US Cl.: 726/22, 23, 24		
Applicant		
FINJAN SOFTWARE, LTD.		

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201 Form PCT/ISA/237 (cover sheet) (April 2005)	Date of completion of this opinion 05 February 2006 (05.02.2006)	Authorized officer Ayaz Sheikh Telephone No. 703-305-3900
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/IL05/00915

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- the international application in the language in which it was filed
- a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- a sequence listing
- table(s) related to the sequence listing

b. format of material

- on paper
- in electronic form

c. time of filing/furnishing

- contained in the international application as filed.
- filed together with the international application in electronic form.
- furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Form PCT/ISA/237(Box No. I) (April 2005)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IL05/00915

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>NONE</u>	YES
	Claims <u>1-43</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-43</u>	NO
Industrial applicability (IA)	Claims <u>1-43</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IL05/00915

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-43 lack novelty under PCT Article 33(2) as being anticipated by Shanklin et al, U.S. Patent 6,487,666.

1. A method for scanning content, comprising: identifying tokens within an incoming byte stream, the tokens being lexical constructs for a specific language; identifying patterns of tokens; generating a parse tree from the identified patterns of tokens; and identifying the presence of potential exploits within the parse tree, wherein said identifying tokens, identifying patterns of tokens, and identifying the presence of potential exploits are based upon a set of rules for the specific language (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).
2. The method of claim 1 further comprising converting the incoming byte stream to a reduced set of character codes (col. 2, lines 3-15).
3. The method of claim 1 wherein further comprising decoding character sequences according to an escape encoding (col. 2, lines 3-15).
4. The method of claim 1 wherein said generating a parse tree is based upon a shift-and-reduce algorithm (col. 3, lines 54-60).
5. The method of claim 1 wherein the set of rules expresses exploits in terms of patterns of tokens (col. 2, lines 3-15).
6. The method of claim 1 wherein the set of rules includes actions to be performed when corresponding patterns are matched (col. 2, lines 3-15).
7. The method of claim 1 wherein the specific language is JavaScript (col. 2, lines 15-21).
8. The method of claim 1 wherein the specific language is Visual Basic VBScript (col. 2, lines 15-21).
9. The method of claim 1 wherein the specific language is HTML (col. 2, lines 15-21).
10. The method of claim 1 wherein the specific language is Uniform Resource Identifier (URI)(col. 2, lines 45-48).
11. The method of claim 1 for scanning a first type of content that has a second type of content embedded therewithin, further comprising recursively invoking another method in accordance with claim 1, for scanning the second type of content (col. 2, lines 3-15).
12. A system for scanning content, comprising: a tokenizer for identifying tokens within an incoming byte stream, the tokens being lexical constructs for a specific language; a parser operatively coupled to said tokenizer for identifying patterns of tokens, and generating a parse tree therefrom; and an analyzer operatively coupled to said parser for analyzing the parse tree and identifying the presence of potential exploits therewithin, wherein said tokenizer, said parser and said analyzer use a set of rules for the specific language to identify tokens, patterns and potential exploits, respectively (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).
13. The system of claim 12 further comprising a pre-scanner for identifying content that is innocuous (col. 2, lines 3-15).
14. The system of claim 12 wherein said tokenizer comprises a normalizer for converting the incoming byte stream to a reduced set of character codes (col. 2, lines 3-15).
15. The system of claim 12 wherein said tokenizer comprises a decoder for decoding character sequences according to an escape encoding (col. 2, lines 3-15).
16. The system of claim 12 wherein said parser generates the parse tree using a shift-and-reduce algorithm (col. 3, lines

Form PCT/ISA/237 (Supplemental Box) (April 2005)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IL05/00915

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

54-60).

17. The system of claim 12 further comprising a pattern-matching engine operatively coupled to said parser and to said analyzer, for matching a pattern within a sequence of tokens (col. 3, lines 54-60).
18. The system of claim 17 wherein the pattern is represented as a finite-state machine (col. 2, lines 3-15).
19. The system of claim 17 wherein the pattern is represented as a pattern expression tree (col. 2, lines 3-15).
20. The system of claim 17 wherein patterns are merged into a single deterministic finite automaton (DFA)(col. 2, lines 3-15).
21. The system of claim 12 wherein the set of rules expresses exploits in terms of patterns of tokens (col. 2, lines 3-15).
22. The system of claim 12 wherein the set of rules includes actions to be performed when corresponding patterns are matched (col. 2, lines 3-15).
23. The system of claim 22 further comprising a scripting engine for implementing the actions to be performed (col. 2, lines 3-15).
24. The system of claim 12 wherein the specific language is JavaScript (col. 2, lines 15-21).
25. The system of claim 12 wherein the specific language is Visual Basic script (col. 2, lines 15-21).
26. The system of claim 12 wherein the specific language is HTML (col. 2, lines 15-21).
27. The system of claim 12 wherein the specific language is Uniform Resource Identifier (URI)(col. 2, lines 45-48).
28. A computer-readable storage medium storing program code for causing a computer to perform the steps of identifying tokens within an incoming byte stream, the tokens being lexical constructs for a specific language; identifying patterns of tokens; generating a parse tree from the identified patterns of tokens; and identifying the presence of potential exploits within the parse tree, wherein said identifying tokens, identifying patterns of tokens, and identifying the presence of potential exploits are based upon a set of rules for the specific language (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).
29. A method for scanning content, comprising expressing an exploit in terms of patterns of tokens and rules, where tokens are lexical constructs of a specific programming language, and rules are sequences of tokens that form grammatical constructs; and parsing an incoming byte source to determine if an exploit is present therewithin, based on said expressing (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).
30. The method of claim 29 further comprising generating a parse tree for the incoming byte source, the nodes of the parse tree corresponding to tokens and rules (col. 3, lines 54-60).
31. The method of claim 30 wherein nodes of the parse tree corresponding to rules are positioned as parent nodes, the children of which correspond to the sequences of tokens that correspond to the rules (col. 3, lines 54-60).
32. The method of claim 31 wherein a new parent node is added to the parse tree if a rule is matched (col. 3, lines 54-60).
33. The method of claim 32 wherein said parsing determines if an exploit is present within the incoming byte source when a new parent node is added to the parse tree (col. 3, lines 54-60).
34. The method of claim 33 wherein tokens and rules have names associated therewith, and further comprising assigning values to nodes in the parse tree, the value of a node corresponding to a token being the name of the corresponding token, and the value of a node corresponding to a rule being the name of the corresponding rule (col. 3, lines 54-60).
35. The method of claim 34 further comprising storing an indicator for the matched rule in the new parent node of the parse tree, if said parsing determines the presence of the matched rule (col. 3, lines 54-60).
36. A system for scanning content, comprising a parser for parsing an incoming byte source to determine if an exploit is present therewithin, based on a formal description of the exploit expressed in terms of patterns of tokens and rules, where tokens are lexical constructs of a specific programming language, and rules are sequences of tokens that form grammatical constructs (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).
37. The system of claim 36 wherein said parser comprises a tree generator for generating a parse tree for the incoming byte source, the nodes of the parse tree corresponding to tokens and rules (col. 3, lines 54-60).
38. The system of claim 37 wherein nodes of the parse tree corresponding to rules are positioned as parent nodes, the children of which correspond to the sequences of tokens that correspond to the rules (col. 3, lines 54-60).
39. The system of claim 38 wherein said tree generator adds a new parent node to the parse tree if a rule is matched (col. 3, lines 54-60).
40. The system of claim 39 wherein said parser determines if a matched rule is present within the incoming byte source when said tree generator adds a new parent node to the parse tree (col. 3, lines 54-60).
41. The system of claim 40 wherein tokens and rules have names associated therewith, and wherein said tree generator assigns value to nodes in the parse tree, the value of a node corresponding to a token being the name of the corresponding token, and the value of a node corresponding to a rule being the name of the corresponding rule (col. 3, lines 54-60).
42. The system of claim 41 wherein said tree generator stores an indicator for the matched rule in the new parent node of the parse tree, if said parser determines the presence of the matched rule (col. 3, lines 54-60).
43. A computer-readable storage medium storing program code for causing a computer to perform the steps of expressing an exploit in terms of patterns of tokens and rules, where tokens are lexical constructs of a specific programming language, and rules are sequences of tokens that form grammatical constructs; and parsing an incoming byte source to determine if an exploit is present therewithin, based on said expressing (see col. 2, lines 3-15; col. 3, lines 54-60; col. 4, lines 40-48; and col. 5, lines 23-28).

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 01/01138

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06F1/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 G06F H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 983 348 A (JI SHUANG) 9 November 1999 (1999-11-09)	30-64, 67-76
Y	cited in the application column 1, line 9 - line 25 column 2, line 62 - column 3, line 56 column 3, line 65 - column 5, line 15 column 6, line 38 - column 8, line 15 figures 1,2 --- -/--	1-5, 11-13, 15-19, 24-29, 65,66
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents :		
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family		
Date of the actual completion of the international search	Date of mailing of the international search report	
12 September 2002	20/09/2002	
Name and mailing address of the ISA	Authorized officer	
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016	Arbutina, L	

INTERNATIONAL SEARCH REPORT

Intel Application No
PCT/IB 01/01138

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 623 600 A (JI SHUANG ET AL) 22 April 1997 (1997-04-22) abstract column 7, line 29 -column 8, line 38 -----	1-5, 11-13, 15-19, 24-29
Y	US 5 974 549 A (GOLAN GILAD) 26 October 1999 (1999-10-26) cited in the application abstract column 5, line 37 -column 6, line 29 -----	65,66

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 01/01138

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5983348	A	09-11-1999	AU 8822998 A	29-03-1999
			WO 9913402 A1	18-03-1999
			US 6272641 B1	07-08-2001
US 5623600	A	22-04-1997	AU 2001997 A	17-04-1997
			DE 19680539 T0	11-12-1997
			EP 0852762 A1	15-07-1998
			GB 2309561 A	30-07-1997
			JP 11513153 T	09-11-1999
			WO 9712321 A1	03-04-1997
			US 5889943 A	30-03-1999
US 5974549	A	26-10-1999	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 31 DEC 2002
WIPO PCT

(PCT Article 36 and Rule 70)

(Rationalised Report according to the Notice of the President of the EPO published in the OJ11/2001)

Applicant's or agent's file reference 134943.0 SZ	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB 01/ 01138	International filing date (day/month/year) 17/05/2001	Priority date (day/month/year) 17/05/2000
International Patent Classification (IPC) or national classification and IPC G06F1/00		
Applicant FINJAN SOFTWARE, LTD.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This **REPORT** consists of a total of 2 sheets, including this cover sheet.

This report is also accompanied by **ANNEXES**, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 30/11/2001	Date of completion of this report 19/12/2002
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer NESSMANN C A Tel. (+49-89) 2399 2828



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No.PCT/ IB 01/ 01138

I. Basis of the report

The basis of this international preliminary examination is the application as originally filed.

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability

In light of the documents cited in the international search report, it is considered that the invention as defined in at least some of the claims does not appear to meet the criteria mentioned in Article 33(1) PCT, i.e. does not appear to be novel and/or to involve an inventive step (see international search report, in particular the documents cited X and/or Y and corresponding claim references).

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	13290708
Filing Date	2011-11-07
First Named Inventor	EDERY, Yigal
Art Unit	2431
Examiner Name	REVAK, Christopher A
Attorney Docket Number	FIN0001-CON1-CIP1-CON4

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 CFR 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

ii. Other _____

b. Enclosed

i. Amendment/Reply

iii. Information Disclosure Statement (IDS)

ii. Affidavit(s)/ Declaration(s)

iv. Other NonPatent Literature

2. Miscellaneous

a. Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

b. Other _____

3. Fees

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. _____.

i. RCE fee required under 37 CFR 1.17(e)

ii. Extension of time fee (37 CFR 1.136 and 1.17)

iii. Other Credit Card Payment via EFS-Web

b. Check in the amount of \$ _____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/Dawn-Marie Bey/	Date	05/07/2013
Name (Print/Type)	Dawn-Marie Bey	Registration No.	44,442

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature		Date	
Name (Print/Type)		Date	

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Instruction Sheet for RCEs

(not to be submitted to the USPTO)

NOTES:

An RCE is not a new application, and filing an RCE will not result in an application being accorded a new filing date.

Filing Qualifications:

The application must be a utility or plant application filed on or after June 8, 1995. The application cannot be a provisional application, a utility or plant application filed before June 8, 1995, a design application, or a patent under reexamination. See 37 CFR 1.114(e).

Filing Requirements:

Prosecution in the application must be closed. Prosecution is closed if the application is under appeal, or the last Office action is a final action, a notice of allowance, or an action that otherwise closes prosecution in the application (e.g., an Office action under *Ex parte Quayle*). See 37 CFR 1.114(b).

A submission and a fee are required at the time the RCE is filed. If reply to an Office action under 35 U.S.C. 132 is outstanding (e.g., the application is under final rejection), the submission must meet the reply requirements of 37 CFR 1.111. If there is no outstanding Office action, the submission can be an information disclosure statement, an amendment, new arguments, or new evidence. See 37 CFR 1.114(c). The submission may be a previously filed amendment (e.g., an amendment after final rejection).

WARNINGS:

Request for Suspension of Action:

All RCE filing requirements must be met before suspension of action is granted. A request for a suspension of action under 37 CFR 1.103(c) does not satisfy the submission requirement and does not permit the filing of the required submission to be suspended.

Improper RCE will NOT toll Any Time Period:

Before Appeal - If the RCE is improper (e.g., prosecution in the application is not closed or the submission or fee has not been filed) and the application is not under appeal, the time period set forth in the last Office action will continue to run and the application will be abandoned after the statutory time period has expired if a reply to the Office action is not timely filed. No additional time will be given to correct the improper RCE.

Under Appeal - If the RCE is improper (e.g., the submission or the fee has not been filed) and the application is under appeal, the improper RCE is effective to withdraw the appeal. Withdrawal of the appeal results in the allowance or abandonment of the application depending on the status of the claims. If there are no allowed claims, the application is abandoned. If there is at least one allowed claim, the application will be passed to issue on the allowed claim(s). See MPEP 1215.01.

See MPEP 706.07(h) for further information on the RCE practice.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	13290708
Filing Date:	07-Nov-2011
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Filer:	Dawn-Marie Bey./Amanda Bayliss
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with \$0 paid	1251	1	200	200

Blue Coat Systems - Exhibit 1004

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for Continued Examination	1801	1	1200	1200
Total in USD (\$)				1400

Electronic Acknowledgement Receipt

EFS ID:	15714222
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Amanda Bayliss
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	16:07:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1400
RAM confirmation Number	2839
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part	Pages (if applicable)

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This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Affidavit-Rule 131-pre-AIA (FTI) ONLY	Finjan_Shlomo_Declaration.pdf	697545 e05598b5c14317c64bd3fb452dcd478ca27be91f	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	FIN0001_CON1_CIP1_CON4_IDS1.pdf	151528 8c4ec1b91b729d7d3987475b083208b277b335d8	no	18
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Information:					
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4	Information Disclosure Statement (IDS) Form (SB08)	FIN0001_CON1_CIP1_CON4_IDS2.pdf	114599 07858efed5fee7709c5dc6f72691c75ed1e38acb	no	8
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37	Non Patent Literature	20BNonPatentLiterature.pdf	270945 d43e2e512c72fd87797650c285e1210742d338dd	no	8
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41	Non Patent Literature	24NonPatentLiterature.pdf	233831 32618c91e901dc5f069ca6b80ef18ff8aabecbba	no	5
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42	Non Patent Literature	25ANonPatentLiterature.pdf	10795459 cb2f0b5c52bfa8909be77cc0675cd6222907677	no	231
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13290708	
	Filing Date		2011-11-07	
	First Named Inventor	EDERY, Yigal		
	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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1	"Trend Micro's Virus Protection Added to Sun Microsystems Netra Internet Servers," Business Wire, October 1, 1996, available at http://www.cs.indiana.edu/~kinzler/pubs/viruswall.html	<input type="checkbox"/>
2	"Symantec Announces Norton Antivirus 2.0 for Windows NT," Symantec Corporation press release, September 16, 1996, available at http://www.symantec.com/about/news/release/article.jsp?prid=19960916_01	<input type="checkbox"/>
3	"Dark Avenger Mutation Engine No Threat to Protected PCs," McAfee, Inc. press release, May 11, 1992, available at http://securitydigest.org/virus/mirror/www.phreak.orgvirus/1/1992/vinl05.191	<input type="checkbox"/>
4	"Dark Avenger Mutation Engine No Threat to Protected PCs," McAfee, Inc. press release, May 11, 1992, available at http://securitydigest.org/virus/mirror/www.phreak.orgvirus/1/1992/vinl05.191	<input type="checkbox"/>
5	Gryaznov, D.O., "Scanners of the Year 2000: Heuristics," Proceedings of the Fifth International Virus Bulletin Conference, pp. 225-234 (1995), available at http://vxheavens.com/lib/adgOO.html	<input type="checkbox"/>
6	"Symantec Announces Norton Internet Email Gateway at Internet World - Booth # 369 on December 11, 12, and 13," Symantec Corporation press release, December 11, 1996, available at http://www.symantec.com/about/news/release/article.jsp?prid=19961211_03	<input type="checkbox"/>
7	"Internet Security Gets Less Costly and Easier to Manage: Integralis Announces MIMESweeper Compatible with Check Point Firewall-Ion Single NT Server; E-mail Virus Detection and Content Management Can Reside on Firewall Server, Saving Money and Support Costs," Business Wire, September 16, 1996, available at http://www.thefreelibrary.com/Internet+Security+Gets+Less+Costly+and	<input type="checkbox"/>
8	"Presenting Java," by John December (1995)	<input type="checkbox"/>
9	"The Java Language Specification" by Gosling, et al. (1996)	<input type="checkbox"/>
10	"The Java Programming Language," by Ken Arnold and James Gosling (1996)	<input type="checkbox"/>
11	"The Java Virtual Machine Specification," by Tim Lindholm and Frank Yellin (1997)	<input type="checkbox"/>

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12	"Computer Viruses and Artificial Intelligence," by David Stang (September, 1995)	<input type="checkbox"/>
13	"Java Security and a Firewall Extension for Authenticity Control of Java Applets," by Magnus Johansson (January 29, 1997)	<input type="checkbox"/>
14	"Static Analysis of Programs With Application to Malicious Code Detection," by Raymond Lo (1992)	<input type="checkbox"/>
15	File History for U.S. Patent No. 6,804,780	<input type="checkbox"/>
16	"Virus Detection Alternatives," by Patrick Min (July, 1992)	<input type="checkbox"/>
17	"Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns," by LeCharlier, et al. (September, 1995)	<input type="checkbox"/>
18	The Giant Black Book of Computer Viruses by Mark Ludwig (1995)	<input type="checkbox"/>
19	HotJava: The Security Story	<input type="checkbox"/>
20	The Java Filter	<input type="checkbox"/>
21	"A Java Filter," by Balfanz, et al.	<input type="checkbox"/>
22	"Improved JavaScript and Java Screening Function," by Claunch (May 4, 1996)	<input type="checkbox"/>

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23	"New Version of Java, JavaScript, ActiveX Screening," by Claunch (July 3, 1996)	<input type="checkbox"/>
24	"A Toolkit and Methods for Internet Firewalls," by Ranum, et al.	<input type="checkbox"/>
25	"Identifying and Controlling Undesirable Program Behaviors," by Maria King	<input type="checkbox"/>
26	"PACL's: An Access Control List Approach to Anti-Viral Security," by Wichers, et al.	<input type="checkbox"/>
27	ENDRIJONAS, Janet, Rx PC The Anti-Virus Handbook. Published in the U.S. in 1993 by TAB Books, a division of McGraw-Hill, Inc. (201 paQes)	<input type="checkbox"/>
28	"Secure Code Distribution," by X. Nick Zhang (June, 1997)	<input type="checkbox"/>
29	IBM AntiVirus User's Guide (November 15, 1995)	<input type="checkbox"/>
30	"Breadth of Runtime Environments and Security Make Java a Good Choice for the Internet" (1996)	<input type="checkbox"/>
31	Omura, Jim K., "Novel Applications of Cryptography in Digital Communications," IEEE Communications Magazine, pp. 21-29, May, 1990	<input type="checkbox"/>
32	Okamoto, E., et al., "ID-Based Authentication System For Computer Virus Detection," IEEE/IEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19,1990, Abstract and pages 1169-1170, URL: http://iel.ihs.com:80/cgi-bin/iel_cgi?se ... 2ehts%26ViewTemplate%3ddocview%5fb%2ehts	<input type="checkbox"/>
33	IBM AntiVirus User's Guide Version 2.4, International Business Machines Corporation, pp. 6-7, November 15, 1995	<input type="checkbox"/>

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34	Leach, Norvin, et al., "IE 3.0 Applets Will Earn Certification," PC Week, Vol. 13, No. 29,2 pp., July 22, 1996	<input type="checkbox"/>
35	"Finjan Software Releases SurfinBoard, Industry's First JAVA Security product For the World Wide Web," Article published on the Internet by Finjan Software Ltd., 1 p., July 29, 1996	<input type="checkbox"/>
36	"Powerful PC Security for the New World of JAVATM and Downloadables, Surfin Shield™," Article published on the Internet by Finjan Software Ltd., 2 pp. 1996	<input type="checkbox"/>
37	Microsoft® Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet," Microsoft Corporation, including Abstract, Contents, Introduction, and pp. 1-10, October, 1996	<input type="checkbox"/>
38	Finjan Announces a Personal Java™ Firewall for Web Browsers - the SurfinShield™ 1.6 (formerly known as SurfinBoard)," Press Release of Finjan Releases SurfinShield 1.6, 2 pp., October 21, 1996	<input type="checkbox"/>
39	Company Profile, "Finjan-Safe Surfing. The Java Security Solutions Provider," Article published on the Internet by Finjan Software Ltd., 3 pp., October 31,1996	<input type="checkbox"/>
40	"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0," Las Vegas Convention Center/Pavilion 5 P5551, 3 pp., November 18, 1996	<input type="checkbox"/>
41	"Java Security: Issues & Solutions," Article published on the Internet by Finjan Software Ltd., 8 pp., 1996	<input type="checkbox"/>
42	"Products," Article published on the Internet, 7 pp.	<input type="checkbox"/>
43	Mark LaDue, "Online Business Consultant: Java Security: Whose Business Is It?," Article published on the Internet, Home Page Press, Inc., 4 pp., 1996	<input type="checkbox"/>
44	Web Page Article, "Frequently Asked Questions About Authenticode," Microsoft Corporation, last updated February 17, 1997, printed December 23, 1998, URL: http://www.microsoft.com/workshop/security/authcodee/signfaq.asp#9 , pp. 1-13	<input type="checkbox"/>

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45	Zhang, X.N., "Secure Code Distribution," IEEE/IEE Electronic Library online, Computer Vol. 30, Issue 6, pp. 76-79, June, 1997	<input type="checkbox"/>
46	Binstock, Andrew, "Multithreading, Hyper-Threading, Multiprocessing: Now, What's the Difference?," http://hiviv-intel.com/cd/ids!dcvdoQcr!asmo-na/enfl/20456.htm , Pacific Data Works, LLC, downloaded 7/7/2008, 7 pp.	<input type="checkbox"/>
47	VirexPC Version 2.0 or later from Microcom	<input type="checkbox"/>
48	AntiVirus Kit From 1 stAide Software	<input type="checkbox"/>
49	FluShot+ Series of Products by Ross Greenberg	<input type="checkbox"/>
50	Symantec Antivirus ofthe Mac version 3.0 or later	<input type="checkbox"/>

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

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The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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1	"Synthesizing Fast Intrusion Prevention/Detection Systems From High-Level Specifications," by Sekar, et al. (1999)	<input type="checkbox"/>
2	Art of Computer Virus Research and Defense b Peter Szor (February, 2005)	<input type="checkbox"/>
3	"Process Execution Controls as a Mechanism to Ensure Consistency," by Eugen Bacic (1990)	<input type="checkbox"/>
4	"Process Execution Controls: Revisited," by Bacic (1990)	<input type="checkbox"/>
5	"A Flexible Access Control Service for Java Mobile Code," by Corradi, et al. (2000)	<input type="checkbox"/>
6	"Java Security: Issues & Solutions" (1996)	<input type="checkbox"/>
7	"Microsoft Authenticode analyzed," by Rohit Khare (July 22, 1996)	<input type="checkbox"/>
8	"Java Security: Whose Business Is It?" by Mark LaDue (1996)	<input type="checkbox"/>
9	Microsoft Authenticode Technology (October, 1996)	<input type="checkbox"/>
10	"Mobile Code Security," by Rubin, et al.	<input type="checkbox"/>
11	"Protecting Data From Malicious Software," by Schmid, et al.	<input type="checkbox"/>

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12	"Security in the Large: Is Java's Sandbox Scalable?" by Zhong, et al. (April, 1998)	<input type="checkbox"/>
13	"A Domain and type Enforcement UNIX Prototype," by Badger, et al. (June, 1995)	<input type="checkbox"/>
14	"Heuristic Anti-Virus Technology," by Frans Veldman	<input type="checkbox"/>
15	"Standards for Security in Open Systems," by Warwick Ford (1989)	<input type="checkbox"/>
16	"Secure File Transfer Over TCP/IP," by Brown, et al. (November, 1992)	<input type="checkbox"/>
17	"Standards in Commercial Security," by Nick Pope	<input type="checkbox"/>
18	"X.400 Security Features," by Tony Whyman	<input type="checkbox"/>
19	"Using CASE Tools to Improve the Security of Applications Systems," by Hosmer, et al. (1988)	<input type="checkbox"/>
20	"Miro: Visual Specification of Security," by Heydon, et al. (October, 1990)	<input type="checkbox"/>
21	"An Evaluation of Object-Based Programming with Visual Basic," by Dukovic, et al. (1995)	<input type="checkbox"/>
22	"Visual Basic 5.0 Significantly Improved," by W. Dennis Swift (June, 1997)	<input type="checkbox"/>

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23	"Development of an Object Oriented Framework for Design and Implementation of Database Powered Distributed Web Applications With the DEMETER Project as a Real-Life Example," by Goschka, et al. (1997)	<input type="checkbox"/>
24	"Detecting Unusual Program Behavior Using the Statistical Component of the Nextgeneration Intrusion Detection Expert System (NIDES), by Anderson, et al. (May, 1995)	<input type="checkbox"/>
25	"A Generic Virus Scanner in C++," by Kumar, et al. (September 17, 1992)	<input type="checkbox"/>
26	"A Model For Detecting the Existence of Software Corruption in Real Time," by Voas, et al. (1993)	<input type="checkbox"/>
27	"Protection Against Trojan Horses by Source Code Analysis," by Saito, et al. (March, 1993)	<input type="checkbox"/>
28	"Information Agents for Automated Browsing," by Dharap, et al. (1996)	<input type="checkbox"/>
29	"Static Analysis Virus Detection Tools for Unix Systems," by Kerchen, et al. (1990)	<input type="checkbox"/>
30	"Managing Trust in an Information-Labeling System," by Blaze, et al. (November 4, 1996)	<input type="checkbox"/>
31	List of Secure Internet Programming Publications from www.cs.princeton.edu	<input type="checkbox"/>
32	"A Guide to the Selection of Anti-Virus Tools and Techniques," by Polk, et al. (December 2, 1992)	<input type="checkbox"/>
33	"An Integrated Toolkit for Operating System Security," by Rabin, et al. (August, 1988)	<input type="checkbox"/>

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34	"A Web Navigator With Applets in Caml," by Francois Ronaix (May, 1996)	<input type="checkbox"/>
35	"Intel Launches Virus Counterattack," by Charles Bruno (August, 1992)	<input type="checkbox"/>
36	Intel LANProtect Software User's Guide (1992)	<input type="checkbox"/>
37	"Parents Can Get PC Cruise Control," by George Mannes (July, 1996)	<input type="checkbox"/>
38	"A New Techniques for Detecting Polymorphic Computer Viruses," by Carey Nachenberg (1995)	<input type="checkbox"/>
39	"Heuristic Scanners: Artificial Intelligence," by Righard Zwienenberg (September, 1995)	<input type="checkbox"/>
40	Intel LANProtect, 30-Day Test Drive Version User's Manual	<input type="checkbox"/>
41	Slade, Robert, "Guide to Computer Viruses: How to A void Them, How to Get Rid of Them, and How to Get Help" (April, 1996)	<input type="checkbox"/>
42	A Pathology of Computer Viruses by David Ferbranche (November, 1994)	<input type="checkbox"/>
43	Earl Boebert's post to the greatcircle firewalls mailing list. Taken from http://www.greatcircle.com/lists/firewalls/archive/firewalls.199410 (October, 16, 1994)	<input type="checkbox"/>
44	CSL Bulletin: Connecting to the Internet: Security Considerations. Taken from http://csrc.nist.gov/publications/nistbul/cs193-07.txt (July 1993)	<input type="checkbox"/>

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13290708
	Filing Date	2011-11-07
	First Named Inventor	EDERY, Yigal
	Art Unit	2431
	Examiner Name	REVAK, Christopher A
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4

45	FAQ: Interscan Viruswall Taken from http://\veb.archive.org/web/19970605050331/www..antivirus.com/faq/finterscanfaq.html (last updated August 8, 1996)	<input type="checkbox"/>
46	Network Security and SunScreen SPF-IOO: Technical White Paper, Sun Microsystems, 1995	<input type="checkbox"/>
47	"Why Do We Need Heuristics?" by Frans Veldman (September, 1995)	<input type="checkbox"/>
48	"Leading Content Security Vendors Announce Support for Check Point Firewall- 1.3.0; New Partners for Anti-Virus Protection, URL Screening and Java Security," Business Wire, October 7, 1996, available at http://www.allbusiness.com/technology/computer-networks-computer-networksecurity17274315-1.html#ixzz1gkbKf4g1	<input type="checkbox"/>
49	"McAfee Introduces Web shield; Industry's First Secure Anti-Virus Solution for Network Firewalls; Border Network Technologies and Secure Computing to Enter into Web Shield OEM Agreements," Business Wire, May 14, 1996, available at http://findarticles.com/p/articles/mi_mOEINlis_1996_May_14/ai_182834561	<input type="checkbox"/>
50	"Trend Micro Announces Virus and Security Protection For Microsoft Proxy Server; Also Blocks Java Applets, ActiveX," Business Wire, October 29, 1996, available at http://www.thefreelibrary.com/Trend+Micro+announces+virus+and+security+protection+for+MicrosoftL.-aO18810512	<input type="checkbox"/>

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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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OR

That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- See attached certification statement.
- The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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	Art Unit	2431		
	Examiner Name	REVAK, Christopher A		
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4		

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

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1	Finjan's Opposition to Websense's Renewed Motion For Judgment as a Matter of Law, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS)	<input type="checkbox"/>
2	Declaration of Paul Batcher Re Websense, Inc.s' Proffer of Evidence Re Laches, dated December 19,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS) (Redacted 12/26/12)	<input type="checkbox"/>
3	Opposition to Symantec's Motion For JMOL, dated December 17, 2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS) (Redacted 12/27/12)	<input type="checkbox"/>
4	Omura, Jim K., "Novel Applications of Cryptography in Digital Communications," IEEE Communications Magazine, pp. 21-29, May, 1990	<input type="checkbox"/>
5	Okamoto, E., et al., "ID-Based Authentication System For Computer Virus Detection," IEEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19,1990, Abstract and pages 1169-1170, URL: http://iel.ihs.com:80/cgi-bin/iel.cgi?se2ehts%26ViewTemplate%3ddocview%5fb%2ehts	<input type="checkbox"/>
6	IBM AntiVirus User's Ouide Version 2.4, International Business Machines Corporation, pp. 6-7, November 15,1995	<input type="checkbox"/>
7	Leach, Norvin, et al., "IE 3.0 Applets Will Earn Certification," PC Week, Vol. 13, No. 29, 2 pp., July 22, 1996	<input type="checkbox"/>
8	"Finjan Software Releases SurfinBoard, Industry's First JAVA Security product For the World Wide Web," Article published on the Internet by Finjan Software Ltd., 1 p., July 29, 1996	<input type="checkbox"/>
9	"Powerful PC Security for the New World of JAVATM and Downloadables, Surfin Shield™," Article published on the Internet by Finjan Software Ltd., 2 pp. 1996	<input type="checkbox"/>
10	Microsoft® Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet," Microsoft Corporation, including Abstract, Contents, Introduction, and pp. 1-10, October, 1996	<input type="checkbox"/>
11	Finjan Announces a Personal Java™ Firewall for Web Browsers - the SurfinShield™ 1.6 (fonnerly known as SurfinBoard)," Press Release of Finjan Releases SurfinShield 1.6,2 pp., October 21, 1996	<input type="checkbox"/>

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12	Company Profile, "Finjan-Safe Surfing. The Java Security Solutions Provider," Article published on the Internet by Finjan Software Ltd., 3 pp., October 31, 1996	<input type="checkbox"/>
13	"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0," Las Vegas Convention Center/Pavilion 5 P5551, 3 pp., November 18, 1996	<input type="checkbox"/>
14	"Java Security: Issues & Solutions," Article published on the Internet by Finjan Software Ltd., 8 pp., 1996	<input type="checkbox"/>
15	"Products," Article published on the Internet, 7 pp.	<input type="checkbox"/>
16	Mark LaDue, "Online Business Consultant: Java Security: Whose Business Is It?," Article published on the Internet, Home Page Press, Inc., 4 pp., 1996	<input type="checkbox"/>
17	Web Page Article, "Frequently Asked Questions About Authenticode," Microsoft Corporation, last updated February 17, 1997, printed December 23, 1998, URL: http://www.microsoft.com/workshop/security/authcode/signfaq.asp#9 , pp. 1-13	<input type="checkbox"/>
18	Zhang, X.N., "Secure Code Distribution," IEEE/IEE Electronic Library online, Computer Vol. 30, Issue 6, pp. 76-79, June, 1997	<input type="checkbox"/>
19	Binstock, Andrew, "Multithreading, Hyper-Threading, Multiprocessing: Now, What's the Difference?," http://www.intel.com/cd/ids/developer/asmo-na/eng/20456.htm , Pacific Data Works, LLC, downloaded 7/7/2008, 7 pp.	<input type="checkbox"/>
20	"Frequently Asked Questions About Authenticode," Microsoft Corporation, updated February 17, 1997	<input type="checkbox"/>
21	"WWWProxyto Cut Off Java," by Carl Claunch (April 12, 1996)	<input type="checkbox"/>
22	"Combating Viruses Heuristically," by Frans Veldman (September, 1993)	<input type="checkbox"/>

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23	"MCF: A Malicious Code Filter," by Lo, et al. (May 4, 1994)	<input type="checkbox"/>
24	Anti-Virus Tools and Techniques for Computer Systems by Polk, et al. (1995)	<input type="checkbox"/>
25	"Dynamic Detection and Classification of Computer Viruses Using General Behaviour Patterns," by LeCharlier, et al. (July 2, 1995)	<input type="checkbox"/>
26	"Towards a Testbed for Malicious Code Detection," by Lo, et al. (1991)	<input type="checkbox"/>
27	"Blocking Java Applets at the Firewall," by Martin, et al.	<input type="checkbox"/>
28	Virus Detection and Elimination by Rune Skardhamar (1996)	<input type="checkbox"/>
29	Computer Viruses and Anti-Virus Warfare by Jan Hruska (1992)	<input type="checkbox"/>
30	"Active Content Security," by Brady, et al. (December 13, 1999)	<input type="checkbox"/>
31	"Low Level Security in Java," by Frank Yellin	<input type="checkbox"/>
32	"Email With a Mind of Its Own: The Safe-Tcl Language for Enabled Mail," by Nathaniel Borenstein	<input type="checkbox"/>
33	"Mobile Agents: Are They a Good Idea?" by Chess, et al. (December 21, 1994)	<input type="checkbox"/>

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34	"Remote Evaluation," by Stamos, et al. (October, 1990)	<input type="checkbox"/>
35	"Active Message Processing: Messages as Messengers," by John Vittal (1981)	<input type="checkbox"/>
36	"Programming Languages for Distributed Computing Systems," by Bal, et al. (September, 1989)	<input type="checkbox"/>
37	"Scripts and Agents: The New Software High Ground," by John Ousterhout (October 20, 1995)	<input type="checkbox"/>
38	"The HotJava Browser: A White Paper"	<input type="checkbox"/>
39	The Java Virtual Machine Specification, Sun Microsystems (August 21, 1995)	<input type="checkbox"/>
40	"Security of Web Browser Scripting Languages: Vulnerabilities, Attacks and Remedies," by Anupam, et al. (January, 1998)	<input type="checkbox"/>
41	"ActiveX and Java: The Next Virus Carriers?"	<input type="checkbox"/>
42	"Gateway Level Corporate Security for the New World of Java and Downloadables" (1996)	<input type="checkbox"/>
43	"Practical Domain and Type Enforcement for UNIX," by Badger, et al. (1995)	<input type="checkbox"/>
44	"A Sense of Self for Unix Processes," by Forrest, et al. (1996)	<input type="checkbox"/>

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45	"Antivirus Scanner Analysis 1995," by Marko Helenius (1995)	<input type="checkbox"/>
46	"State Transition Analysis: A Rule-Based Intrusion Detection Approach," by Ilgun, et al. (March, 1995)	<input type="checkbox"/>
47	"Automated Detection of Vulnerabilities in Privileged Programs by Execution Monitoring," by Ko, et al. (1994)	<input type="checkbox"/>
48	"Execution Monitoring of Security-Critical Programs in Distributed Systems: A Specification-Based Approach," by Ko, et al. (1997)	<input type="checkbox"/>
49	"Classification and Detection of Computer Intrusions," by Sandeep Kumar (August, 1995)	<input type="checkbox"/>
50	ThunderBYTE Anti-Virus Utilities User Manual (1995)	<input type="checkbox"/>

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EXAMINER SIGNATURE

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Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

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U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8079086		2011-12-13	Ederly, et al.	
	2	4562305		1995-12-31	Ji, et al.	
	3	5077677		1991-12-31	Murphy, et al.	
	4	5263147		1993-11-16	Francisco, et al.	
	5	5278901		1994-05-05	Shieh, et al.	
	6	5311591		1994-05-10	Fischer	
	7	5319776		1994-06-07	Rile, et al.	
	8	5359659		1994-10-25	Rosenthal	

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9	5361359		1992-08-31	Tajalli, et al.	
10	5398196		1995-03-14	Chambers	
11	5412717		1995-05-02	Fischer	
12	5414833		1995-05-09	Hershey, et al.	
13	5440723		1995-08-08	Arnold, et al.	
14	5452442		1995-09-19	Kephart	
15	5483649		1996-06-09	Kuznetsov, et al.	
16	5485409		1996-01-16	Gupta, et al.	
17	5485575		1996-01-16	Chess, et al.	
18	5524238		1996-06-04	Miller, et al.	
19	5579509		1996-11-26	Furtney, et al.	

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20	5606668		1997-02-25	Shwed	
21	5621889		1997-04-15	Lermuzeaux, et al.	
22	5623600		1997-04-22	Ji, et al.	
23	5623601		1997-04-22	Vu	
24	5638446		1997-06-10	Rubin	
25	5675711		1997-10-07	Kephart, et al.	
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Attorney Docket Number	FIN0001-CON1-CIP1-CON4

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Doyle, et al., "Microsoft Press Computer Dictionary," Microsoft Press, 2nd Edition, pp. 137-138,1993	<input type="checkbox"/>

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	Attorney Docket Number	FIN0001-CON1-CIP1-CON4

46	Amendment and Response to Office Action (Dated July 23,2012) Under 37 C.F.R. 1.111 filed October 23,2012 for Application Serial No. 13/290,708,9 pp.	<input type="checkbox"/>
47	Final Office Action, dated January 7,2013, for Application Serial No. 13/290,708, 7 pp.	<input type="checkbox"/>
48	Judgment, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., C.A. No. 10-cv-593 (GMS)	<input type="checkbox"/>
49	Finjan's Opposition to Sophos' Renewed Motion For Judgment as a Matter of Law, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., C.A. No. 10-cv-593 (GMS)	<input type="checkbox"/>
50	Finjan's Opposition to Symantec's Motion For Judgment as a Matter of Law at the Close of Evidence, dated December 21,2012, filed in Finjan, Inc. v. Symantec Corp., Sophos, Inc., and Websense, Inc., CA. No. 10-cv-593 (OMS)	<input type="checkbox"/>

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	Filing Date	2011-11-07
	First Named Inventor	EDERY, Yigal
	Art Unit	2431
	Examiner Name	REVAK, Christopher A
	Attorney Docket Number	FIN0001-CON1-CIP1-CON4

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

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Signature	/Dawn-Marie Bey/	Date (YYYY-MM-DD)	2013-05-07
Name/Print	Dawn-Marie Bey	Registration Number	44,442

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Amanda Bayliss
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
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Application Type:	Utility under 35 USC 111(a)

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US005809230A

United States Patent [19] Pereira

[11] Patent Number: **5,809,230**
[45] Date of Patent: **Sep. 15, 1998**

- [54] **SYSTEM AND METHOD FOR CONTROLLING ACCESS TO PERSONAL COMPUTER SYSTEM RESOURCES**
- [75] Inventor: **J. L. A. Pereira**, Buford, Ga.
- [73] Assignee: **McLellan Software International, LLC**, Atlantic, Ga.
- [21] Appl. No.: **587,143**
- [22] Filed: **Jan. 16, 1996**
- [51] Int. Cl.⁶ **G06F 11/00**
- [52] U.S. Cl. **395/186**
- [58] Field of Search 395/186, 187.01, 395/188.01, 183.12, 652; 380/3; 364/286.5

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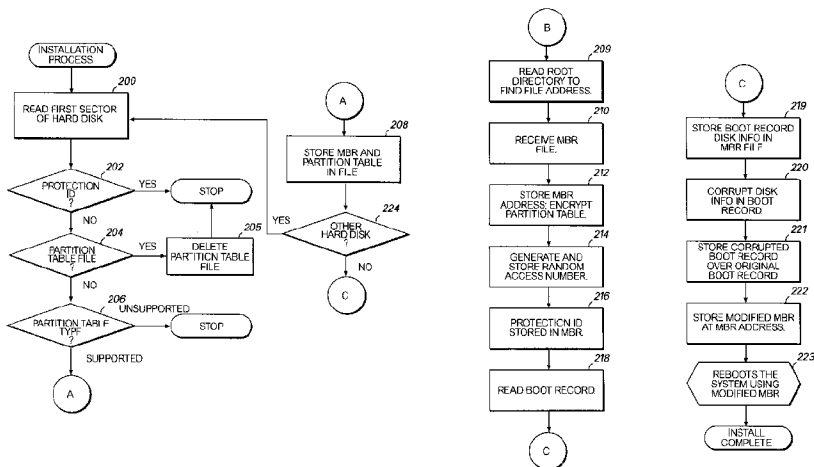
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Assistant Examiner—Scott T. Baderman
Attorney, Agent, or Firm—Morris, Manning & Martin, L.L.P.

[57] **ABSTRACT**

A system and method for controlling access to computer resources of a computer is disclosed. The access control program preferably includes a plurality of program components, which may be terminate stay resident (TSR) programs, for intercepting interrupt service calls. The interrupt service calls are verified to determine whether the user is authorized for the resource requested in the service call. The program components use files containing a list of authorized resources for the computer user. These files are, preferably, used at system initialization to modify the system resource files used by the operating system to identify program and program groups which are displayed to a user. A boot protection program is also disclosed which may be installed with the access control program to prevent a boot program stored on media within the diskette drive from acquiring control of the system during system initialization. The boot protection program corrupts the master boot record, boot record and partition table so that other boot programs do not have sufficient information to initialize the system. The master boot program is modified to access this requisite information elsewhere during system initialization.

18 Claims, 10 Drawing Sheets



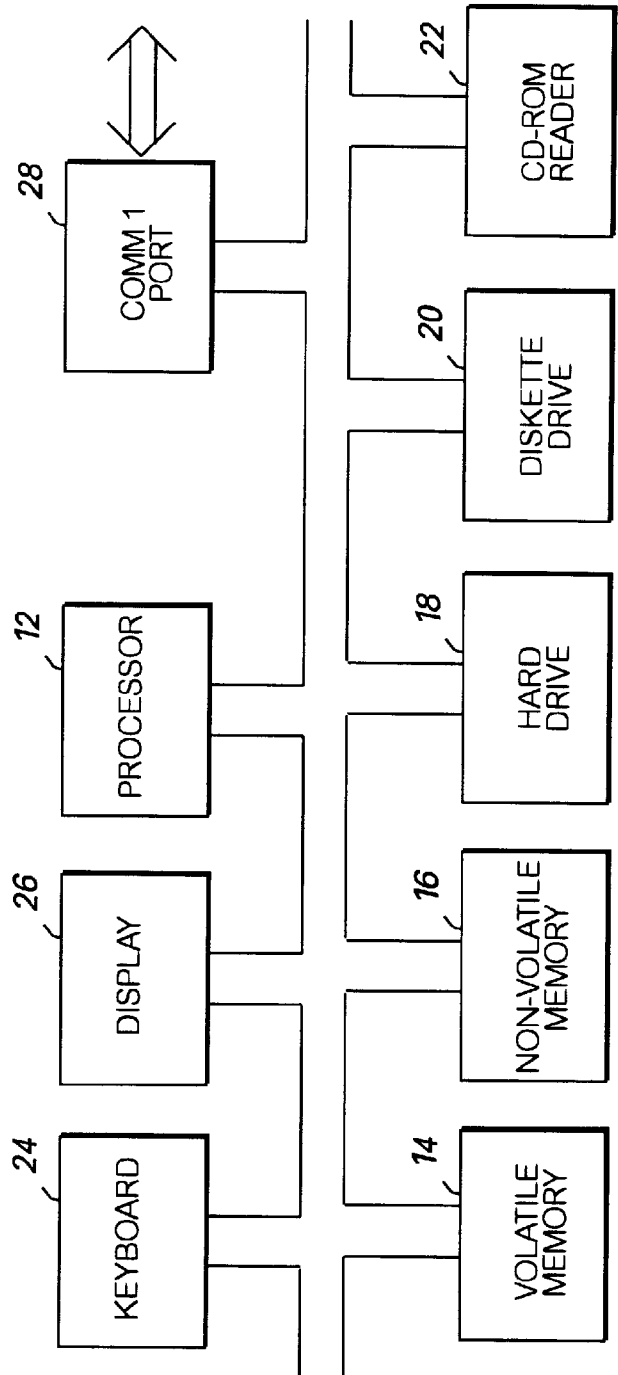


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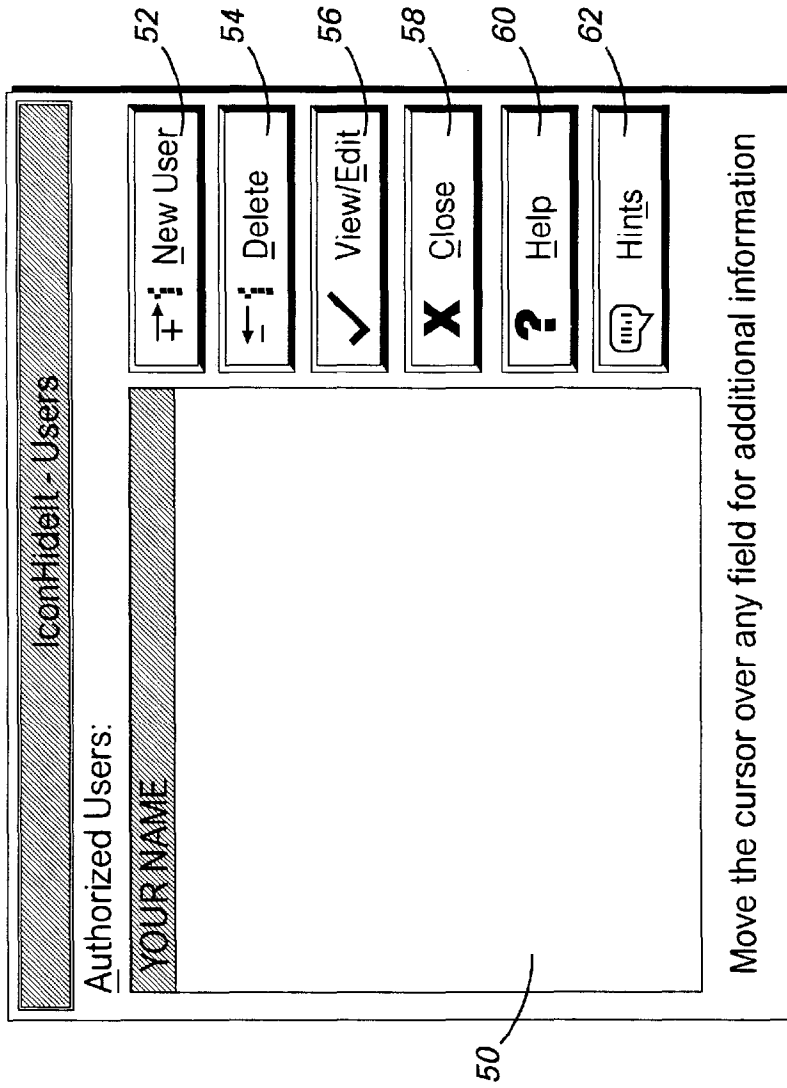


FIG. 2

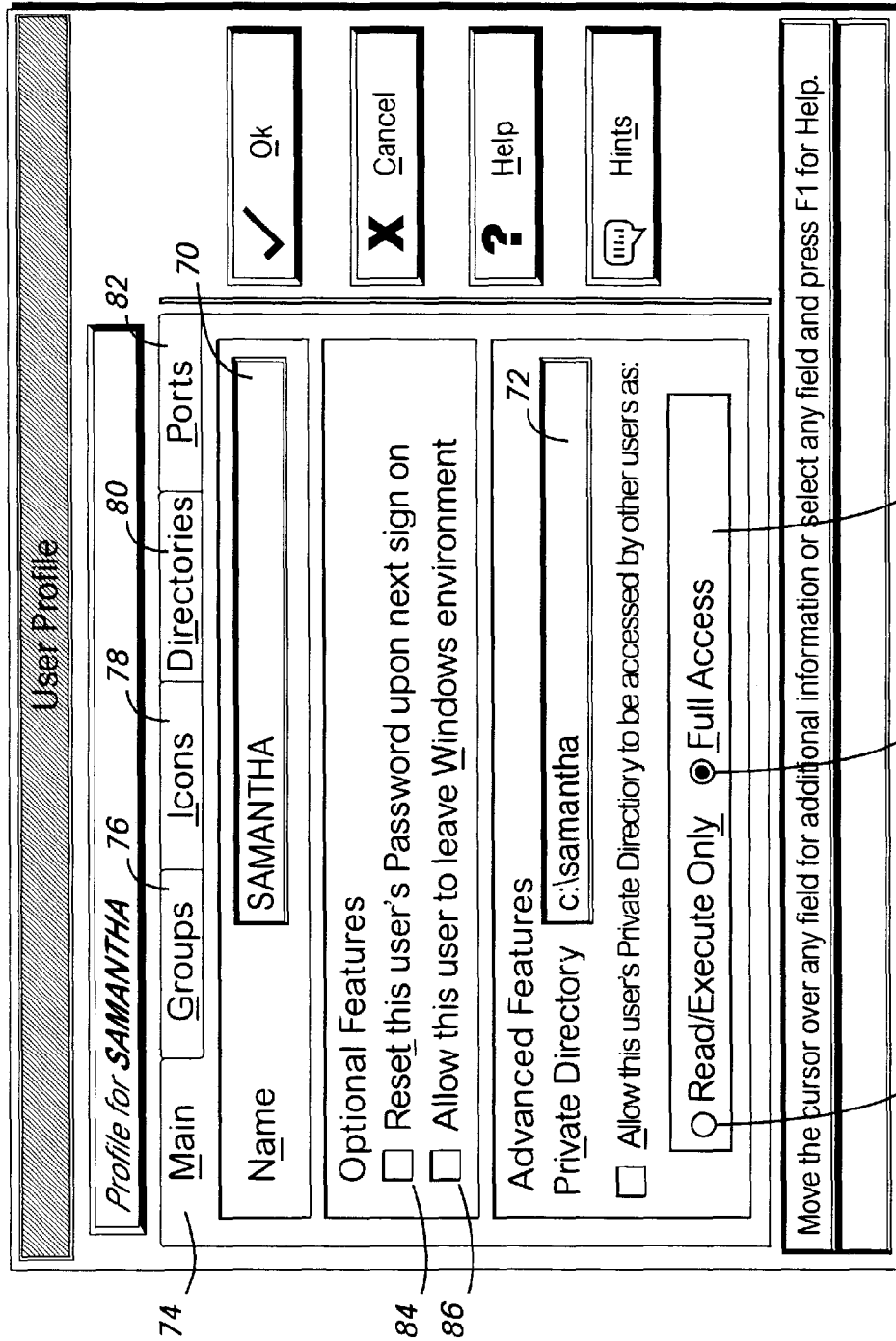


FIG. 3

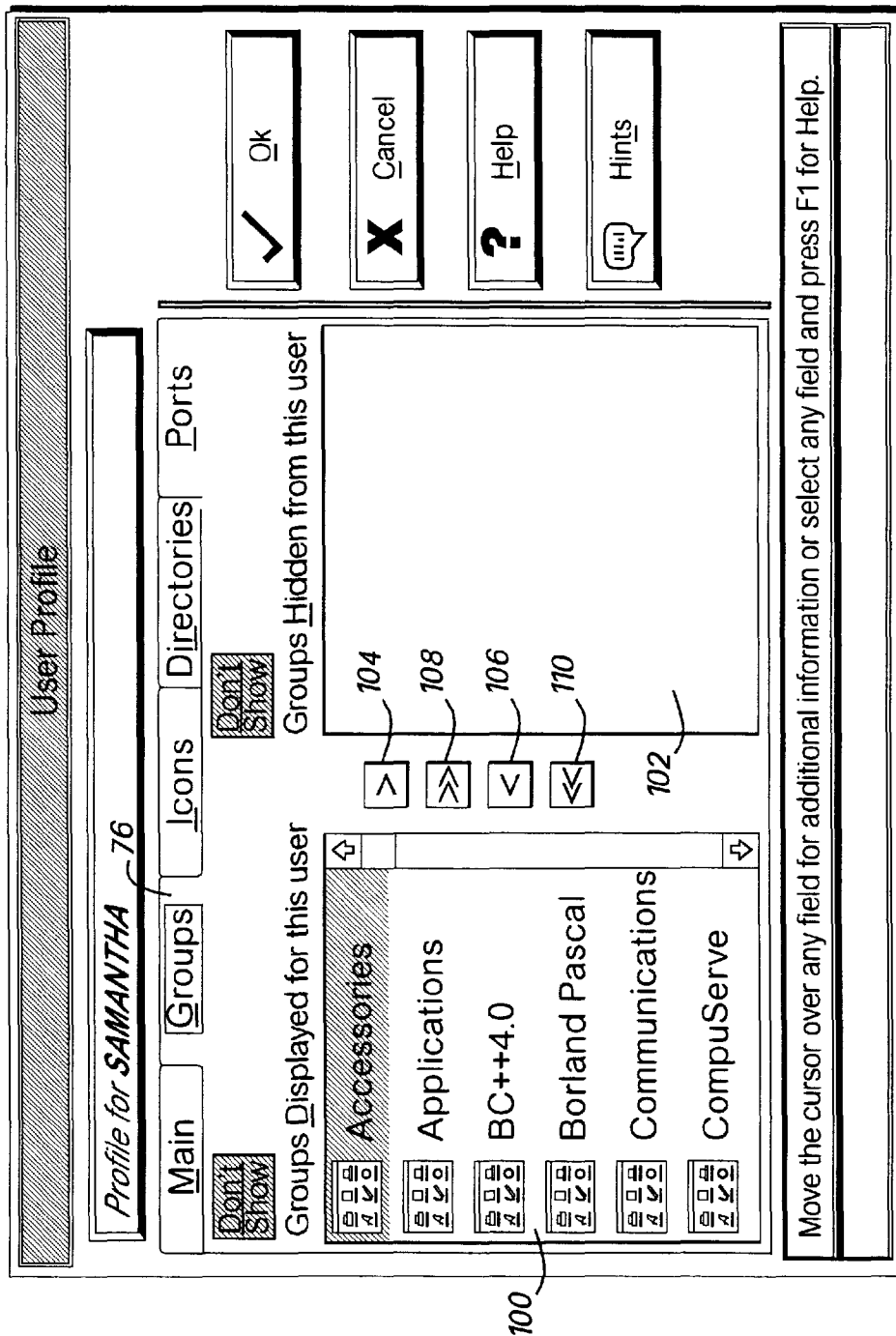


FIG.4

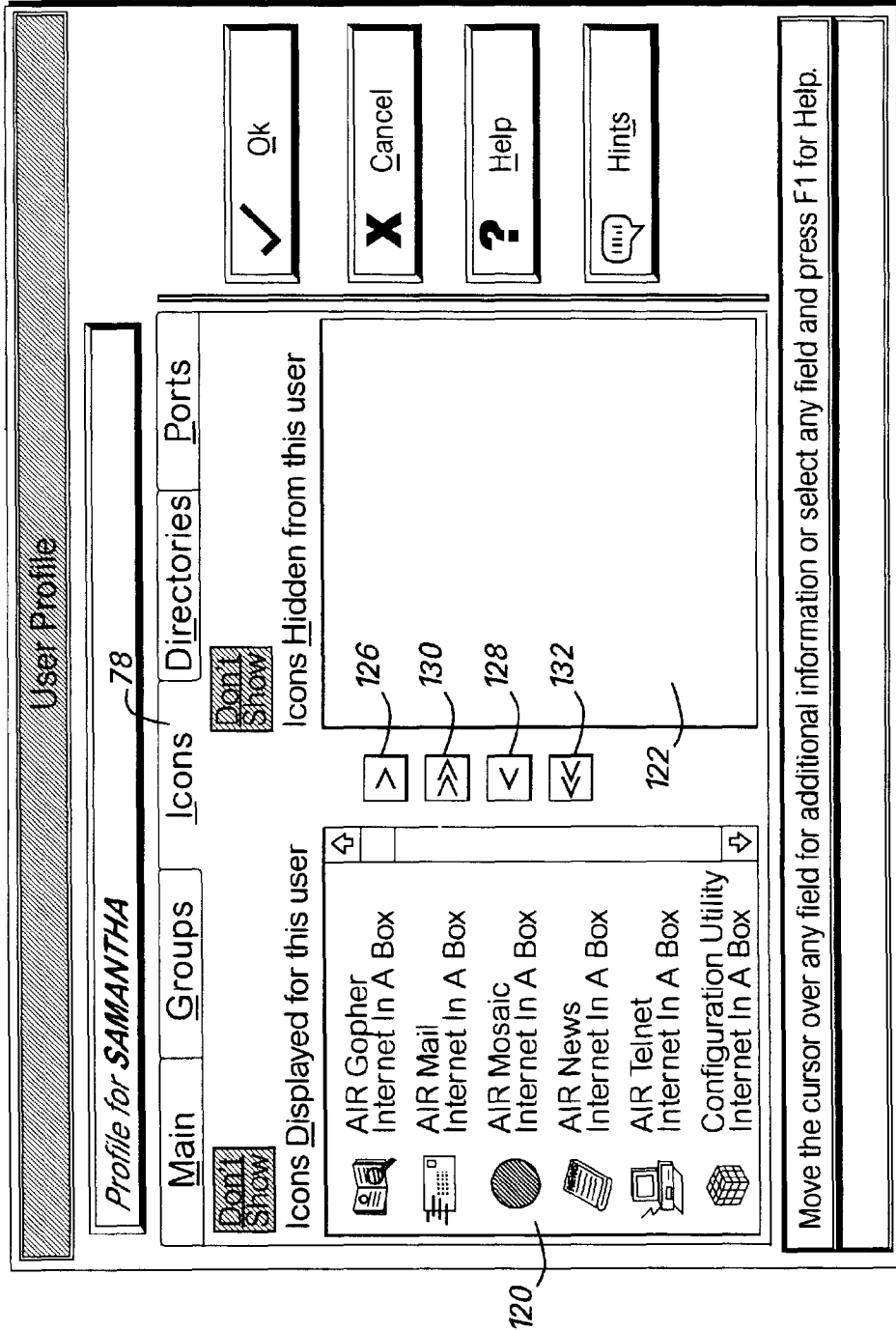


FIG. 5

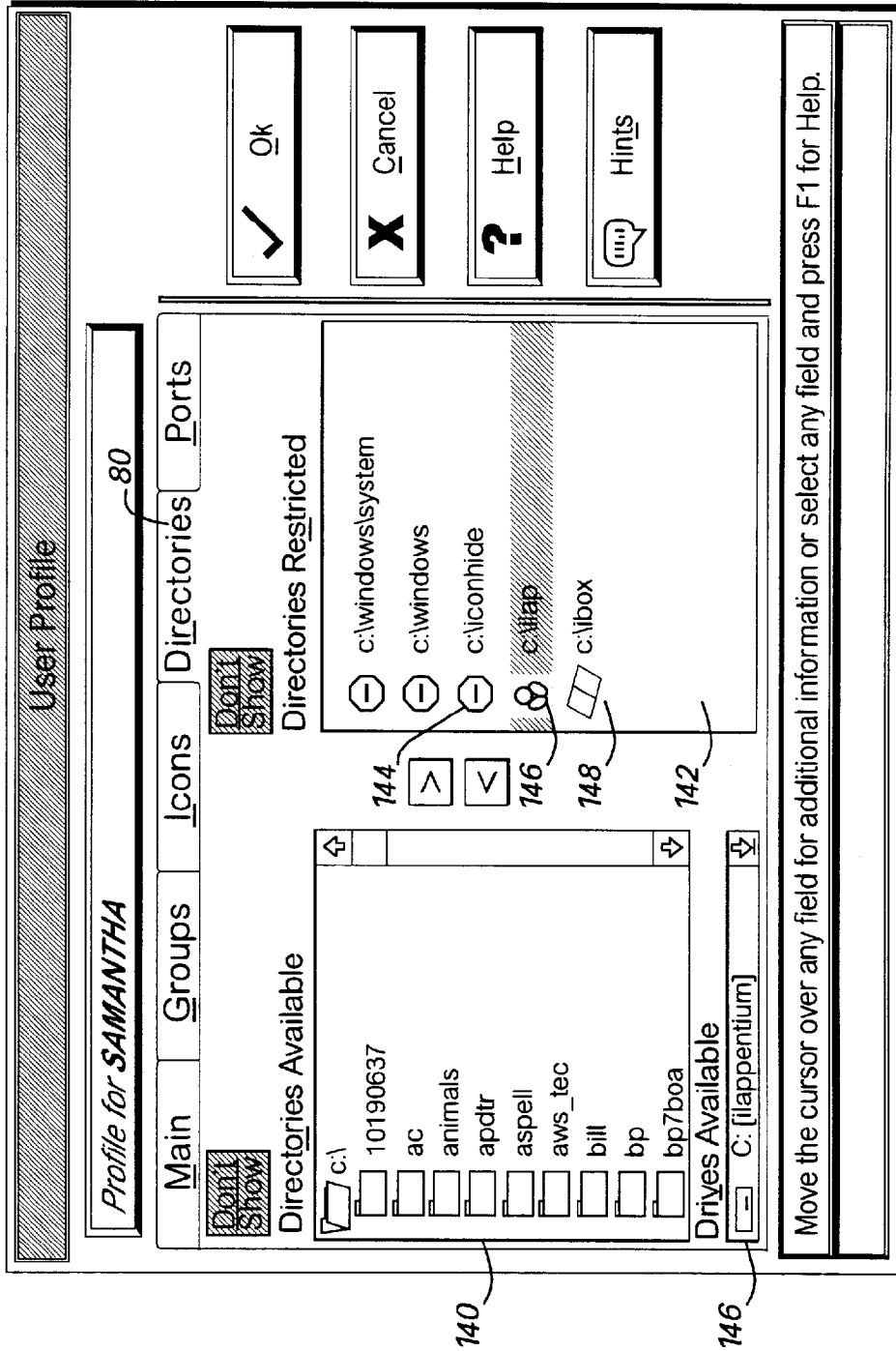


FIG. 6

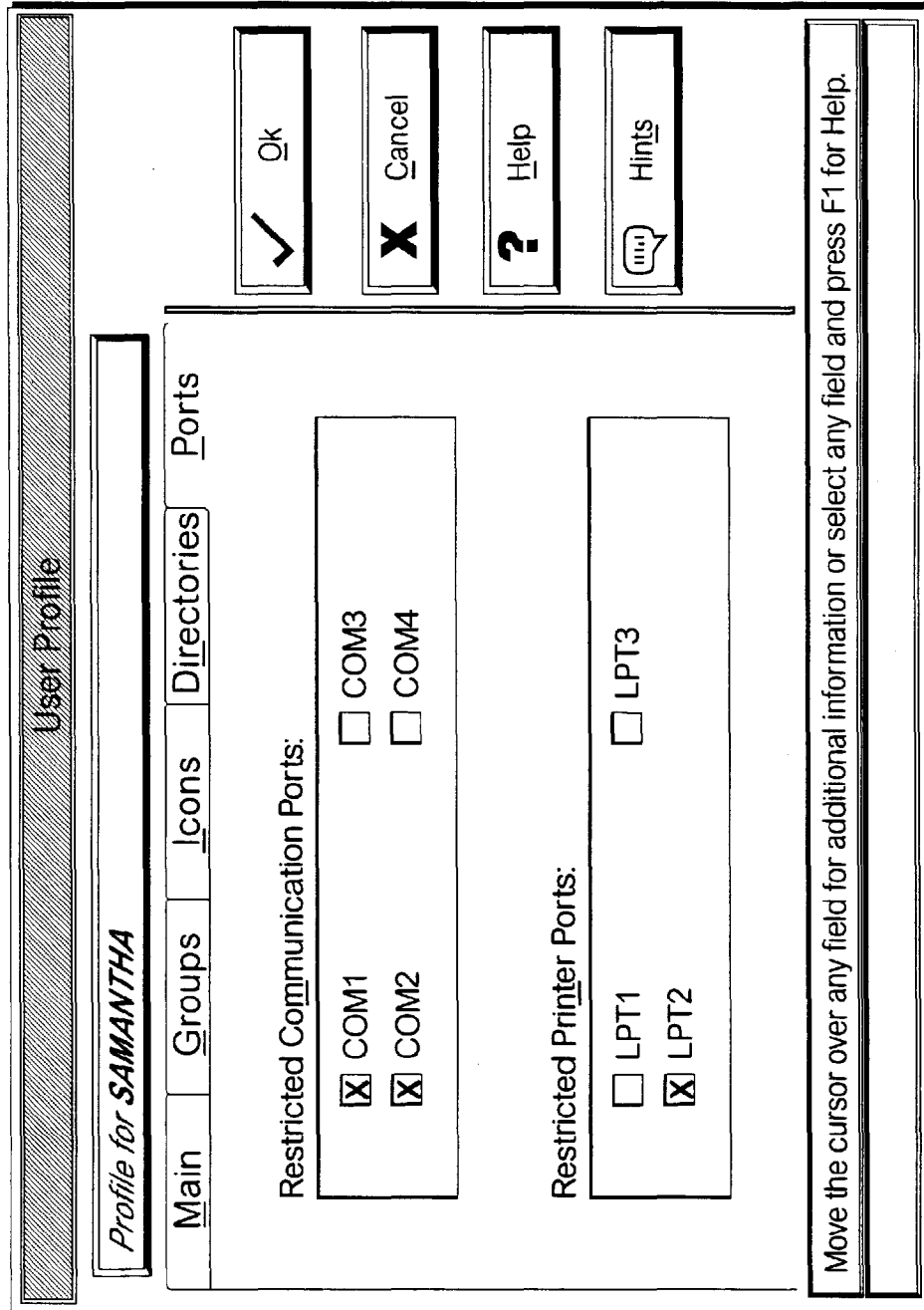


FIG. 7

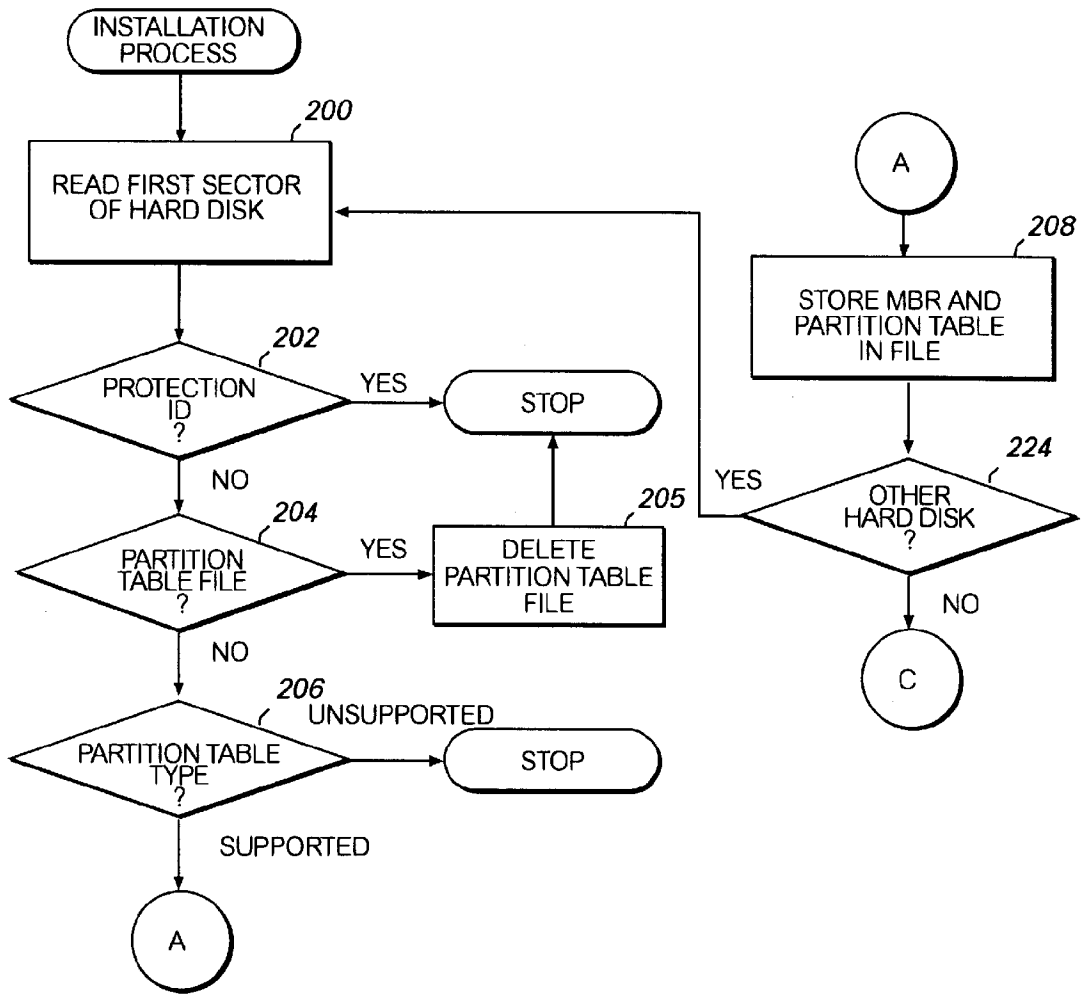


FIG.8A

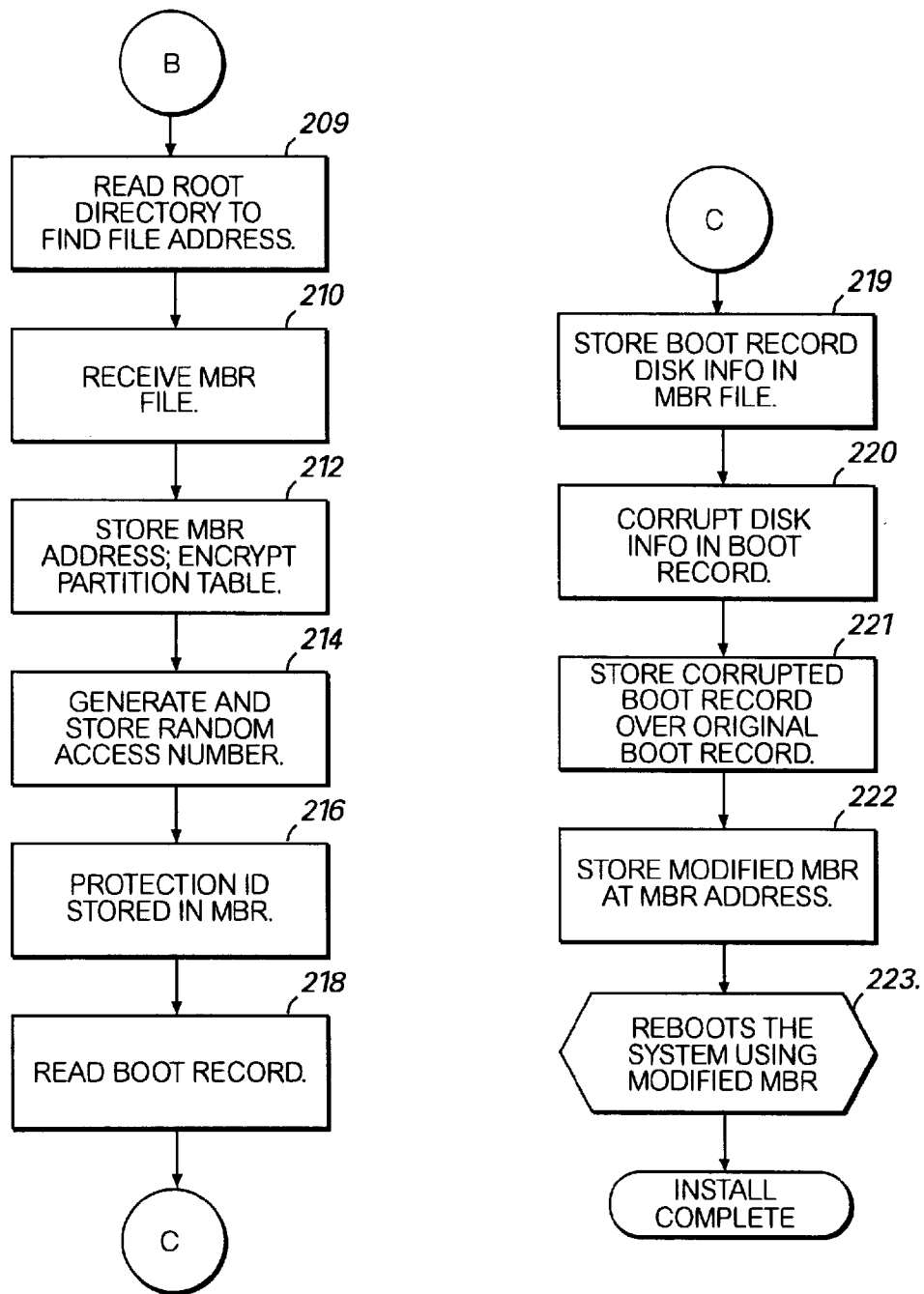


FIG.8B

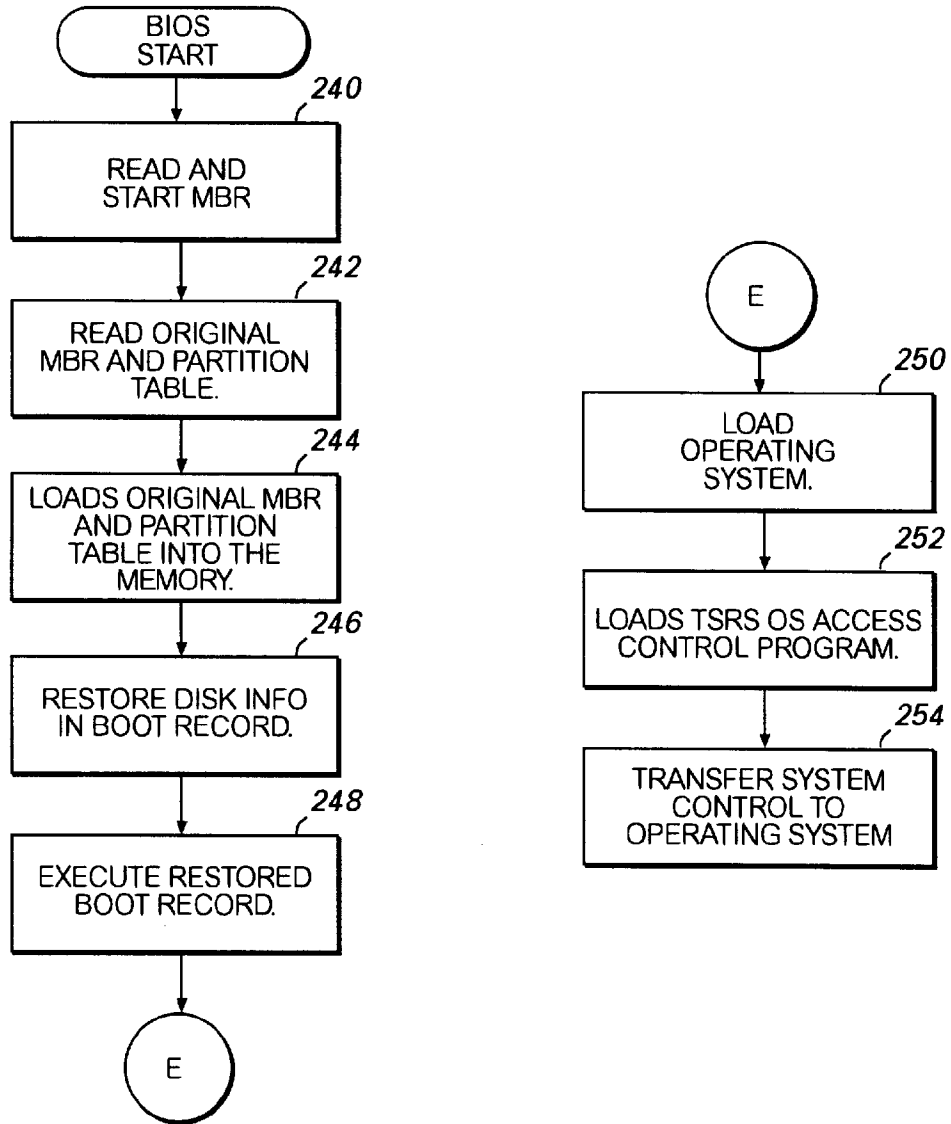


FIG. 9

SYSTEM AND METHOD FOR CONTROLLING ACCESS TO PERSONAL COMPUTER SYSTEM RESOURCES

FIELD OF THE INVENTION

This invention relates to control of local resources on a personal computer and, more particularly, to control of user authorization and access to local resources on a personal computer.

BACKGROUND OF THE INVENTION

The personal computer, or PC, was first introduced in the early 1980s. These systems generally include a hardware platform of a processor, memory and input/output peripherals that support local resources such as a display monitor, keyboard, hard disk drive, a diskette drive and communication ports. This hardware platform is controlled by an operating system. The operating system is software which controls the interaction between a user and the local resources. Usually this control is performed by controlling the communication interface between utility programs for the local resources and application programs executing on the system.

The number and type of application programs available for a user shortly after the introduction of the PC were not too many or diverse. As a result, the operating system for a PC generally permitted any authorized user to access any resource or file available on the system. However, as PCs proliferated, the number of companies which made software for the systems and the types of software offered for the systems also increased. For example, adult users began to use various financial analysis, organizational, and word processing programs to keep financial records, organize housekeeping or family schedule information and create documents for home and family functions. Adolescents used word processing programs and resource programs such as multimedia encyclopedias to generate reports for school. For younger children, programs for educational interaction or edutainment became commonplace. Thus, all members of a family had a use for the PC and began to need access to the system.

While all family members may have a need for access to the PC, not all members need access to all the resources on a PC. For example, the adults in a family have concerns that the bank records and check balancing files may be inadvertently destroyed by a younger member of the family. Thus, there is a need to segregate files for one user on a PC from the other users. One way to keep a user from accessing certain files is to keep the user from gaining access to the application program that modifies the content of the file. Programs which control access to application programs are known which require a user to enter a password before the operating system activates the program for the user. If the user does not enter the correct password, the requested program is not activated. Without being able to use the program that manipulates the file contents, the user is discouraged from trying to access a particular file.

There are a number of limitations to this protection scheme. For one, all users see all of the application programs that are available on the system. Of course, if a user does not know the password for a program, the user quickly learns that the program is not accessible. For some users this may be satisfactory, however, some inquisitive and talented users may consider the denial of access to a program a challenge. The attempts of such users to circumvent the protection program may result in damage beyond the few files to which

the user was being denied access. Another limitation is that the user may legitimately need access to an application file but not to all of the files which may be manipulated by the application program. For example, an adolescent user may require access to the word processing program to generate a paper for school but not the letter containing details of a personal matter being discussed with a counselor for another member of the family. Programs which use a password to limit access to a file are also known but these programs also notify a user of his or her unauthorized status for the file which may result in attempts to break the access lock. Accordingly, there is a need for denying access to programs or files on a PC without informing the user of the denied access or of the program's or file's existence.

Recently, interest in the Internet and the World Wide Web (WWW) has resulted in millions of PC users purchasing subscriptions to Internet services, browsers for viewing Web sites and high speed modems for downloading files to a PC. While the information services available over the Internet and WWW can be a useful educational supplement to the programs already available on a user's system, there are also sites and services which are not desirable for all members of a family. For example, sexually explicit sites are accessible over the Internet and WWW. Also, some discussion or talk groups may be used by unscrupulous people to contact adolescents or young children so they may later meet the adolescents or children without adult supervision. Thus, there is a need for controlling which users may access the programs and communication resources required for Internet and WWW access.

Granting a user access to certain programs or files should not mean that the user's access rights are unqualified. For example, a parent may wish to deny access to the game programs available on a PC during the afternoon hours for a school age family member but would like to encourage the use of the PC for preparation of the student's work. However, the parent may want to grant access to the games after completion of the student's homework as a reward for a job well done. Currently, a parent would not be able to achieve such time selective control over the programs, files and resources of a PC in an automatic manner.

Some users, who become aware of resources to which they are denied access, attempt to circumvent access control systems and methods by aborting operating system operation and rebooting the system. The user may then attempt a number of methods for obtaining access to the denied resource. One method is to let the reboot proceed until the operating system is loaded but terminate the reboot before the user interface program begins execution. Usually the user interface or some program associated with it performs the access control function. By terminating the reboot prior to the user interface activation, a user knowledgeable about operating system commands may use the operating system to explore the resources available on the system. The user may even be able to modify the access control program to grant the user rights to resources previously denied to the user. Another method of obtaining unauthorized access is to place a system disk containing a system initialization program written by the user in the diskette drive of the system. Most PCs examine the diskette drive for a system initialization program following execution of the Basic Input and Output System (BIOS) program. The BIOS program is a low level program that initializes and verifies basic input and output functions of the PC and then relinquishes control for the remainder of system initialization. If the user's system initialization file on the diskette drive is executed before the initialization file on the hard disk is started, then the user

may prevent the user interface and access control program from being executed.

One known way of preventing a system boot from a diskette drive is to install an extended BIOS card and program. Such cards and programs are set forth in U.S. Pat. Nos. 4,951,249 and 5,113,442. These devices modify the interrupt vectors for the hard disk and keyboards so that the new routines executed in response to these interrupts do not permit a user to gain unencumbered access to the operating system or hard drive. While these devices may be effective, they both require an expansion card which must be inserted in the expansion card bus. Thus, these devices take a card slot which may be otherwise used to enhance the performance of the PC. Additionally, such devices may be defeated by powering down the system and simply removing the expansion card. What is needed is a way of preventing a system boot from a diskette drive without adding a hardware component to the system which may be removed to defeat the system.

At the time that PCs were introduced into the market place the Disk Operating System (DOS) was frequently used for the systems. Because many users found DOS commands cryptic or difficult to understand, user interfaces which communicated between a user and DOS were developed. The interface which is installed in many, if not most, of the PCs today is the Windows program interface from Microsoft of Redmond, Washington. The Windows program facilitates a user's interaction with a PC because it permits a user to activate programs by simply placing a cursor over an icon by using a mouse and activating the program by depressing a button on the mouse. Selections within a program are provided by the Windows program in like manner through a Graphical User Interface (GUI). Thus, many PC users view Windows as an operating system, even though it is an interface between GUI and DOS programs. However, some users see Windows as an unsecured access port to a PC. To gain access to the PC, such users abnormally terminate a program or terminate the execution of the Windows program itself, to gain access to DOS. Since these users are familiar with DOS, they may then investigate the PC and its resources without intervention from an access control component of the Windows program. What is needed is an access control program that is seamless across the Windows/DOS interface.

As can be ascertained from the discussion above, there is a need for a PC access control system and method that can limit each user to a predefined set of resources on the PC without informing the user of the resources not available to the user. There is a need for a PC access control system and method that permits time selective control over a PC's resources. There is also a need to prevent a system boot from a program stored on media in the diskette drive of the PC. There is also a need for a PC access control system and method which provides seamless access control over a Windows/DOS interface in a PC.

SUMMARY OF THE INVENTION

The above limitations of previously known PC access control systems are overcome by a system and method implemented in accordance with the principles of the present invention. The method of the present invention includes the steps of storing a user identifier and a list of computer resources for each user of a PC system, displaying only the computer resources in the list corresponding to the user identifier for the user active on the PC system so that the user active on the PC system only sees the resources which the

user may access, and limiting said active user's access to the computer resources in the list of computer resources stored with the user identifier.

This inventive method does not indicate to a user on a PC system the other resources on the system which are not accessible by the user. Accordingly, there is a reduced likelihood that the user knows what other resources are on the PC system and this in turn reduces the likelihood that the user will attempt to gain access to the other resources on the system. On PCs implementing a Windows program type interface, the list of the computer resources are preferably kept in files which are used to modify Group and INI files through the Dynamic Data Exchange (DDE). The modified system files are used to display group and program icons which may be activated by a user to launch a program. Once the system files have been modified, the access control program prevents a user from restoring the deleted group displays and programs to the system files. Thus, the user cannot restore deleted group displays and programs even if the user knows the file names for deleted resources. To restore the system files for the next user, the method of the present invention encrypts and stores an unabridged version of the system files which contain all of the groups and programs which are available on the system to a user having no limitations. At the system start-up for each user, the method retrieves and decrypts the unabridged version and deletes those programs and groups not contained in the corresponding list for the user. In this way, the system may be configured to only display the authorized resources for each user without losing a reference to all programs and groups possible on the system.

The method of the present invention is preferably implemented with three program components. One program component maintains a memory map for the address space for which a user is authorized. A second program component monitors all DOS or Windows file management access calls and verifies whether the user is authorized to access a file, directory, drive, or port. A third program component monitors all BIOS functions and verifies whether the requested access is authorized. As a result, system calls which a knowledgeable user may attempt to execute through user written programs, abnormally terminated programs, DOS or Windows system calls, or BIOS functions are trapped by one of the program components. The program components respond with error messages for resources for which the user is not authorized. An additional benefit of this preferred implementation is that each program component verifies the existence of the other two program components whenever one program component is executed. This protects against a user modifying one program component in an effort to circumvent the system. Whenever an uncorrupted program component executes, it would detect the change in the other program components and immediately execute a system reset. The initialization following system reset restores the program components from the hard disk. Most preferably, the program components in the Windows 3.x environment are implemented with terminate stay resident (TSR) programs while virtual device drivers (VxD) programs are used in Windows 95 systems.

The system of the present invention also uses the DOS Protected Mode Interface (DPMI) to restrict access to a user regardless of whether DOS or the Windows interface program is operating. Normally, DOS and Windows programs execute in mutually exclusive address spaces. For that reason, an exit from the Windows operating environment would cause the DOS programs to execute without access to the restricted use lists that had been used in the Windows

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environment. However, the program component that implements the operating environment change provides the addresses of the program component memory space to the DPMI of the Intel or Intel equivalent processor. This permits the program components to continue to execute with access to the restricted lists even though the operating environment has changed.

The method of the present invention may be further supplemented by a boot program protection method which prevents a boot program stored on media within a diskette drive from initializing the system. The boot program protection method includes storing the master boot record and partition table of the PC system hard drive in a non-standard location on the hard drive. This means that a system initialization program implementing the method of the present invention knows where to access the master boot record and partition table to initialize the system. To further frustrate a user boot program which may attempt to intervene during system initialization, the method of the present invention removes hard disk size and format data from the boot record and encrypts the partition table at the standard location on the hard disk. At system initialization, the master boot record restores the boot record as it can ascertain the location of files on the hard disk needed for system startup such as CONFIG.SYS and others. This software only protection scheme is more simple to install and more difficult to defeat than the previously known methods which require the addition of an expansion card or the like.

The system of the present invention includes a computer program that resides on the hard disk of the PC system. The program includes a primary user module which is used by the person installing the program to define the programs, files, directories, times of access, and hardware resources which may be accessed by each user. These files each contain a user identifier and list of computer resources defined as being accessible by the user. These files are encrypted and stored at locations on the hard drive only known to the access control program. Since the access control program may also implement the boot program protection method as well, there may be further difficulty in another being able to ascertain the location of the list files on the hard disk. The program also includes a startup module which is activated during system startup once a user has been authorized for system startup. The startup module uses the identifier corresponding to the authorized user and retrieves the corresponding list of computer resources. This list is then used to modify the system files for the user. These modified files are then stored in memory to be accessed by the access control program. Thereafter, only the programs and groups for which the user is authorized are displayed. Further, any system call for a resource or directory is trapped by one of the Program components of the access control program which sends an error message in response to a request for an unauthorized resource.

Thus, the method and system of the present invention provides an access control program for a PC that may be tailored to limit access to programs, files and other resources of the PC differently for each user. Furthermore, the system maintains a list of the authorized resources for each user regardless of whether the Windows interface or DOS system is the active user interface. The invention may also include a boot protection feature which reduces the likelihood that a user may interrupt system initialization and gain unauthorized access to the PC operating system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a system in which the present invention is implemented;

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FIG. 2 is an illustration of an exemplary display of the manage user function;

FIG. 3 is an illustration of an exemplary display of a user profile;

FIG. 4 is an illustration of an exemplary display of a program group access function;

FIG. 5 is an illustration of an exemplary display of a program icon access function;

FIG. 6 is an illustration of an exemplary display of a directory access function;

FIG. 7 is an illustration of an exemplary display of a port access function;

FIG. 8A and 8B are flow charts of the process to install a hard disk protection program which operates in accordance with the principles of the present invention to reduce the likelihood that a boot program stored on media in a diskette drive can be used to initialize the system of FIG. 1; and

FIG. 9 is a flow chart of how the hard disk protection program controls system initialization and transfers control to the access control program.

DETAILED DESCRIPTION

A personal computer or PC system in which the method and system of the present invention is implemented is shown in FIG. 1. The system 10 includes a processor 12, volatile memory 14, non-volatile memory 16, and I/O peripherals 18-28, all of which are coupled together by a system bus 34. Some of the I/O peripherals generate interrupts which cause the processor to transfer program control to a predefined location for interrupt processing and eventual transfer to a routine for servicing the peripheral which generated the interrupt. For example, an interrupt generated by a hard disk typically causes the processor to transfer program control to address 21H. There the environment of the program currently being executed is saved on the system stack behind the address of the next instruction to process in the interrupted program. Control is then transferred to a hard disk service routine which performs the input or output operation which resulted in the interrupt. Thereafter, the environment of the interrupted program is restored, interrupts reenabled and control transferred to the next instruction address previously stored on the stack.

The system 10, in which the system and method of the present invention is used, is preferably a personal computer (PC) in which the processor 12 is preferably an Intel 80286 or better or equivalent thereof which implements a DOS Protected Mode Interface (DPMI). Additionally, the method of the present system is preferably implemented in the assembler language for processor 12. The assembled code for the program components used to implement the method, discussed in more detail below, is stored in files which are stored on hard disk 18. Preferably, these files are read from hard disk 18 at system initialization and loaded into memory for the DOS operating system or Windows interface program. As known in the art, the memory space of the system is divided so the DOS operating system memory space is mutually exclusive of the memory space used by the Windows interface program. Accordingly, the method of the present invention preferably uses the DPDI to make active the memory in which the program components of the present invention are loaded regardless of whether DOS or Windows is executing. Preferably, the program components of the access control program of the present invention are terminate stay resident (TSR) programs in the Windows 3.x environment and virtual device drivers (VxD) programs in a Windows 95 system.

At system power up, the processor begins system initialization by transferring control to a program which verifies the operational status of system memory and the basic input and output operations of the system. Such programs are well known and are generally called BIOS programs. Upon completion of the BIOS program, the system may execute BIOS extensions programs which verify certain expansion devices for the system or control may be transferred to a system initialization file on a user's diskette or hard drive. The system initialization file probably continues by verifying that the user bringing up the system is authorized for use of the system. If the user is authorized, installation of the programs necessary for the operating system and the user interface continues. Control is then transferred to the user interface so the user may begin to select programs for execution and use. If the user is not authorized for system use, the system initialization program denies the user access. After a predetermined number of attempts to gain access have failed, the program aborts system initialization.

Preferably, the resource control system and method of the present invention are implemented by an access control program which is installed on the PC once a user is given access to the system. The program is typically provided on a diskette which is placed in the disk drive of a PC system. The diskette is provided with an installation program which creates a directory for the access control program on the user's hard disk drive. The files containing the program components are then copied into this directory. Part of the installation procedure is to insert commands into a system initialization file, such as the AUTOEXEC.BAT file, before the command which activates an operating system or Windows interface program. These commands activate the program components of the access control program before the operating system or Windows interface program is activated at system initialization. After the access control program is installed, the program requests the user to register as the Primary User and to identify a password. This password is used to identify the Primary User at subsequent logins. After installation of the program and registration of the Primary User, only the Primary User may thereafter install software on the PC, upgrade the access control program or uninstall the access program.

Now the Primary User may use the access control program to add users, define the application programs accessible for each user, and restrict the directories, drives, communication ports and printer ports available for the users. Additionally, the Primary User may allow selected users to be able to exit the Windows interface program and operate within the DOS environment.

To identify or add users to the PC, the Primary User selects the manage users program component. This program component causes a display of the Primary User's name and any other users currently on the system. An exemplary display is shown in FIG. 2. The Primary User may view a list of authorized users in window 50. To add a user, the primary user activates the new user function which causes the display of FIG. 3 to appear so the primary user can enter the user's name and resource parameters. The display of FIG. 2 also includes function buttons for deleting a user (54), viewing or editing a user's profile (56), and closing the manage user function (58). A help function (60) and hint function (62) are also provided to facilitate the primary user's use of the function. In response to the closing of the manage users function, the access control program generates a file of authorized user identifiers and, as each user supplies a password, the file is updated with each user's corresponding password. This file is used by the access control program to limit access to the system to authorized users only.

By activating the view/edit function, the Primary User may also then activate a folder corresponding to one of the previously authorized users. Preferably, the folder is opened by highlighting the user's identifier in window 50 and clicking the mouse cursor over the view/edit function. An exemplary folder for a user is shown in FIG. 3. As shown in FIG. 3, the folder includes a window for the user's name (70) and a private directory (window 72) for the user, if one has been identified by the Primary User. The folder preferably includes five tabs which identify the authorized resources for a user. These tabs include main (74), groups (76), icons (78), directories (80) and ports (82). The main tab is used to identify a directory where a user may keep files which are inaccessible to other users. If the Primary User enters a directory within the private directory window 72, the access control program creates the directory for the user. The Primary User may also indicate whether the user's password is to be reset (window 84), whether the user shares the private directory with another (window 88), and whether the user may leave the Window's environment to operate the DOS environment (window 86). A user must assign a password to his or her user name at the first sign-in following addition of the user's name to the user list otherwise the access control program does not give the user access to the PC system. If the user's directory is going to be shared with other users, the Primary User may specify whether the user's private directory may be only read by others (windows 90) or whether others may be able to read and modify the contents of files in the user's private directory (windows 92).

Upon selecting the tab groups 76, the Primary User is presented with a display of application program groups. An exemplary display of application program groups is shown in FIG. 4. Any of the application groups shown in the left-hand window 100 entitled Groups Displayed for this user are available to that user. Conversely, program groups shown in the Groups Hidden from this user window 102 are not available to that user. To move a program from one category to the other, the user may use the mouse cursor to highlight a program group and then click on to the right pointing arrow 104 to transfer the selected program group to the Groups Hidden window 102 or the reverse may be achieved by selecting a program group and clicking on the left pointing arrow 106 to transfer the selected program group to the Groups Displayed window 100. The double arrow buttons 108 and 110 shown in the exemplary display are preferably used to transfer all of the application groups from one window to the other window. In response to defining the program groups to be displayed and hidden, the access control program generates a file identified by the user's identifier which identifies a list of program groups which are not displayed for user selection.

By activating the icons tab 78, the Primary User is presented with a display of the program icons for the previously selected program group. An exemplary display of program icons is shown in FIG. 5. Again, the Primary User may transfer programs from the Icons Displayed window 120 to the Icons Hidden window 122 or from the Icons Hidden window 122 to the Icons Displayed window 120 using arrow functions 126, 128, 130 and 132 in a manner similar to that discussed above with respect to FIG. 4. In response to defining the program icons to be displayed and hidden, the access control program generates a file identified by the user's identifier which identifies a list of program icons which are not displayed for user selection.

By activating the directories tab 80, the directories on the system are displayed. The directories which may be accessed by a user and those which are not accessible by a

user are shown in the display. An exemplary display for this program component is shown in FIG. 6. Again, directories and subdirectories may be transferred from the Directories Available window **140** to Directories Restricted window **142** by the method described above with respect to the group and icon windows. Certain directories in the Directories Restricted window **142** cannot be made available to a user. These directories are system directories for the operating system or Windows interface program and the access control program (which is identified in FIG. 6 as the C:\CONHIDE directory). Other directories may be made available to a user on a read only basis. While access to the other directories in the restricted list are completely restricted, the status of these directories may be changed by the Primary User. Preferably, a stop sign **144** is used to indicate the directories for which the restricted status cannot be changed, a lock symbol **146** is used to indicate restricted directories which cannot be accessed by a user, and an open book **148** which is used to identify the directories which are available to a user on a read only basis. Preferably, directory identifiers are limited to 255 characters to comport with the restrictions on directory path names imposed by the operating system or Windows interface program. To restrict a user's access to a drive, the drive is selected in the Drives Available window **146** and the root directory for the drive appears in the Directories Available window **140**. The root directory may then be transferred to the Directories Restricted window **142** to make the drive unavailable for the user. In response to defining the directories which may be accessed by a user, the access control program generates a file identified by the user's identifier which identifies a list of directories to which the user is denied access or whose access is limited to read only.

By activating the ports tab **82**, the ports program component generates a list of the communication and printer ports available on the system. An exemplary display is shown in FIG. 7. Those communication and printer ports which have an "X" in the window next to a port identifier, such as COM1, indicate that those communication and printer ports have been restricted from use for that user. In response to the definition of these ports as being restricted or not, the access control program generates a file identified by the user's identifier of ports to which the user is denied access.

The restricted lists for the groups, programs, directories, and ports are placed in files which are associated with a user's identifier. These files are then used by the access control program to modify system files when a user signs on the system. Specifically, after system initialization has been performed by the BIOS, control is transferred to the access control program. This program prompts the user for a user name and corresponding password. If the password and user name are verified, the files containing the lists of restricted groups, programs, directories, and ports are read by the access control program. The access control program uses the group and program lists to delete references to those files from the system files. In the Windows 3.x environment this is done by passing the lists to the dynamic data exchange (DDE) which causes the program manager to delete the specified resources from the Group and INI files. Thereafter, the only group folders and program icons which are displayed are those which were not deleted at user sign on. The access control program also monitors calls to the DDE and program manager to prevent the restoration of deleted resources to the system files by a user. The directory and port lists are used to generate tables for the program components of the access control program which control the I/O routines that interface with the drives and ports of the PC system.

These tables are maintained in memory with the program components and remain active regardless of whether the operating system or Windows interface program is executing since the DPMI is used to make the memory in which the program components are located accessible. When the program components trap a request for a directory or port, the I/O routine of the program component verifies that the requested directory or port is authorized for the user currently on the system.

In the Windows 95 environment, the access control program modifies the registry file since this file is used to define the computer resources which a user can access and which the Windows 95 program accesses to generate displays of program icons and program groups. Because Windows 95 performs its own user login procedure, the transfer from the login procedure to the access program is done differently. The login procedure in Windows 95 assigns the user a default user registry file if the user cannot enter a password that corresponds with a user's identifier or if the user aborts the login procedure. To prevent this default user from gaining control of the system, the access control program modifies the default user profile in the registry file so the default user is not authorized to use any system resources. If the user enters a corresponding password, however, the files identified by the user's identifier are used to define the resources in the registry file. Since Windows 95 uses this file to display program icons and program groups, the system only displays the ones which the Primary User identified for the user through the access control program. The access control program may use an application program interface (API) to modify the registry system file in accordance with the restricted list files generated by the access control program.

The access control program may also include a function for limiting a user's access to a computer resource to a particular time period. This time restriction may be defined for a program group, program, directory, or port. The access time is stored in the corresponding file for the resource and is accessed by a program component at user login. If any resource has a corresponding access time, the program component retrieves the system time maintained by the system time function and compares system time to the access time to determine whether the resource should be displayed as being available for the user. In this way, the Primary User may deny access to a games program group, for example, during afternoon hours when the user should be using the PC to do his or her homework.

Preferably, the access control program is implemented by three program components. One program component is loaded resident in memory to, preferably, allocate memory space for a user and monitor memory access. This program allocates memory for a user and verifies that the attempted memory access is for a memory location in a memory space authorized for the user. The second program component loaded into memory preferably monitors operating system and/or Windows calls to verify whether the requested resource is authorized for access by the user. The third program component preferably monitors BIOS calls to verify whether the requested resource is authorized for access at system startup. This program is used to detect boot programs which a user may try to use to gain control of the system at initialization. Although these functions may be performed by a single program component, three program components are preferably used. Whenever one of the program components is activated for a verification function, it communicates with the other two program components to verify they are still loaded and are operational. Thus, if a

user is able to find and modify one program component to access unauthorized resources, the other two program components detect the change. In response to a detected change, the program component resets the system so that all three program components are reloaded from the hard disk to memory to overwrite the changed program component. The TSR programs preferably used in the Windows 3.x components environment are loaded into system memory at system initialization. The VxD programs used in a Windows 95 system may be dynamically loaded anywhere in memory.

When the user logs off, the system maintains the same tables and system files until another user tries to log on. If the user is verified, the file containing all of the system resources is retrieved from the hidden location on the hard drive. This file is used to restore the system files of the system. The restricted lists for the user are then retrieved and these lists are used to delete group and programs from the system files and to initialize the tables in the same manner previously discussed. Alternatively, a user may log off and power off the system, in which case, the system simply reboots upon the application of power by the next user.

The access control program also includes a program component for preventing a boot program on the diskette drive from controlling the PC. The executable code for this component is stored in a file on the PC hard disk. When the Primary User installs this feature, the access control program modifies and moves the master boot record (MBR) and partition table on the hard disk. It then modifies the boot record so this component operates following the termination of BIOS operation at system power up.

The installation process for this program component is shown in FIG. 8. That method begins by reading the first sector of the hard disk (Block 200) to determine whether this program component has been previously installed (Block 202). Preferably, this is done by determining whether a particular byte or group of bytes within the first sector has a predetermined value. If the component has been installed previously, the installation stops. Otherwise, the installation program verifies whether the file in which the program stores a copy of the partition table already exists (Block 204). If it does, then the installation program deletes it (Block 205) and stops. This is done to permit the hard drive protection program to be installed, if the user wants to add it. Otherwise, the hard disk remains unprotected.

If the program determines that the hard disk protection program has not been previously installed or that any vestige of the program remain, it examines the partition table stored on the hard disk (Block 206) to determine whether the system operating the disk is compatible with the protection program. For example, DOS and Windows partition a hard disk into four partitions while other operating systems partition the disk differently. If the operating system is not supported then the installation terminates. Otherwise, the program copies the MBR and partition table to a file (Block 208). This process is repeated for any other hard disks for which the user desires to install the protection (Block 224).

Installation continues by searching the root directory of the hard disk to locate the cylinder/track/sector address of the file in which the MBR and partition table are stored (Block 209). The file containing the MBR program is then retrieved (Block 210). The address of the original MBR on the disk is stored for future reference and the original partition table on the disk is encrypted and rewritten to the disk (Block 212). Using a random number generator, an access number is generated and stored in the MBR program (Block 214). This is done to identify whether a user attempt-

ing to remove the hard disk protection program is authorized to do so. The protection program identifier is written into the MBR program (Block 216). The boot record is then read from the hard disk (Block 218) and the hard disk information, such as disk size, sector size, etc., is retrieved from the boot record and stored in the MBR program (Block 219). The hard disk drive information in the boot record is corrupted (Block 220) and the boot record rewritten to the hard disk (Block 221). The MBR program is then written to the address of the original MBR (Block 222) and the system is re-initialized with the new MBR to install the hard disk protection program (Block 223).

The boot process performed in response to system start up under control of the modified MBR program is shown in FIG. 9. After BIOS has completed its initialization with a normal termination, the BIOS reads the MBR program (Block 240) and begins its execution. The modified MBR program reads the original MBR and partition table from the hard disk (Block 242) and loads them into memory (Block 244). The hard disk information in the modified MBR program is then written into the boot record (Block 246) and the boot record is stored in memory and executed (Block 248). The operating system is loaded (Block 250) and the system initialization batch file (AUTOEXEC.BAT in DOS computers) is executed (Block 252). The execution of this file loads the program components for the access control program into memory. System control is then transferred to the operating system (Block 254). Thereafter, interrupts to access the hard disk are intercepted by one of the program components which use the modified MBR program and restored partition table and boot record to control access to the hard disk.

After the hard disk protection program and access control program have been installed, the program and the access control program control access to the operating system and computer resources of the system. Upon system initialization, the BIOS executes and, at its termination, activates the hard disk protection program, if installed. This program controls access to system resources during the remainder of system initialization and loads the operating system and program components for the access control program. Control is transferred to the operating system and the program components of the access control program limit user access to the resources identified in restricted lists as set forth above. If a user attempts to boot the system with a boot program stored on media or a diskette drive, the boot program tries to use the hard disk interrupt to look at the master boot record. In this case, the program is unable to gain sufficient information to search the hard disk and load the operating system. If the hard disk protection program is not installed, system initialization continues with the loading of the operating system and the program components of the access control program, however, the protection provided by the hard disk protection program is not available. Control is then transferred to the operating system. Thereafter, the access control program intercepts interrupt service calls and verifies whether the user is authorized to access the requested resource.

While the present invention has been illustrated by a description of preferred and alternative embodiments and processes, and while the preferred and alternative embodiments and processes have been described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. For example, a file identified by a user identifier may be generated which contains those resources for which a user is authorized to use. This list of resources may be used

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to delete any reference to resources in a system file not contained in the file. Such additional advantages and modifications will readily appear to those skilled in the art.

What is claimed is:

1. A method for limiting a user's access to computer resources of a computer system, comprising:
 - relocating an original master boot record and an original partition table from a first location to a second location on a hard disk;
 - providing a corrupted master boot record and a corrupted partition table at said first location so that a program using the corrupted master boot record and said corrupted partition table is unable to initialize said system; and
 - using, via a security protection program, at system initialization said corrupted master boot record and locating via the security protection program, said original master boot record and said original partition table at said second location to initialize said computer system.
2. The method of claim 1 further comprising the step of:
 - controlling computer initialization using said relocated master boot record and said relocated partition table; and
 - installing a program component for controlling access to computer resources in a memory of said system prior to allowing a user to access said computer.
3. The method of claim 1 further comprising the step of:
 - deleting hard disk information from a boot record; and
 - storing said hard disk information in said corrupted master boot record so that said hard disk information may be restored in said boot record prior to activating said boot record.
4. The method of claim 1 wherein said second memory location is determining from the steps of:
 - copying the original master boot record to a file during set-up of the security protection program;
 - searching the root directory of the hard disk to locate a cylinder/track/sector address of the file containing the original master boot record; and
 - storing the address of the original master boot record for reference by said corrupted master boot record.
5. A software-implemented system for controlling access to a hard disk during a computer system initialization comprising:
 - a modified master boot record written to a memory location on a hard disk corresponding to location for an original master boot record;
 - a corrupted partition table written to a memory location on said hard disk corresponding to a location for an original partition table;
 - an original partition table stored to a location on said hard disk different from said corrupted partition table; and
 - a corrupted boot record written to a memory location on said hard disk corresponding to a location for an original boot record whereby said modified master boot record accesses previously stored information during system initialization to restore said boot record for system initialization.
6. The system of claim 5 wherein said modified master boot record loads a program component for controlling user access to computer resources before a user is provided access to a computer.
7. The system of claim 5 said modified master boot record including:
 - a protection program identifier so that installation of said modified master boot record may be verified.

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8. The system of claim 5 wherein said corrupted partition table is encrypted.

9. The system of claim 5 wherein said stored disk information is removed from said original boot record.

10. A computer implemented method that prevents unauthorized access to a computer system, comprising the steps of:

- moving an original master boot record from its original location to a non-standard location in memory;

- creating a modified master boot record by storing a modified partition table in the modified master boot record that has different specifications than the original master boot record, said modified partition table containing specifications that prevents an operating system from booting from a diskette, thereby preventing access to computer system resources;

- storing the modified master boot record at the location corresponding to the original location of the original master boot record; and

- using said modified master boot record to control access to computer system resources.

11. The method of claim 10 wherein said non-standard memory location is an arbitrary memory location determined by a security protection program.

12. The method of claim 11 wherein said arbitrary location is determining from the steps of:

- copying the original master boot record to a file during set-up of the security protection program;

- searching the root directory of a hard disk to locate a cylinder/track/sector address of the file containing the original master boot record; and

- storing the address of the original master boot record for reference by said modified master boot record.

13. A computer implemented method that protects a computer system from unauthorized access, comprising the steps of:

- accessing a boot record of a hard disk;

- changing the boot record data in a manner that prevents an unauthorized user from accessing the hard disk; and

- storing information that enables the original boot record data to be restored by an access protection program.

14. The method of claim 13 comprising the steps of:

- removing disk information from the boot record of the hard disk; and

- storing information removed from said boot record in a manner that enables the original boot record data to be restored by the access protection program.

15. The method of claim 14 further comprising the steps of:

- moving a master boot record to a non-standard memory location different than the original location for the master boot record;

- creating a modified master boot record which is stored at the original location of the master boot record; and
- storing information in the modified master boot record that enables the boot record to be restored by a security protection program.

16. The method of claim 15 wherein said non-standard memory location is an arbitrary memory location determined by the security protection program.

17. The method of claim 16 wherein said arbitrary location is determined from the steps of:

- copying the master boot record to a file during set-up of the security protection program;

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searching the root directory of the hard disk to locate a cylinder/track/sector address of the file containing the master boot record; and
storing the address of the original master boot record for reference by said modified master boot record.

16

18. The method of claim **17** further comprising the step of corrupting a partition table in a manner that prevents the computer system from booting.

* * * * *

Electronic Acknowledgement Receipt

EFS ID:	15718260
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Mary Ellen Quigley
Filer Authorized By:	Dawn-Marie Bey.
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Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	21:43:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



US006804780B1

(12) **United States Patent**
Touboul

(10) **Patent No.:** **US 6,804,780 B1**
(45) **Date of Patent:** ***Oct. 12, 2004**

(54) **SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES**

(75) **Inventor:** **Shlomo Touboul, Kefar-haim (IL)**

(73) **Assignee:** **Finjan Software, Ltd., Netanya (IL)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) **Appl. No.:** **09/539,667**

(22) **Filed:** **Mar. 30, 2000**

Related U.S. Application Data

(63) Continuation of application No. 08/964,388, filed on Nov. 6, 1997, now Pat. No. 6,092,194.

(60) Provisional application No. 60/030,639, filed on Nov. 8, 1996.

(51) **Int. Cl.⁷** **H04L 9/00; G06F 11/30**

(52) **U.S. Cl.** **713/181; 713/201; 713/176; 717/178**

(58) **Field of Search** **713/200, 201, 713/176, 181; 709/223, 225, 227, 229; 717/168-178**

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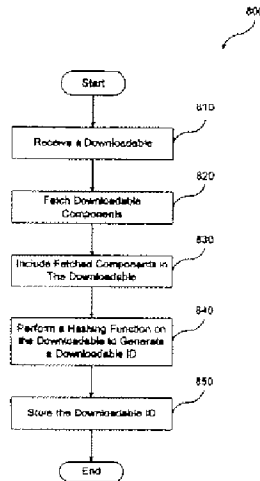
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Primary Examiner—Ayaz Sheikh
Assistant Examiner—Christopher Revak
(74) *Attorney, Agent, or Firm*—Squire, Sanders & Dempsey, L.L.P.

(57) **ABSTRACT**

A computer-based method for generating a Downloadable ID to identify a Downloadable, including obtaining a Downloadable that includes one or more references to software components required by the Downloadable, fetching at least one software component identified by the one or more references, and performing a function on the Downloadable and the fetched software components to generate a Downloadable ID. A system and a computer-readable storage medium are also described and claimed.

18 Claims, 10 Drawing Sheets



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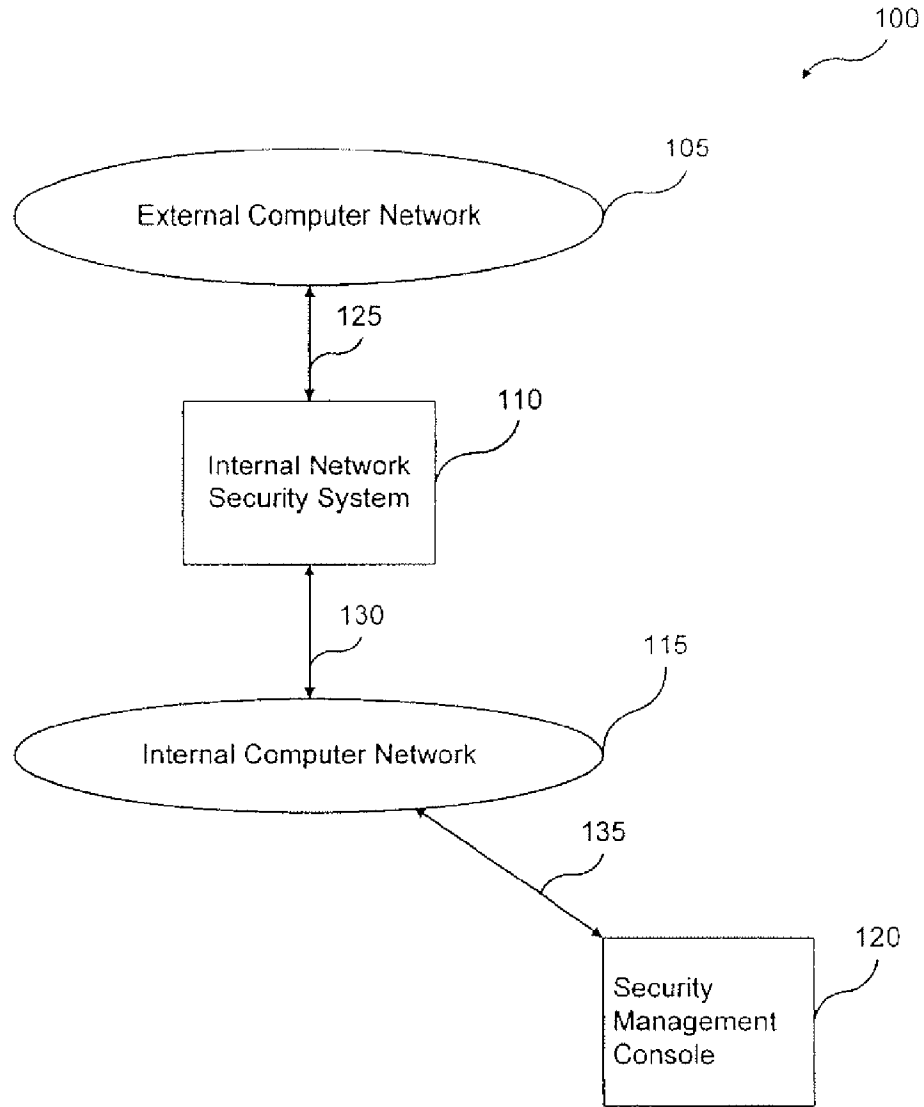


FIG. 1

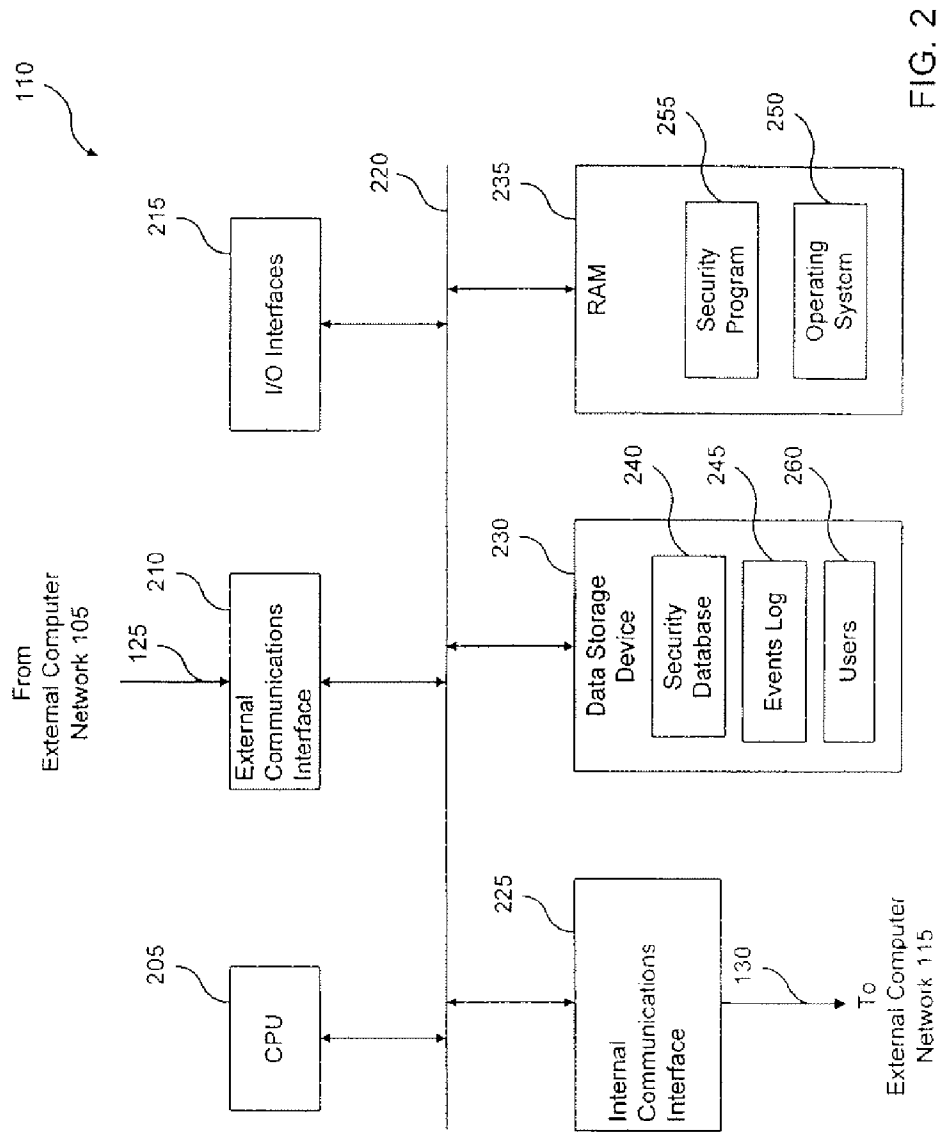


FIG. 2

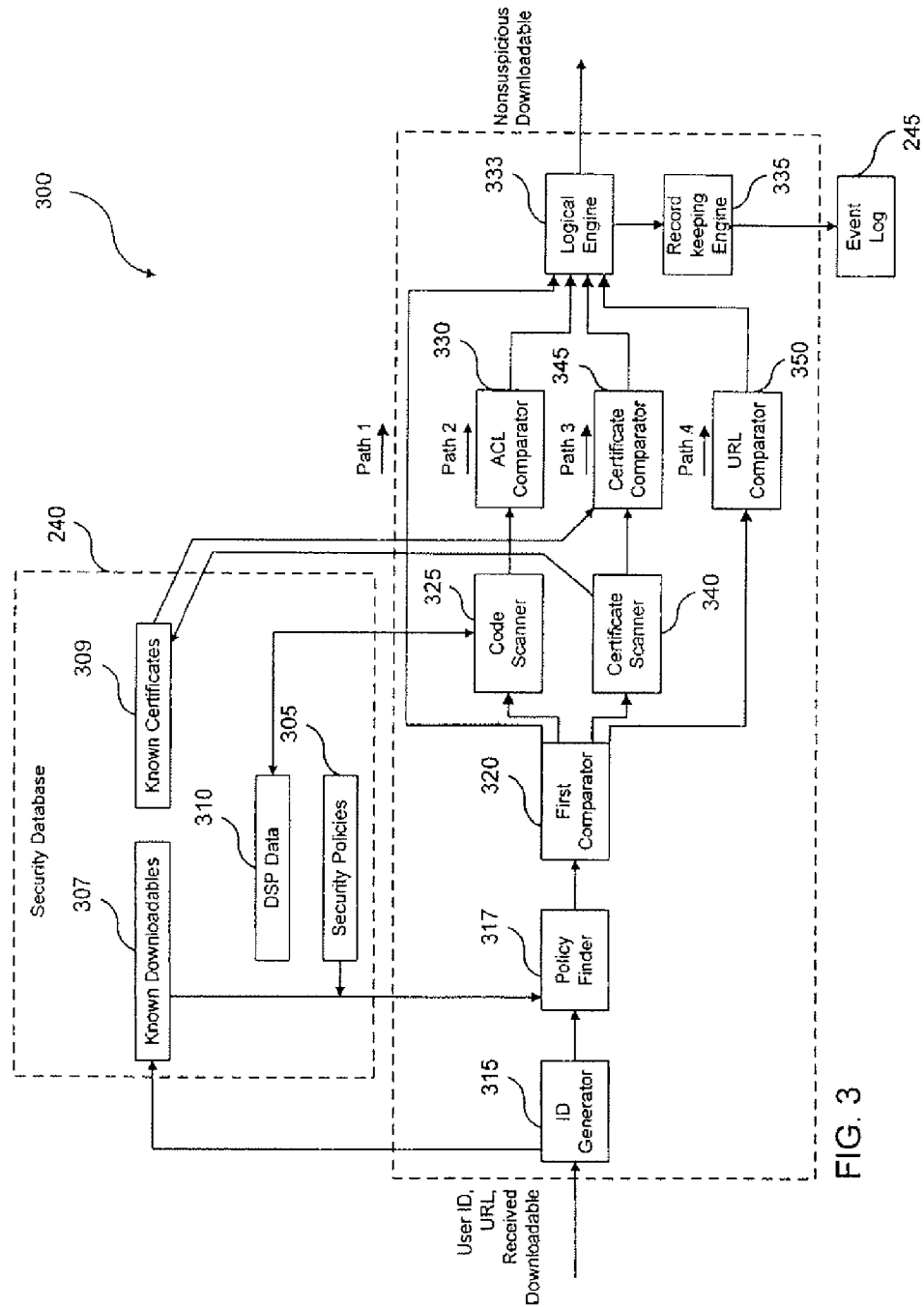


FIG. 3

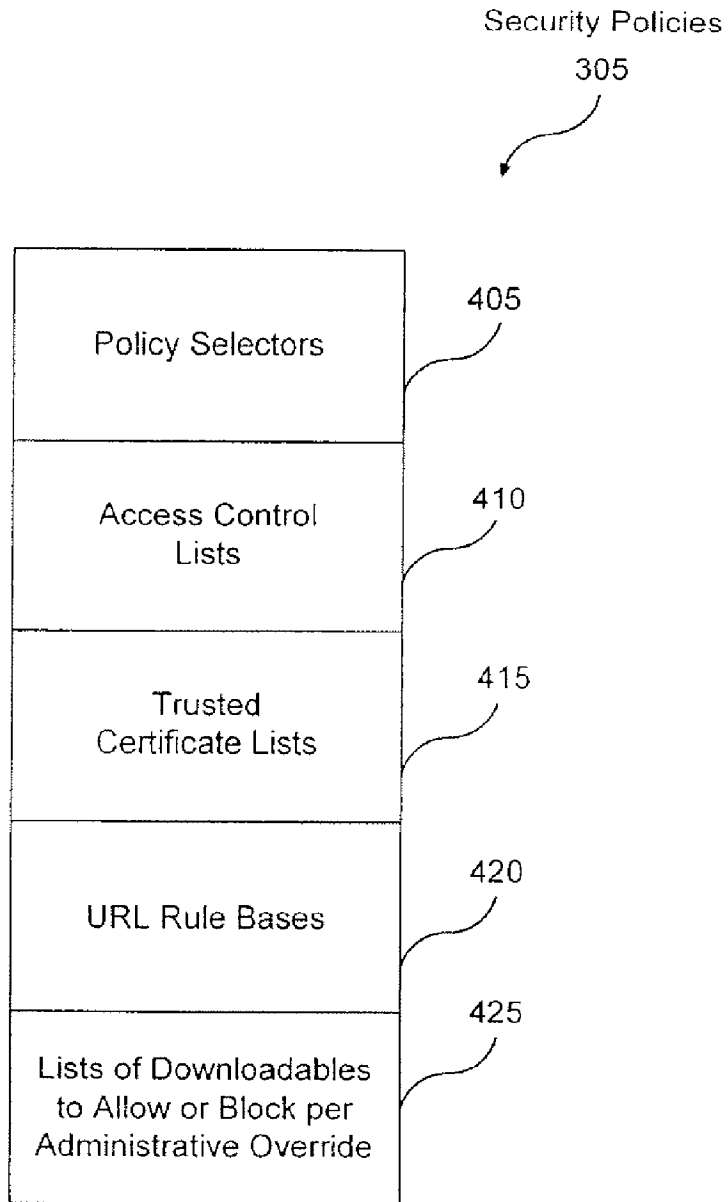


FIG. 4

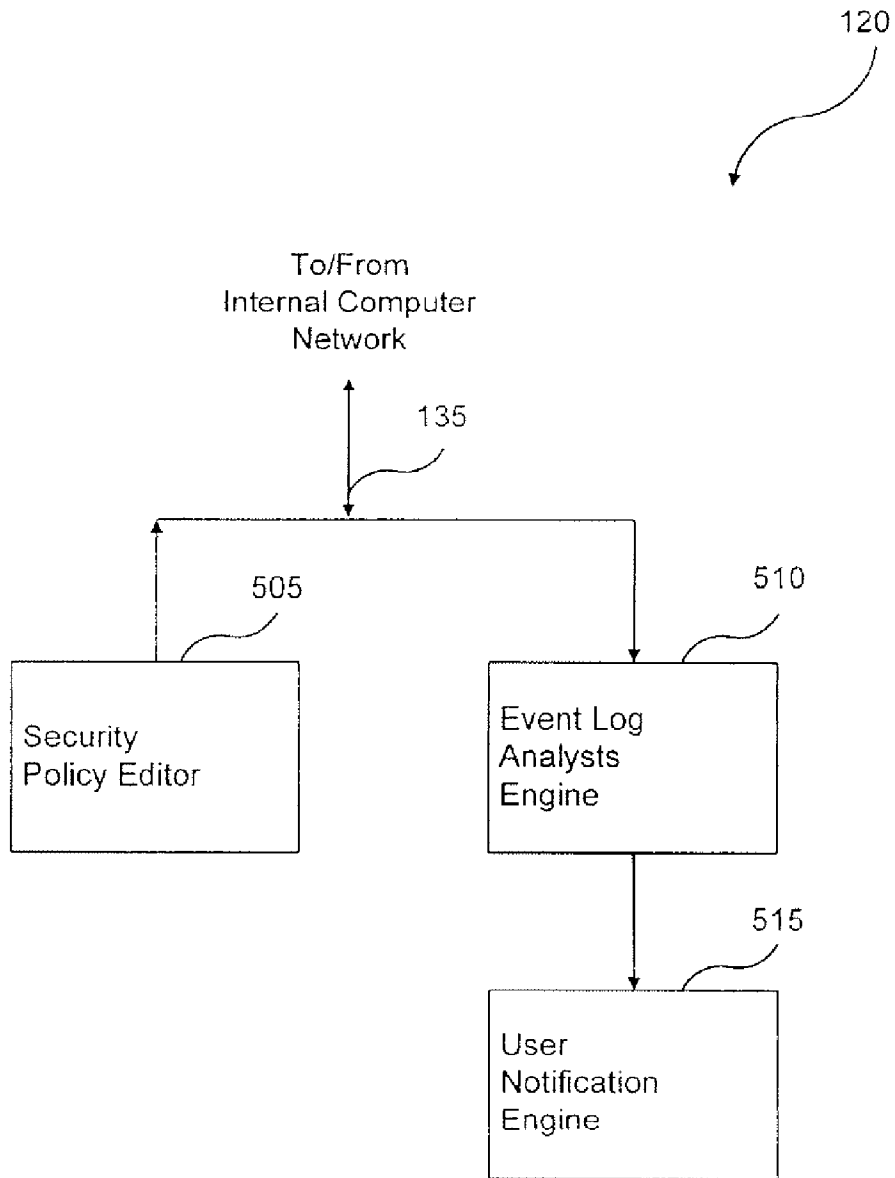


FIG. 5

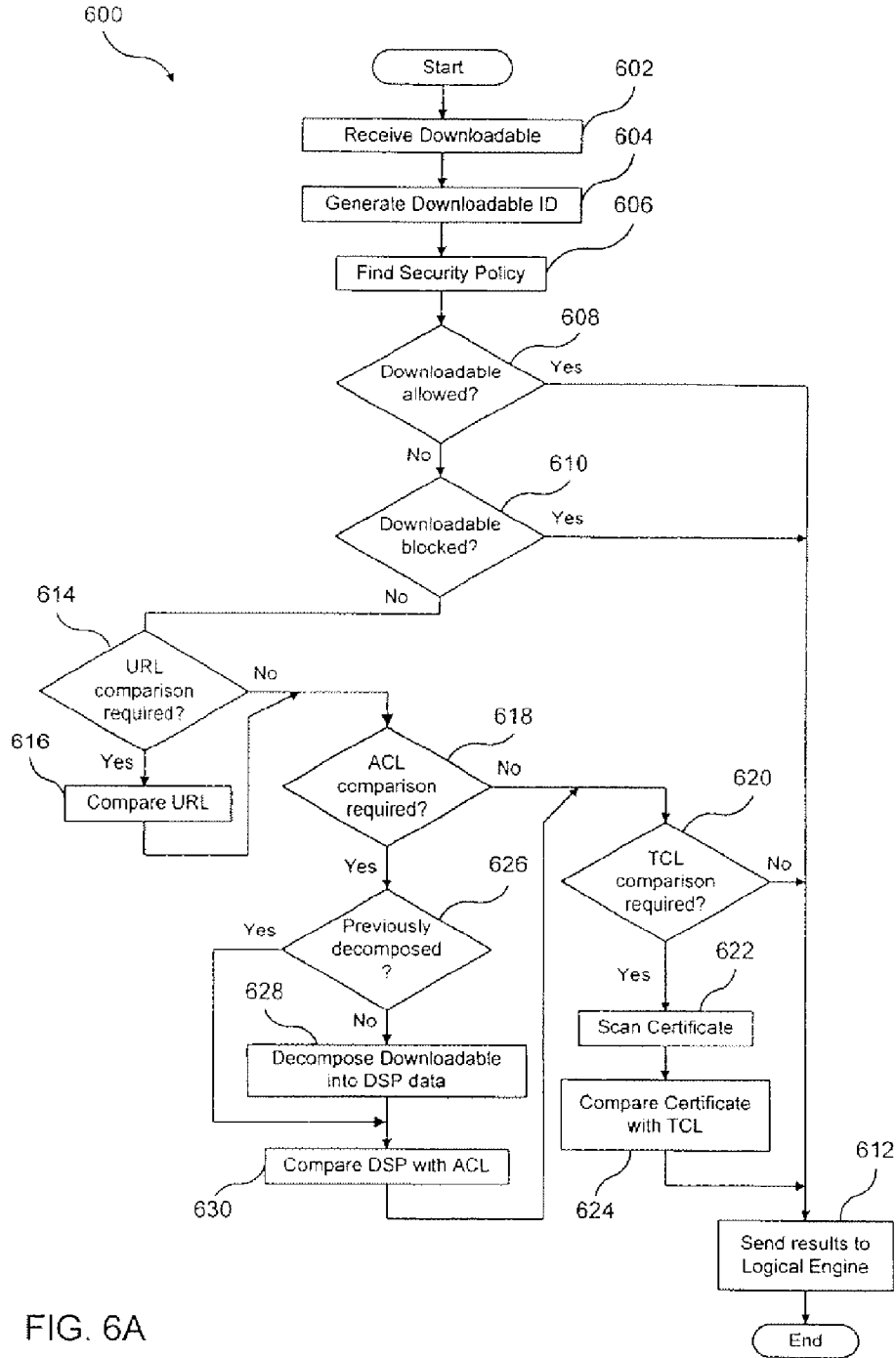


FIG. 6A

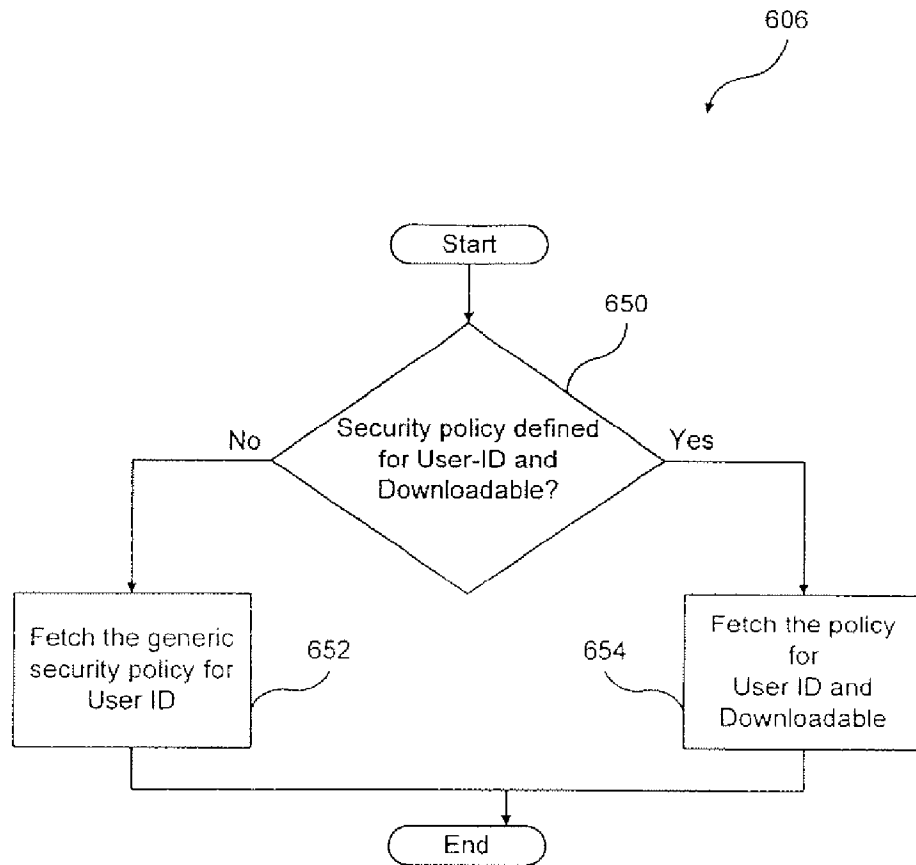


FIG. 6B

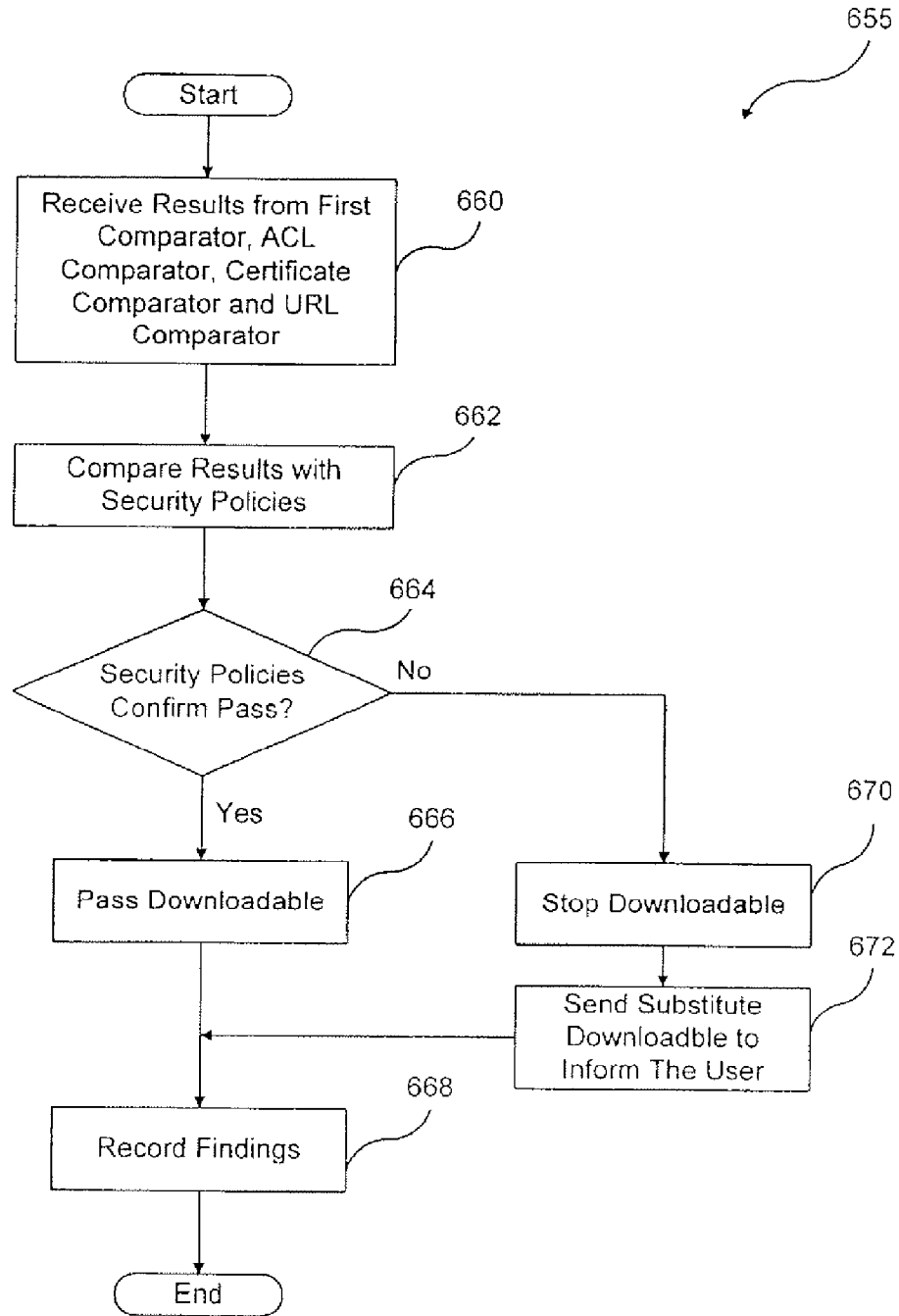


FIG. 6C

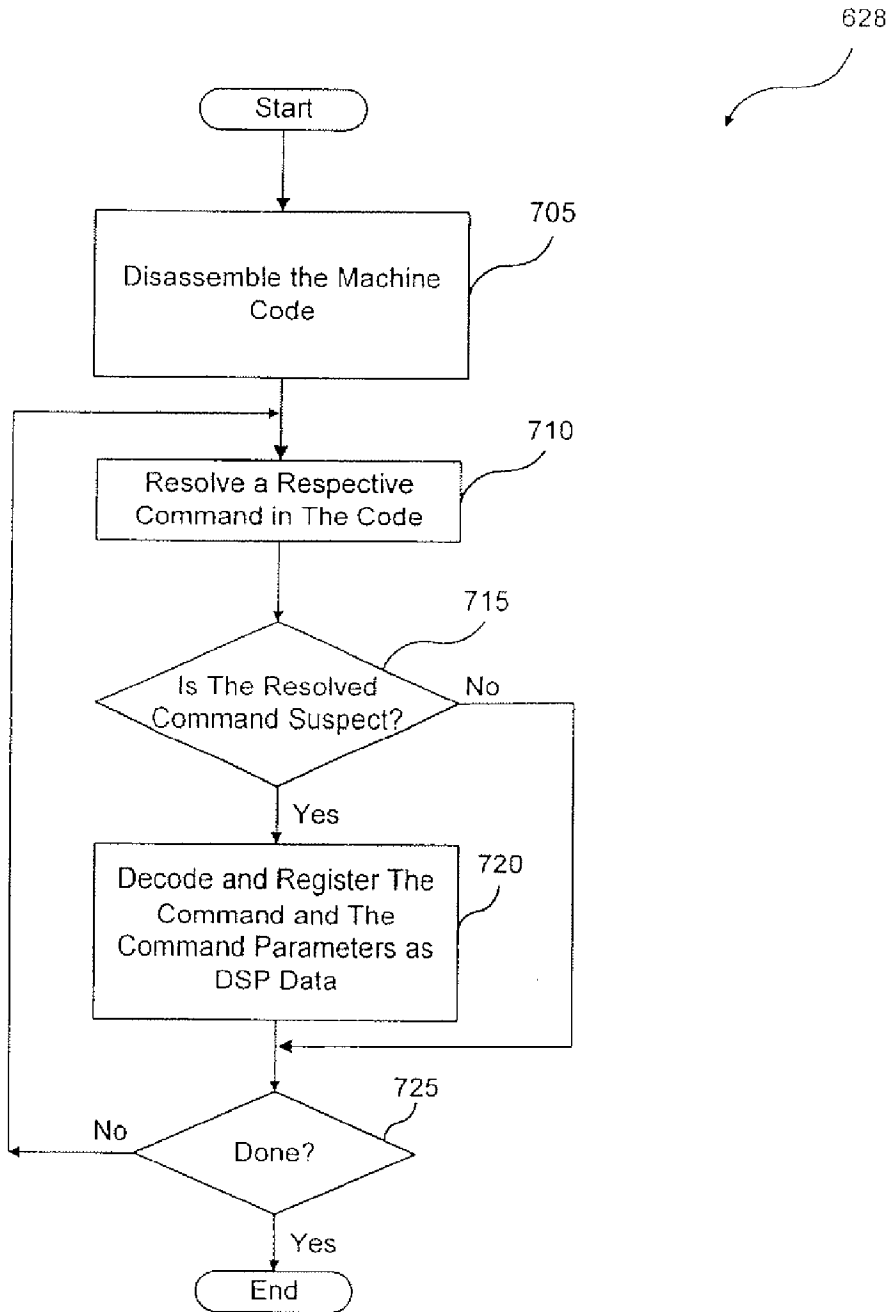


FIG. 7

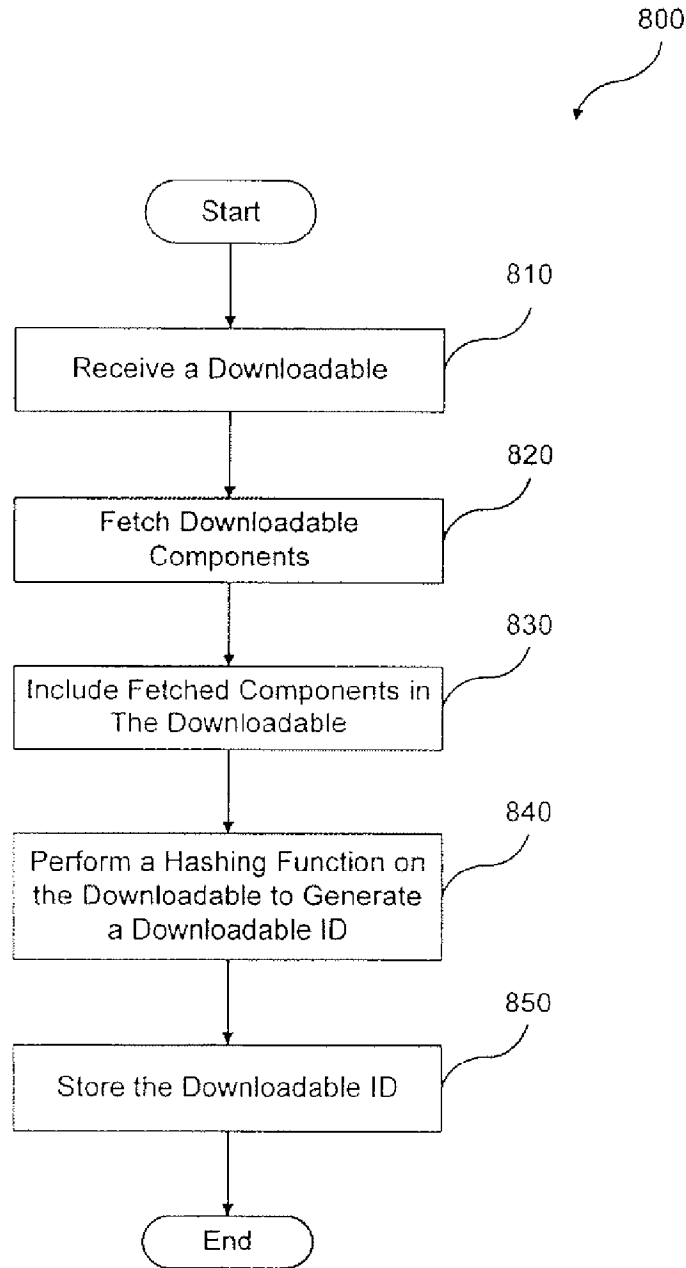


FIG. 8

SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

PRIORITY REFERENCE TO RELATED APPLICATION

This application is a continuation of and hereby incorporates by reference U.S. patent application Ser. No. 08/964,388, entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables," filed Nov. 6, 1997, which is now U.S. Pat. No. 6,092,194, which claims priority to provisional application Serial No. 60/030,639, entitled "System and Method for Protecting a Computer from Hostile Downloadables," filed on Nov. 8, 1996, by inventor Shlomo Touboul.

INCORPORATION BY REFERENCE TO RELATED APPLICATIONS

This application hereby incorporates by reference related U.S. patent application Ser. No. 08/790,097, entitled "System and Method for Protecting a Client from Hostile Downloadables," filed on Jan. 29, 1997, which is now U.S. Pat. No. 6,167,520, by inventor Shlomo Touboul; and hereby incorporates by reference provisional application Ser. No. 60/030,639, entitled "System and Method for Protecting a Computer from Hostile Downloadables," filed on Nov. 8, 1996, by inventor Shlomo Touboul.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to computer networks, and more particularly provides a system and method for protecting a computer and a network from hostile Downloadables.

2. Description of the Background Art

The Internet is currently a collection of over 100,000 individual computer networks owned by governments, universities, nonprofit groups and companies, and is expanding at an accelerating rate. Because the Internet is public, the Internet has become a major source of many system damaging and system fatal application programs, commonly referred to as "viruses."

Accordingly, programmers continue to design computer and computer network security systems for blocking these viruses from attacking both individual and network computers. On the most part, these security systems have been relatively successful. However, these security systems are not configured to recognize computer viruses which have been attached to or configured as Downloadable application programs, commonly referred to as "Downloadables." A Downloadable is an executable application program, which is downloaded from a source computer and run on the destination computer. Downloadable is typically requested by an ongoing process such as by an Internet browser or web engine. Examples of Downloadables include Java™ applets designed for use in the Java™ distributing environment developed by Sun Microsystems, Inc., JavaScript scripts also developed by Sun Microsystems, Inc., ActiveX™ controls also developed by Sun Microsystems, Inc., ActiveX™ controls designed for use in the ActiveX™ distributing environment developed by the Microsoft Corporation, and Visual Basic also developed by the Microsoft Corporation. Therefore, a system and method are needed to protect a network from hostile Downloadables.

SUMMARY OF THE INVENTION

The present invention provides a system for protecting a network from suspicious Downloadables. The system com-

prises a security policy, an interface for receiving a Downloadable, and a comparator, coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, a specific security policy to be applied based on the client or the group to which the client belongs, or a specific policy to be applied based on the client/group and on the particular Downloadable received. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components.

Further, the security policy may indicate several tests to perform, including (1) a comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

The present invention further provides a method for protecting a computer from suspicious Downloadables. The method comprises the steps of receiving a Downloadable, comparing the Downloadable against a security policy to determine if the security policy has been violated, and discarding the Downloadable if the security policy has been violated.

It will be appreciated that the system and method of the present invention may provide computer protection from known hostile Downloadables. The system and method of the present invention may identify Downloadables that perform operations deemed suspicious. The system and method of the present invention may examine the Downloadable code to determine whether the code contains any suspicious operations, and thus may allow or block the Downloadable accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating a network system, in accordance with the present invention;

FIG. 2 is a block diagram illustrating details of the internal network security system of FIG. 1;

FIG. 3 is a block diagram illustrating details of the security program and the security database of FIG. 2;

FIG. 4 is a block diagram illustrating details of the security policies of FIG. 3;

FIG. 5 is a block diagram illustrating details of the security management console of FIG. 1;

FIG. 6A is a flowchart illustrating a method of examining for suspicious Downloadables, in accordance with the present invention;

FIG. 6B is a flowchart illustrating details of the step for finding the appropriate security policy of FIG. 6A;

FIG. 6C is a flowchart illustrating a method for determining whether an incoming Downloadable is to be deemed suspicious;

FIG. 7 is a flowchart illustrating details of the FIG. 6 step of decomposing a Downloadable; and

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram illustrating a network system 100, in accordance with the present invention. The network system 100 includes an external computer network 105, such as the Wide Area Network (WAN) commonly referred to as the Internet, coupled via a communications channel 125 to an internal network security system 110. The network system 100 further includes an internal computer network 115, such as a corporate Local Area Network (LAN), coupled via a communications channel 130 to the internal network computer system 110 and coupled via a communications channel 135 to a security management console 120.

The internal network security system 110 examines Downloadables received from external computer network 105, and prevents Downloadables deemed suspicious from reaching the internal computer network 115. It will be further appreciated that a Downloadable is deemed suspicious if it performs or may perform any undesirable operation, or if it threatens or may threaten the integrity of an internal computer network 115 component. It is to be understood that the term "suspicious" includes hostile, potentially hostile, undesirable, potentially undesirable, etc. Security management console 120 enables viewing, modification and configuration of the internal network security system 110.

FIG. 2 is a block diagram illustrating details of the internal network security system 110, which includes a Central Processing Unit (CPU) 205, such as an Intel Pentium® microprocessor or a Motorola Power PC® microprocessor, coupled to a signal bus 220. The internal network security system 110 further includes an external communications interface 210 coupled between the communications channel 125 and the signal bus 220 for receiving Downloadables from external computer network 105, and an internal communications interface 225 coupled between the signal bus 220 and the communications channel 130 for forwarding Downloadables not deemed suspicious to the internal computer network 115. The external communications interface 210 and the internal communications interface 225 may be functional components of an integral communications interface (not shown) for both receiving Downloadables from the external computer network 105 and forwarding Downloadables to the internal computer network 115.

Internal network security system 110 further includes Input/Output (I/O) interfaces 215 (such as a keyboard, mouse and Cathode Ray Tube (CRT) display), a data storage device 230 such as a magnetic disk, and a Random-Access Memory (RAM) 235, each coupled to the signal bus 220. The data storage device 230 stores a security database 240, which includes security information for determining whether a received Downloadable is to be deemed suspicious. The data storage device 230 further stores a users list 260 identifying the users within the internal computer network 115 who may receive Downloadables, and an event log 245 which includes determination results for each Downloadable examined and runtime indications of the internal network security system 110. An operating system 250 controls processing by CPU 205, and is typically stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution. A security program 255 controls

examination of incoming Downloadables, and also may be stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution by CPU 205.

FIG. 3 is a block diagram illustrating details of the security program 255 and the security database 240. The security program 255 includes an ID generator 315, a policy finder 317 coupled to the ID generator 315, and a first comparator 320 coupled to the policy finder 317. The first comparator 320 is coupled to a logical engine 333 via four separate paths, namely, via Path 1, via Path 2, via Path 3 and via Path 4. Path 1 includes a direct connection from the first comparator 320 to the logical engine 333. Path 2 includes a code scanner coupled to the first comparator 320, and an Access Control List (ACL) comparator 330 coupling the code scanner 325 to the logical engine 333. Path 3 includes a certificate scanner 340 coupled to the first comparator 320, and a certificate comparator 345 coupling the certificate scanner 340 to the logical engine 333. Path 4 includes a Uniform Resource Locator (URL) comparator 350 coupling the first comparator 320 to the logical engine 333. A record-keeping engine 335 is coupled between the logical engine 333 and the event log 245.

The security program 255 operates in conjunction with the security database 240, which includes security policies 305, known Downloadables 307, known Certificates 309 and Downloadable Security Profile (DSP) data 310 corresponding to the known Downloadables 307. Security policies 305 includes policies specific to particular users 260 and default (or generic) policies for determining whether to allow or block an incoming Downloadable. These security policies 305 may identify specific Downloadables to block, specific Downloadables to allow, or necessary criteria for allowing an unknown Downloadable. Referring to FIG. 4, security policies 305 include policy selectors 405, access control lists 410, trusted certificate lists 415, URL rule bases 420, and lists 425 of Downloadables to allow or to block per administrative override.

Known Downloadables 307 include lists of Downloadables which Original Equipment Manufacturers (OEMs) know to be hostile, of Downloadables which OEMs know to be non-hostile, and of Downloadables previously received by this security program 255. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by each known Downloadable 307, and may also include the respective arguments of these operations. An identified argument of an operation is referred to as "resolved." An unidentified argument is referred to as "unresolved." DSP data 310 is described below with reference to the code scanner 325.

The ID generator 315 receives a Downloadable (including the URL from which it came and the userID of the intended recipient) from the external computer network 105 via the external communications interface 210, and generates a Downloadable ID for identifying each Downloadable. The Downloadable ID preferably includes a digital hash of the complete Downloadable code. The ID generator 315 preferably prefetches all components embodied in or identified by the code for Downloadable ID generation. For example, the ID generator 315 may prefetch all classes embodied in or identified by the Java™ applet bytecode to generate the Downloadable ID. Similarly, the ID generator 315 may retrieve all components listed in the INF file for an ActiveX™ control to compute a Downloadable ID. Accordingly, the Downloadable ID for the Downloadable will be the same each time the ID generator 315 receives the same Downloadable. The ID generator 315 adds the generated Downloadable ID to the list of known Downloadables

307 (if it is not already listed). The ID generator 315 then forwards the Downloadable and Downloadable ID to the policy finder 317.

The policy finder 317 uses the userID of the intended user and the Downloadable ID to select the specific security policy 305 that shall be applied on the received Downloadable. If there is a specific policy 305 that was defined for the user (or for one of its super groups) and the Downloadable, then the policy is selected. Otherwise the generic policy 305 that was defined for the user (or for one of its super groups) is selected. The policy finder 317 then sends the policy to the first comparator 320.

The first comparator 320 receives the Downloadable, the Downloadable ID and the security policy 305 from the policy finder 317. The first comparator 320 examines the security policy 305 to determine which steps are needed for allowing the Downloadable. For example, the security policy 305 may indicate that, in order to allow this Downloadable, it must pass all four paths, Path 1, Path 2, Path 3 and Path 4. Alternatively, the security policy 305 may indicate that to allow the Downloadable, it must pass only one of the paths. The first comparator 320 responds by forwarding the proper information to the paths identified by the security policy 305.

Path 1

In path 1, the first comparator 320 checks the policy selector 405 of the security policy 305 that was received from the policy finder 317. If the policy selector 405 is either "Allowed" or "Blocked," then the first comparator 320 forwards this result directly to the logical engine 333. Otherwise, the first comparator 320 invokes the comparisons in path2 and/or path 3 and/or path 4 based on the contents of policy selector 405. It will be appreciated that the first comparator 320 itself compares the Downloadable ID against the lists of Downloadables to allow or block per administrative override 425. That is, the system security administrator can define specific Downloadables as "Allowed" or "Blocked."

Alternatively, the logical engine 333 may receive the results of each of the paths and based on the policy selector 405 may institute the final determination whether to allow or block the Downloadable. The first comparator 320 informs the logical engine 333 of the results of its comparison.

Path 2

In path 2, the first comparator 320 delivers the Downloadable, the Downloadable ID and the security policy 305 to the code scanner 325. If the DSP data 310 of the received Downloadable is known, the code scanner 325 retrieves and forwards the information to the ACL comparator 330. Otherwise, the code scanner 325 resolves the DSP data 310. That is, the code scanner 325 uses conventional parsing techniques to decompose the code (including all prefetched components) of the Downloadable into the DSP data 310. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by a specific Downloadable 307, and may also include the respective arguments of these operations. For example, DSP data 310 may include a READ from a specific file, a SEND to an unresolved host, etc. The code scanner 325 may generate the DSP data 310 as a list of all operations in the Downloadable code which could ever be deemed potentially hostile and a list of all files to be accessed by the Downloadable code. It will be appreciated that the code scanner 325 may search the code for any pattern, which is undesirable or suggests that the code was written by a hacker.

An Example List of Operations Deemed Potentially Hostile

- File operations: READ a file, WRITE a file;
- Network operations: LISTEN on a socket, CONNECT to a socket, SEND data, RECEIVE data, VIEW INTRANET;
- Registry operations: READ a registry item, WRITE a registry item;
- Operating system operations: EXIT WINDOWS, EXIT BROWSER, START PROCESS/THREAD, KILL PROCESS/THREAD, CHANGE PROCESS/THREAD PRIORITY, DYNAMICALLY LOAD A CLASS/LIBRARY, etc.; and

Resource usage thresholds: memory, CPU, graphics, etc. In the preferred embodiment, the code scanner 325 performs a full-content inspection. However, for improved speed but reduced security, the code scanner 325 may examine only a portion of the Downloadable such as the Downloadable header. The code scanner 325 then stores the DSP data into DSP data 310 (corresponding to its Downloadable ID), and sends the Downloadable, the DSP data to the ACL comparator 330 for comparison with the security policy 305.

The ACL comparator 330 receives the Downloadable, the corresponding DSP data and the security policy 305 from the code scanner 325, and compares the DSP data against the security policy 305. That is, the ACL comparator 330 compares the DSP data of the received Downloadable against the access control lists 410 in the received security policy 305. The access control list 410 contains criteria indicating whether to pass or fail the Downloadable. For example, an access control list may indicate that the Downloadable fails if the DSP data includes a WRITE command to a system file. The ACL comparator 330 sends its results to the logical engine 333.

Path 3

In path 3, the certificate scanner 340 determines whether the received Downloadable was signed by a certificate authority, such as VeriSign, Inc., and scans for a certificate embodied in the Downloadable. The certificate scanner 340 forwards the found certificate to the certificate comparator 345. The certificate comparator 345 retrieves known certificates 309 that were deemed trustworthy by the security administrator and compares the found certificate with the known certificates 309 to determine whether the Downloadable was signed by a trusted certificate. The certificate comparator 345 sends the results to the logical engine 333.

Path 4

In path 4, the URL comparator 350 examines the URL identifying the source of the Downloadable against URLs stored in the URL rule base 420 to determine whether the Downloadable comes from a trusted source. Based on the security policy 305, the URL comparator 350 may deem the Downloadable suspicious if the Downloadable comes from an untrustworthy source or if the Downloadable did not come from a trusted source. For example, if the Downloadable comes from a known hacker, then the Downloadable may be deemed suspicious and presumed hostile. The URL comparator 350 sends its results to the logical engine 333.

The logical engine 333 examines the results of each of the paths and the policy selector 405 in the security policy 305 to determine whether to allow or block the Downloadable. The policy selector 405 includes a logical expression of the results received from each of the paths. For example, the

logical engine 333 may block a Downloadable if it fails any one of the paths, i.e., if the Downloadable is known hostile (Path 1), if the Downloadable may request suspicious operations (Path 2), if the Downloadable was not signed by a trusted certificate authority (Path 3), or if the Downloadable did come from an untrustworthy source (Path 4). The logical engine 333 may apply other logical expressions according to the policy selector 405 embodied in the security policy 305. If the policy selector 405 indicates that the Downloadable may pass, then the logical engine 333 passes the Downloadable to its intended recipient. Otherwise, if the policy selector 405 indicates that the Downloadable should be blocked, then the logical engine 333 forwards a non-hostile Downloadable to the intended recipient to inform the user that internal network security system 110 discarded the original Downloadable. Further, the logical engine 333 forwards a status report to the record-keeping engine 335, which stores the reports in event log 245 in the data storage device 230 for subsequent review, for example, by the MIS director.

FIG. 5 is a block diagram illustrating details of the security management console 120, which includes a security policy editor 505 coupled to the communications channel 135, an event log analysis engine 510 coupled between communications channel 135 and a user notification engine 515, and a Downloadable database review engine 520 coupled to the communications channel 135. The security management console 120 further includes computer components similar to the computer components illustrated in FIG. 2.

The security policy editor 505 uses an I/O interface similar to I/O interface 215 for enabling authorized user modification of the security policies 305. That is, the security policy editor 505 enables the authorized user to modify specific security policies 305 corresponding to the users 260, the default or generic security policy 305, the Downloadables to block per administrative override, the Downloadables to allow per administrative override, the trusted certificate lists 415, the policy selectors 405, the access control lists 410, the URLs in the URL rule bases 420, etc. For example, if the authorized user learns of a new hostile Downloadable, then the user can add the Downloadable to the Downloadables to block per system override.

The event log analysis engine 510 examines the status reports contained in the event log 245 stored in the data storage device 230. The event log analysis engine 510 determines whether notification of the user (e.g., the security system manager or MIS director) is warranted. For example, the event log analysis engine 510 may warrant user notification whenever ten (10) suspicious Downloadables have been discarded by internal network security system 110 within a thirty (30) minute period, thereby flagging a potential imminent security threat. Accordingly, the event log analysis engine 510 instructs the user notification engine 515 to inform the user. The user notification engine 515 may send an e-mail via internal communications interface 220 or via external communications interface 210 to the user, or may display a message on the user's display device (not shown).

FIG. 6A is a flowchart illustrating a method 600 for protecting an internal computer network 115 from suspicious Downloadables. Method 600 begins with the ID generator 315 in step 602 receiving a Downloadable. The ID generator 315 in step 604 generates a Downloadable ID identifying the received Downloadable, preferably, by generating a digital hash of the Downloadable code (including prefetched components). The policy finder 317 in step 606

finds the appropriate security policy 305 corresponding to the userID specifying intended recipient (or the group to which the intended recipient belongs) and the Downloadable. The selected security policy 305 may be the default security policy 305. Step 606 is described in greater detail below with reference to FIG. 6B.

The first comparator 320 in step 608 examines the lists of Downloadables to allow or to block per administrative override 425 against the Downloadable ID of the incoming Downloadable to determine whether to allow the Downloadable automatically. If so, then in step 612 the first comparator 320 sends the results to the logical engine 333. If not, then the method 600 proceeds to step 610. In step 610, the first comparator 620 examines the lists of Downloadables to block per administrative override 425 against the Downloadable ID of the incoming Downloadable for determining whether to block the Downloadable automatically. If so, then the first comparator 420 in step 612 sends the results to the logical engine 333. Otherwise, method 600 proceeds to step 614.

In step 614, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 4. If not, then method 600 jumps to step 618. If so, then the URL comparator 350 in step 616 compares the URL embodied in the incoming Downloadable against the URLs of the URL rules bases 420, and then method 600 proceeds to step 618.

In step 618, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 2. If not, then method 600 jumps to step 620. Otherwise, the code scanner 235 in step 626 examines the DSP data 310 based on the Downloadable ID of the incoming Downloadable to determine whether the Downloadable has been previously decomposed. If so, then method 600 jumps to step 630. Otherwise, the code scanner 325 in step 628 decomposes the Downloadable into DSP data. Downloadable decomposition is described in greater detail with reference to FIG. 7. In step 630, the ACL comparator 330 compares the DSP data of the incoming Downloadable against the access control lists 410 (which include the criteria necessary for the Downloadable to fail or pass the test).

In step 620, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 3. If not, then method 600 returns to step 612 to send the results of each of the test performed to the logical engine 333. Otherwise, the certificate scanner 622 in step 622 scans the Downloadable for an embodied certificate. The certificate comparator 345 in step 624 retrieves trusted certificates from the trusted certificate lists (TCL) 415 and compares the embodied certificate with the trusted certificates to determine whether the Downloadable has been signed by a trusted source. Method 600 then proceeds to step 612 by the certificate scanner 345 sending the results of each of the paths taken to the logical engine 333. The operations of the logical engine 333 are described in greater detail below with reference to FIG. 6C. Method 600 then ends.

One skilled in the art will recognize that the tests may be performed in a different order, and that each of the tests need not be performed. Further, one skilled in the art will recognize that, although path 1 is described in FIG. 6A as an automatic allowance or blocking, the results of Path 1 may be another predicate to be applied by the logical engine 333. Further, although the tests are shown serially in FIG. 6A, the tests may be performed in parallel as illustrated in FIG. 3.

FIG. 6B is a flowchart illustrating details of step 606 of FIG. 6A (referred to herein as method 606). Method 606 begins with the policy finder 317 in step 650 determining whether security policies 305 include a specific security policy corresponding to the userID and the Downloadable. If so, then the policy finder 317 in step 654 fetches the corresponding specific policy 305. If not, then the policy finder 317 in step 652 fetches the default or generic security policy 305 corresponding to the userID. Method 606 then ends.

FIG. 6C is a flowchart illustrating details of a method 655 for determining whether to allow or to block the incoming Downloadable. Method 655 begins with the logical engine 333 in step 660 receiving the results from the first comparator 320, from the ACL comparator 330, from the certificate comparator 345 and from the URL comparator 350. The logical engine 333 in step 662 compares the results with the policy selector 405 embodied in the security policy 305, and in step 664 determines whether the policy selector 405 confirms the pass. For example, the policy selector 405 may indicate that the logical engine 333 pass the Downloadable if it passes one of the tests of Path 1, Path 2, Path 3 and Path 4. If the policy selector 405 indicates that the Downloadable should pass, then the logical engine 333 in step 666 passes the Downloadable to the intended recipient. In step 668, the logical engine 333 sends the results to the record-keeping engine 335, which in turn stores the results in the event log 245 for future review. Method 655 then ends. Otherwise, if the policy selector 405 in step 664 indicates that the Downloadable should not pass, then the logical engine 333 in step 670 stops the Downloadable and in step 672 sends a non-hostile substitute Downloadable to inform the user that the incoming Downloadable has been blocked. Method 655 then jumps to step 668.

FIG. 7 is a flowchart illustrating details of step 628 of FIG. 6A (referred to herein as method 628) for decomposing a Downloadable into DSP data 310. Method 628 begins in step 705 with the code scanner 325 disassembling the machine code of the Downloadable. The code scanner 325 in step 710 resolves a respective command in the machine code, and in step 715 determines whether the resolved command is suspicious (e.g., whether the command is one of the operations identified in the list described above with reference to FIG. 3). If not, then the code scanner 325 in step 725 determines whether it has completed decomposition of the Downloadable, i.e., whether all operations in the Downloadable code have been resolved. If so, then method 628 ends. Otherwise, method 628 returns to step 710.

Otherwise, if the code scanner 325 in step 71 determines that the resolved command is suspect, then the code scanner 325 in step 720 decodes and registers the suspicious command and its command parameters as DSP data 310. The code scanner 325 in step 720 registers the commands and command parameters into a format based on command class (e.g., file operations, network operations, registry operations, operating system operations, resource usage thresholds). Method 628 then jumps to step 725.

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable. Method 800 begins with the ID generator 315 in step 810 receiving a Downloadable from the external computer network 105. The ID generator 315 in step 820 may fetch some or all components referenced in the Downloadable code, and in step 830 includes the fetched components in the Downloadable code. The ID generator 315 in step 840 performs a hashing function on at least a portion of the Downloadable code to generate a Downloadable ID. The ID

generator 315 in step 850 stores the generated Downloadable ID in the security database 240 as a reference to the DSP data 310. Accordingly, the Downloadable ID will be the same for the identical Downloadable each time it is encountered.

The foregoing description of the preferred embodiments of the invention is by way of example only, and other variations of the above-described embodiments and methods are provided by the present invention. For example, although the invention has been described in a system for protecting an internal computer network, the invention can be embodied in a system for protecting an individual computer. Components of this invention may be implemented using a programmed general purpose digital computer, using application specific integrated circuits, or using a network of interconnected conventional components and circuits. The embodiments described herein have been presented for purposes of illustration and are not intended to be exhaustive or limiting. Many variations and modifications are possible in light of the foregoing teaching. The system is limited only by the following claims.

What is claimed is:

1. A computer-based method for generating a Downloadable ID to identify a Downloadable, comprising:

obtaining a Downloadable that includes one or more references to software components required to be executed by the Downloadable;

fetching at least one software component identified by the one or more references; and

performing a hashing function on the Downloadable and the fetched software components to generate a Downloadable ID.

2. The method of claim 1, wherein the Downloadable includes an applet.

3. The method of claim 1, wherein the Downloadable includes an active software control.

4. The method of claim 1, wherein the Downloadable includes a plugin.

5. The method of claim 1, wherein the Downloadable includes HTML code.

6. The method of claim 1, wherein the Downloadable includes an application program.

7. The method of claim 1, wherein said fetching includes fetching a first software component referenced by the Downloadable.

8. The method of claim 1, wherein said fetching includes fetching all software components referenced by the Downloadable.

9. A system for generating a Downloadable ID to identify a Downloadable, comprising:

a communications engine for obtaining a Downloadable that includes one or more references to software components required to be executed by the Downloadable; and

an ID generator coupled to the communications engine that fetches at least one software component identified by the one or more references, and for performing a hashing function on the Downloadable and the fetched software components to generate a Downloadable ID.

10. The system of claim 9, wherein the Downloadable includes an applet.

11. The system of claim 9, wherein the Downloadable includes an active software control.

12. The system of claim 9, wherein the Downloadable includes a plugin.

13. The system of claim 9, wherein the Downloadable includes HTML code.

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14. The system of claim 9, wherein the Downloadable includes an application program.

15. The system of claim 9, wherein the ID generator fetches a first software component referenced by the Downloadable.

16. The method of claim 9, wherein the ID generator fetches all software components referenced by the Downloadable.

17. A system for generating a Downloadable ID to identify a Downloadable, comprising:

means for obtaining a Downloadable that includes one or more references to software components required to be executed by the Downloadable;

means for fetching at least one software component identified by the one or more references; and

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means for performing a hashing function on the Downloadable and the fetched software components to generate a Downloadable ID.

18. A computer-readable storage medium storing program code for causing a computer to perform the steps of:

obtaining a Downloadable that includes one or more references to software components required to be executed by the Downloadable;

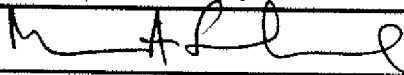
fetching at least one software component identified by the one or more references; and

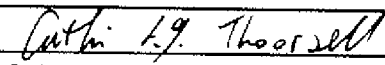
performing a hashing function on the Downloadable and the fetched software components to generate a Downloadable ID.

* * * * *

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ENCLOSURES (check all that apply)		
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This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

COPY

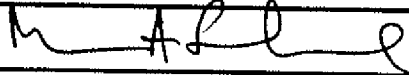
PTO/SB/21 (09-04)

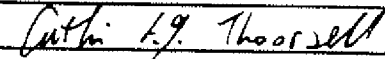
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TRANSMITTAL FORM		Patent Number	6,804,780
		Issued Date	October 12, 2004
		Application Number	09/539,667
		Filing Date	October 12, 2004
		First Named Inventor	Shlomo TOUBOUL
		Art Unit	2131
(to be used for all correspondence after initial filing)		Examiner Name	C. REVAK
		Attorney Docket Number	43426.00011
Total Number of Pages in This Submission	3		

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input checked="" type="checkbox"/> Change of Correspondence Address [Total 1 page] <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Return postcard
<input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to <u>Deposit Account Number 05-0150</u> .		
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Firm	Squire, Sanders & Dempsey L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043		
Signature			
Printed Name	Marc A. Sockol		
Date	April 14, 2005	Reg. No.	40,823

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Typed or printed name	Cathi L.G. Thoorse!!	Date	April 14, 2005

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CHANGE OF CORRESPONDENCE ADDRESS Patent	Patent Number	6,804,780
	Issue Date	October 12, 2004
	Application Number	09/539,667
	Filing Date	March 30, 2000
	First Named Inventor	Shlomo TOUBOUL
	Attorney Docket Number	43426.00011

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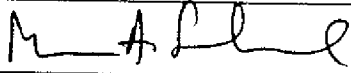
I am the:

Patentee.

Assignee of record of the entire interest. See 37 CFR 3.71. Certificate under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

Attorney or agent of record. Registration Number 40,823

Signature Marc A. Sockol

Typed or Printed Name 

Date April 14, 2005 Telephone 650-856-6500

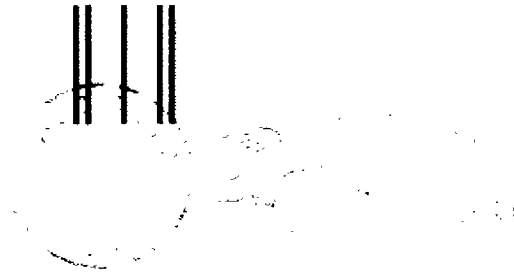
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

*Total of one form is submitted.

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600 Hansen Way
Palo Alto, CA 94304-1043



Date Mailed: April 14, 2005	By: MAS/ct	PTO DATE STAMP:	
Application No.: 09/539,667	Filed: March 30, 2000	Docket No.: 43426.00011	
Patent No.: 6,804,780	Issued: October 12, 2004		
Applicant: Shlomo TOUBOUL			
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES			

The following has been received in the U.S. Patent Office on the date stamped hereon:

- | | |
|---|---|
| <input type="checkbox"/> Patent Application ___ Pages ___ Claims | <input type="checkbox"/> Response/Amendment |
| <input type="checkbox"/> Drawings Informal ___ Sheets | <input type="checkbox"/> Petition for Extension of Time |
| <input type="checkbox"/> General Authorization / Request to Petition for Extensions of Time | |
| <input type="checkbox"/> Oath/Declaration | <input checked="" type="checkbox"/> Transmittal Form w/ duplication [Total 2 pages] |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input checked="" type="checkbox"/> Change of Correspondence [Total 1 page] |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Fee Transmittal (in duplicate) |
| <input type="checkbox"/> Continued Prosecution Application (§1.53(d)) | <input type="checkbox"/> Issue Fee Transmittal with PTO-85b |
| <input type="checkbox"/> Provisional Application ___ Pages | <input type="checkbox"/> Copy of PTO-1533, Notice to File Missing Parts |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Refs ___ |
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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., ISSUE DATE, PATENT NO., ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 09/539,667, 10/12/2004, 6804780, 40492.00011, 8436

30256 7590 09/23/2004
SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO, CA 94304-1043

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Extension under 35 U.S.C. 154 (b)
(application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

APPLICANT(s) (up to 18 names are included below, see PAIR WEB site http://pair.uspto.gov for additional applicants):

Shlomo Touboul, Kefar-haim, ISRAEL;

D-WISE ENTERED:

No Actia

HO

ATTORNEY: SQUIRE SANDERS & DEMPSEY

Date Mailed: August 31, 2004 | By: MAS/emj | PTO DATE STAMP:
 Application No.: 09/539,667 | Docket No.: 43426.00011
 Applicant: Shlomo Touhou
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
 DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application ___ Pages ___ Claims
- Drawings Informal ---- Sheets
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration
- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (§1.53(d))
- Provisional Application _____ Pages
- Design Application ___ Pages ___ Drawings
- Status Letter
- Check No. _____ for \$
- Power of Attorney
- Certificate(s) of First Class Mailing
- Response/Amendment
- Petition for Extension of Time
- Transmittal Form
- Notice of Appeal
- Fee Transmittal (in duplicate)
- Issue Fee Transmittal with PTO-85b (in duplicate)
- Copy of PTO-1533, Notice to File Missing Parts
- Info. Disclosure Statement & PTO-1449/Refs _____
- Request to Correct Filing Receipt
- Check No. _____ for \$
- Other: Authorization to Charge Deposit Account No. 05-0150 (\$1,330 Issue Fee)

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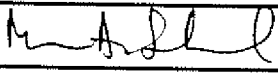
Squire, Sanders & Dempsey L.L.P.
 600 Hansen Way, Suite 100
 Palo Alto, CA 94304-1043

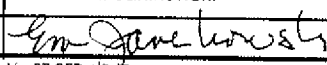


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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Art Unit	2131	
	Examiner Name	Christopher A. Revak	
Total Number of Pages in This Submission	3	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Formal Drawings <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input checked="" type="checkbox"/> PTOL-85 Issue Fee Transmittal (in duplicate) <input checked="" type="checkbox"/> Authorization to Charge Deposit Account No. 05-0150 \$240 Issue Fee <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input checked="" type="checkbox"/> Return Postcard <input type="checkbox"/> Other Enclosure(s) (please identify below).
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	August 31, 2004

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Typed or printed name	Eileen M. Janikowski		
Signature		Date	August 31, 2004

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30256 7590 06/04/2004

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Eileen M. Janikowski	(Depositor's name)
<i>Eileen M. Janikowski</i>	(Signature)
August 31, 2004	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,667	03/30/2000	Shlomo Touboul	40492-00011 43426.00011	8436

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES/NO	\$665,1330	\$0	\$665,1330	09/07/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2131	713-181000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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1. Squire, Sanders & Dempsey, L.L.P.
2. _____
3. _____

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(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

FINJAN SOFTWARE, LTD.

NETANYA, ISRAEL

Please check the appropriate assignee category or categories (will not be printed on the patent); individual corporation or other private group entity government

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(Authorized Signature) *Marc A. Sockol* (Date) August 25, 2004
Marc A. Sockol, Reg. No. 40,823

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Eileen M. Janikowski (Depositor's name)
E.M. Janikowski (Signature)
August 31, 2004 (Date)

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

Table with 6 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE, PUBLICATION FEE, TOTAL FEE(S) DUE, DATE DUE

Table with 3 columns: EXAMINER, ART UNIT, CLASS-SUBCLASS

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"Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

- 2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. Squire, Sanders & Dempsey, L.L.P.
2.
3.

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(A) NAME OF ASSIGNEE: FINJAN SOFTWARE, LTD. (B) RESIDENCE: (CITY and STATE OR COUNTRY) NETANYA, ISRAEL

Please check the appropriate assignee category or categories (will not be printed on the patent); individual corporation or other private group entity government

- 4a. The following fee(s) are enclosed: Issue Fee, Publication Fee, Advance Order - # of Copies
4b. Payment of Fee(s): A check in the amount of the fee(s) is enclosed, Payment by credit card. Form PTO-2038 is attached.
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(Authorized Signature) Marc A. Sockol, Reg. No. 40,823 (Date) August 25, 2004

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SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO, CA 94304-1043

Issue Fee Due: 9/7/04

JUN 07 2004

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2131

DATE MAILED: 06/04/2004

CALENDARED
BY [Signature]
ATTORNEY
SQUIRE, SANDERS & DEMPSEY

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
09/539,667 03/30/2000 Shlomo Touboul 40492.00011 8436

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

Table with 6 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE, PUBLICATION FEE, TOTAL FEE(S) DUE, DATE DUE
nonprovisional YES/NO \$665-1325 \$0 \$665.220 09/07/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

[] Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(703) 746-4000**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

30256 7590 06/04/2004

SQUIRE, SANDERS & DEMPSEY L.L.P.
600 HANSEN WAY
PALO ALTO, CA 94304-1043

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,667	03/30/2000	Shlomo Touboul	40492.00011	8436

TITLE OF INVENTION: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES/NO	5665.1230	\$0	5665.1230	09/07/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
REVAK, CHRISTOPHER A	2131	713-181000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent); individual corporation or other private group entity government

4a. The following fee(s) are enclosed:

- Issue Fee
- Publication Fee
- Advance Order - # of Copies _____

4b. Payment of Fee(s):

- A check in the amount of the fee(s) is enclosed.
- Payment by credit card. Form PTO-2038 is attached.
- The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) _____ (Date) _____

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

Notice of Allowability

Application No.	09/539,667	Applicant(s)	TOUBOUL, SHLOMO
Examiner	Christopher A. Revak	Art Unit	2131

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1. This communication is responsive to amendment filed February 27, 2004.
- 2. The allowed claim(s) is/are 1-6, 8, 10-16, 18, 20-22.
- 3. The drawings filed on _____ are accepted by the Examiner.
- 4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

- 5. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 6. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 7. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
- 4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5. Notice of Informal Patent Application (PTO-152)
- 6. Interview Summary (PTO-413), Paper No./Mail Date _____
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other _____


AYAZ SHEIKH

SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1459
Alexandria, Virginia 22313-1459
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,667	03/30/2000	Shlomo Touboul	40492.00011	8436

30256 7590 06/04/2004
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600 HANSEN WAY
PALO ALTO, CA 94304-1043

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2131

DATE MAILED: 06/04/2004

12

Determination of Patent Term Extension under 35 U.S.C. 154 (b)
(application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Marc Sockol on May 13, 2004.

The application has been amended as follows:

On page 1 of the specification, line 7, after –November 6, 1997,--, please insert “which is now U.S. Patent 6,092,194,”;

On page 1 of the specification, line 15, after –January 29, 1997,--, please insert “which is now U.S. Patent 6,167,520,”;

In claim 1, on line 8, please insert “hashing” before –function--;

Please cancel claim 7;

In claim 8, line 2, after –fetching--, please delete –the-- and insert “a”;

In claim 11, lines 6-7, please delete –for fetching-- and insert “that fetches” and on line 8, please insert “hashing” before –function--;

Please cancel claim 17;

In claim 18, line 2, after –fetches--, please delete –the-- and insert “a”;

In claim 21, on line 7, please insert “hashing” before –function--;

In claim 22, on line 7, please insert “hashing” before –function--;

Allowable Subject Matter


2. The following is an examiner's statement of reasons for allowance:

It was not found to be taught in the art of a downloadable that includes references to software components required to be executed by the downloadable and performing a hashing function on the downloadable and the fetched software component to generate a downloadable ID.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher A. Revak whose telephone number is 703-305-1843. The examiner can normally be reached on Monday-Friday, 6:30am-4:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh can be reached on 703-305-9648. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



AYAZ SHEIKH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Art Unit: 2131

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CR


May 13, 2004


AYAZ SHEIKH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Notice of References Cited	Application/Control No. 09/539,667	Applicant(s)/Patent Under Reexamination TOUBOUL, SHLOMO	
	Examiner Christopher A. Revak	Art Unit 2131	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
A	US-6,339,829 B1	01-2002	Beadle et al.	713/201
B	US-5,832,274 A	11-1998	Cutler et al.	717/171
C	US-5,579,509 A	11-1996	Furtney et al.	703/27
D	US-			
E	US-			
F	US-			
G	US-			
H	US-			
I	US-			
J	US-			
K	US-			
L	US-			
M	US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N	1132796 A1	09-2001	EP	Mas Ribes	G06F 1/00
O	1091276 A1	04-2001	EP	Brette	G06F 1/00
P					
Q					
R					
S					
T					

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	Schmitt, ".EXE. files, OS-2 style" November 1988, PC Tech Journal via dialog search, Vol. 6, #11, pg 76-78
V	
W	
X	

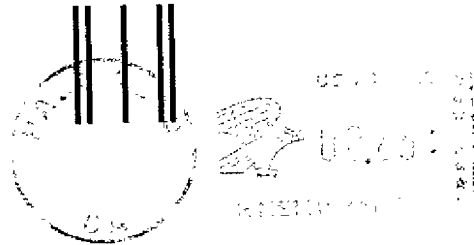
*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
 Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Date Mailed: February 25, 2004 | By: MAS/say | PTO DATE STAMP:
Serial No.: 09/539,667 | Docket No.: 43426.00011
Applicant(s): Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- | | |
|---|---|
| <input type="checkbox"/> Patent Application ___ Pages ___ Claims | <input checked="" type="checkbox"/> Amendment and Response (6 pages) |
| <input type="checkbox"/> Drawing Formal ___ Sheet | <input checked="" type="checkbox"/> Petition for Extension of Time (in duplicate) |
| <input type="checkbox"/> General Authorization / Request to Petition for Extensions of Time | |
| <input type="checkbox"/> Oath/Declaration/Power of Attorney (signed) | <input checked="" type="checkbox"/> Transmittal Form |
| <input type="checkbox"/> Assignment & Recordation Cover Sheet | <input checked="" type="checkbox"/> Fee Transmittal for FY 2004 (in duplicate) |
| <input type="checkbox"/> Verified Statement Claiming Small Entity Status | <input type="checkbox"/> Appeal Brief (in triplicate) |
| <input type="checkbox"/> Continued Prosecution Application (§1.53(d)) | <input type="checkbox"/> Petition for Extension of Time (in duplicate) |
| <input type="checkbox"/> Provisional Application _____ Pages | <input type="checkbox"/> Copy of PTO-1533, Notice to File Missing Parts |
| <input type="checkbox"/> Design Application ___ Pages ___ Drawings | <input type="checkbox"/> Info. Disclosure Statement & PTO-1449/Refs _____ |
| <input checked="" type="checkbox"/> Request for Continued Examination (RCE)
Transmittal (1 page) | <input type="checkbox"/> Other: |
| <input checked="" type="checkbox"/> Certificate(s) of First Class Mailing | |

U.S. DEPARTMENT OF COMMERCE
PATENT/TRADEMARK OFFICE
WASHINGTON, D.C. 20231




Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043




Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Art Unit	2131	
	Examiner Name	Revak, Christopher A.	
Total Number of Pages in This Submission	12	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Amendment and Response (6 pgs) <input type="checkbox"/> After Final <input checked="" type="checkbox"/> with RCE <input checked="" type="checkbox"/> Extension of Time Request (in duplicate) <input checked="" type="checkbox"/> Return Postcard <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Request for Status of Application <input type="checkbox"/> Other Enclosure(s) (please identify below):
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40 823 Squire, Sanders & Dempsey L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	February 25, 2004

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.			
Typed or printed name	Sandy Yi		
Signature		Date	February 25, 2004

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 880

Complete if Known

Application Number 09/539,867

Filing Date March 30, 2000

First Named Inventor Shlomo Touboul

Examiner Name Revak, Christopher A.

Art Unit 2131

Attorney Docket No. 43426 00011

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Other None
Order

Deposit Account:

Deposit Account Number 05-0150

Deposit Account Name Squire, Sanders & Dempsey L.L.P.

The Director is authorized to: (check all that apply)

Charge fee(s) indicated below Credit any overpayments
 Charge any additional fee(s) during the pendency of this application
 Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	
SUBTOTAL (1)					(\$ 0)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

	Total Claims	Extra Claims	Fee from below	Fee Paid
Total Claims	20	-22 **	0	0
Independent Claims	4	-4 **	0	0
Multiple Dependent				0

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	18	2202	9	Claims in excess of 20	
1201	86	2201	43	Independent claims in excess of 3	
1203	290	2203	145	Multiple dependent claim, if not paid	
1204	86	2204	43	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)					(\$ 0)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	110
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	770
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) (\$ 880)

SUBMITTED BY

Name (Print/Type)		Registration No. (Attorney/Agent)		Telephone	
Marc A. Sockol		40,823		650.856.6500	
Signature		Date		February 25, 2004	

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FEE TRANSMITTAL for FY 2004		<i>Complete if Known</i>	
<small>Effective 10/01/2003. Patent fees are subject to annual revision.</small>		Application Number	09/539,667
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Filing Date	March 30, 2000
		First Named Inventor	Shlomo Touboul
TOTAL AMOUNT OF PAYMENT (\$) 880		Examiner Name	Revak, Christopher A.
		Art Unit	2131
		Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)

Check
 Credit card
 Money Order
 Other
 None

Deposit Account:

Deposit Account Number: 05-0150

Deposit Account Name: Squire, Sanders & Dempsey L.L.P.

The Director is authorized to: (check all that apply)

Charge fee(s) indicated below
 Credit any overpayments
 Charge any additional fee(s) during the pendency of this application
 Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	35	Extension for reply within first month	110
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	490	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	770
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** (\$) 880

FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) (\$) 0

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	20	-22**	=	0	X	Fee from below	=	0
Independent Claims	4	-4**	=	0	X	Fee from below	=	0
Multiple Dependent					X	Fee from below	=	0

**or number previously paid, if greater; For Reissues, see above

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	18	2202	9	Claims in excess of 20	
1201	86	2201	43	Independent claims in excess of 3	
1203	290	2203	145	Multiple dependent claim, if not paid	
1204	86	2204	43	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$) 0

SUBMITTED BY		<i>Complete (if applicable)</i>	
Name (Print/Type)	Marc A. Sockol	Registration No. (Attorney/Agent)	40,823
Signature		Telephone	650.856.6500
		Date	February 25, 2004

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 43426.00011
In re Application of Shlomo Touboul		
Application Number 09/539,667	Filed March 30, 2000	
For SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES		
Art Unit 2131	Examiner Revak, Christopher A.	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- One month (37 CFR 1.17(a)(1)) \$110.00
- Two months (37 CFR 1.17(a)(2)) \$ _____
- Three months (37 CFR 1.17(a)(3)) \$ _____
- Four months (37 CFR 1.17(a)(4)) \$ _____
- Five months (37 CFR 1.17(a)(5)) \$ _____
- Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____ .
- A check in the amount of the fee is enclosed.
- Payment by credit card. Form PTO-2038 is attached.
- The Director has already been authorized to charge fees in this application to a Deposit Account.
- The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 05-0150 .
- I have enclosed a duplicate copy of this sheet.

I am the applicant/inventor.

assignee of record of the entire interest. See 37 CFR 3.71
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

attorney or agent of record. Registration Number 40,823


attorney or agent under 37 CFR 1.34(a).
Registration number if acting under 37 CFR 1.34(a). _____ .

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February 25, 2004

Date
650-843-3392

Telephone Number



Signature
Marc A. Sockol

Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of 1 form is submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 43426.00011
In re Application of Shlomo Touboul		
Application Number 09/539,667	Filed March 30, 2000	
For SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES		
Art Unit 2131	Examiner Revak, Christopher A.	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- One month (37 CFR 1.17(a)(1)) \$110.00
- Two months (37 CFR 1.17(a)(2)) \$ _____
- Three months (37 CFR 1.17(a)(3)) \$ _____
- Four months (37 CFR 1.17(a)(4)) \$ _____
- Five months (37 CFR 1.17(a)(5)) \$ _____
- Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.
- A check in the amount of the fee is enclosed.
- Payment by credit card. Form PTO-2038 is attached.
- The Director has already been authorized to charge fees in this application to a Deposit Account.
- The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 05-0150.
I have enclosed a duplicate copy of this sheet.

- I am the applicant/inventor.
- assignee of record of the entire interest. See 37 CFR 3.71
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).
- attorney or agent of record. Registration Number 40,823
- attorney or agent under 37 CFR 1.34(a).
Registration number if acting under 37 CFR 1.34(a): _____.

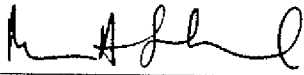
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February 25, 2004

Date

650-843-3392

Telephone Number



Signature

Marc A. Sockol

Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

Total of 1 form is submitted.

This collection of information is required by 37 CFR 1.138(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Request For Continued Examination (RCE) Transmittal Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	<i>Application Number</i>	09/539,667
	<i>Filing Date</i>	March 30, 2000
	<i>First Named Inventor</i>	Shlomo Touboul
	<i>Art Unit</i>	2131
	<i>Examiner Name</i>	Revak, Christopher A.
	<i>Attorney Docket Number</i>	43426.00011

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 C.F.R. 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

ii. Other _____

b. Enclosed

i. Amendment/Reply

ii. Affidavit(s)/Declaration(s)

iii. Information Disclosure Statement (IDS)

iv. Other _____

2. Miscellaneous

a. Suspension of action on the above-identified application is requested under 37 C.F.R. 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. 1.17(i) required)

b. Other _____

3. Fees The RCE fee under 37 C.F.R. 1.17(e) is required by 37 C.F.R. 1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 05-0150

i. RCE fee required under 37 C.F.R. 1.17(e)

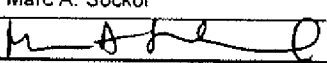
ii. Extension of time fee (37 C.F.R. 1.138 and 1.17)

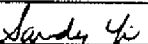
iii. Other _____

b. Check in the amount of \$ _____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED			
<i>Name (Print /Type)</i>	Marc A. Sockol	<i>Registration No. (Attorney/Agent)</i>	40,823
<i>Signature</i>		<i>Date</i>	February 25, 2004

CERTIFICATE OF MAILING OR TRANSMISSION			
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.			
<i>Name (Print /Type)</i>	Sandy Yi	<i>Date</i>	February 25, 2004
<i>Signature</i>		<i>Date</i>	February 25, 2004

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

Date: 2/25/2004

By: Sandy Yi

In Re Patent Application of: Shlomo Touboul
Application No: 09/539,667
Filed: March 30, 2000
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES
Examiner: Christopher A. Revak
Art Unit: 2131

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE WITH RCE

Sir:

In response to the Office Action dated October 27, 2003, the shortened statutory deadline for response ending on February 27, 2004 with the enclosed request for one-month extension and RCE, applicant respectfully requests that the above-identified application be amended as follows:

IN THE CLAIMS:

Please substitute the following claims for the pending claims with the same number:

1 1. (Currently amended) A computer-based method for generating a
2 Downloadable ID to identify a Downloadable, comprising:
3 obtaining a Downloadable that includes one or more references
4 to software components required to be executed by the Downloadable;
5 fetching at least one software component identified by the one or
6 more references; and
7 performing a function on the Downloadable and the fetched
8 software components to generate a Downloadable ID.

1 2. (Original) The method of claim 1, wherein the Downloadable includes an
2 applet.

1 3. (Previously amended) The method of claim 1, wherein the Downloadable
2 includes an active software control.

1 4. (Original) The method of claim 1, wherein the Downloadable includes a
2 plugin.

1 5. (Original) The method of claim 1, wherein the Downloadable includes
2 HTML code.

1 6. (Original) The method of claim 1, wherein the Downloadable includes an
2 application program.

1 7. (Original) The method of claim 1, wherein the function includes a hashing
2 function.

1 8. (Previously amended) The method of claim 1, wherein said fetching includes
2 fetching the first software component referenced by the Downloadable.

1 9. (Cancelled)

1 10. (Previously amended) The method of claim 1, wherein said fetching includes
2 fetching all software components referenced by the Downloadable.

1 11. (Currently amended) A system for generating a Downloadable ID to identify
2 a Downloadable, comprising:

3 a communications engine for obtaining a Downloadable that
4 includes one or more references to software components required to be executed
5 by the Downloadable; and

6 an ID generator coupled to the communications engine for
7 fetching at least one software component identified by the one or more references,
8 and for performing a function on the Downloadable and the fetched software
9 components to generate a Downloadable ID.

1 12. (Original) The system of claim 11, wherein the Downloadable includes an
2 applet.

1 13. (Previously amended) The system of claim 11, wherein the
2 Downloadable includes an active software control.

1 14. (Original) The system of claim 11, wherein the Downloadable includes a
2 plugin.

1 15. (Original) The system of claim 11, wherein the Downloadable includes
2 HTML code.

1 16. (Original) The system of claim 11, wherein the Downloadable includes an
2 application program.

1 17. (Original) The system of claim 11, wherein the function includes a hashing
2 function.

1 18. (Previously amended) The system of claim 11, wherein the ID generator
2 fetches the first software component referenced by the Downloadable.

1 19. (Cancelled)

1 20. (Previously amended) The method of claim 11, wherein the ID generator
2 fetches all software components referenced by the Downloadable.

1 21. (Currently amended) A system for generating a Downloadable ID to identify
2 a Downloadable, comprising:

3 means for obtaining a Downloadable that includes one or more
4 references to software components required to be executed by the Downloadable;

5 means for fetching at least one software component identified by
6 the one or more references; and

7 means for performing a function on the Downloadable and the
8 fetched software components to generate a Downloadable ID.

1 22. (Currently amended) A computer-readable storage medium storing program
2 code for causing a computer to perform the steps of:

3 obtaining a Downloadable that includes one or more references
4 to software components required to be executed by the Downloadable;

5 fetching at least one software component identified by the one or
6 more references; and

7 performing a function on the Downloadable and the fetched
8 software components to generate a Downloadable ID.

REMARKS

Claims 1 – 8, 10 – 18 and 20 – 22 are presented for examination. Claims 1, 11, 21 and 22 are being amended. Applicant respectfully requests reconsideration of the application in view of the amendments above and remarks below.

Applicant would like to thank the Examiner for the interview on January 27, 2004 to discuss the office action, the Apperson reference and the current claim set. During the interview, Applicant and the Examiner discussed how the system described in the Apperson reference associates privileges to a Downloadable and then allows the Downloadable to execute only those operations allowed by the associated privileges. Applicant and the Examiner discussed how the privileges in Apperson are monitored by the browser, not executed by the Downloadable, and further how the Apperson reference does not generate Downloadable IDs based on the fetched executable components. Further, Applicant and the Examiner discussed adding the language “to be executed” into the claim language to further show that the additional components are “to be executed,” thereby highlighting that difference between the Apperson reference and claimed invention.

Specifically, in paragraphs 1 and 2 of the office action, the Examiner rejected claims 1, 5-8, 10, 11, 15-18 and 20-22 under 35 USC § 103(a) over Apperson. Apperson describes the use of digital certificates to authorize privileges for executable code. Such privileges include file I/O privileges, network privileges and registry privileges (Apperson / col. 2, lines 41 – 53; col. 4, lines 33 – 43; FIG. 2).

Apperson, however, does not teach fetching at least one software component referenced by a Downloadable, where the software component is “required to be executed by the Downloadable” and “performing a function on the Downloadable and the fetched software components to generate a Downloadable ID” as recited in independent claims 1, 11, 21 and 22, as amended. As will be recognized by those skilled in the art, in some embodiments, the Downloadable ID may be used to recognize the “same” Downloadable regardless of how the Downloadable is subdivided and/or downloaded before and/or during execution. Since all other claims depend from these independent claims, Applicant

respectfully submits that they are distinguishable over Apperson for at least the same reasons.

In paragraph 3, the Examiner rejected claims 2-4 and 12-14 over Apperson in view of Khare. Khare describes Microsoft Corporation's implementation of digital signatures, referred to as Authenticode, as applied to ActiveX controls and Java applets. Like Apperson, Khare does not teach fetching at least one software component referenced by a Downloadable, where the software component is "required to be executed by the Downloadable" and "performing a function on the Downloadable and the fetched software components to generate a Downloadable ID" as recited in independent claims 1, 11, 21 and 22, as amended. Since claims 2-4 and 12-14 depend from claims 1 and 11, respectively, Applicant respectfully submits that they are patentable for at least the same reasons.

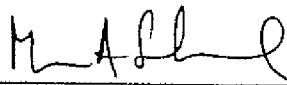
For the foregoing reasons, applicant respectfully submits that the claims are in condition for allowance.

If the Examiner has any questions or needs any additional information, the Examiner is invited to telephone the undersigned attorney at (650) 843-3392. If for any reason an insufficient fee has been paid, please charge the insufficiency to Deposit Account No. 05-0150.

Date: February 25, 2004

Respectfully submitted,

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: (650) 856-6500
Facsimile: (650) 843-8777

By: 
Marc A. Sockol
Attorney for Applicant
Registration No. 40,823

**SQUIRE
SANDERS**

LEGAL
COUNSEL
WORLDWIDE

SQUIRE, SANDERS & DEMPSEY L.L.P.

600 Hansen Way
Palo Alto, CA 94304-1043
Office: +1.650.856.6500
Fax: +1.650.843.8777

Preferred Fax: _____
If Problems: _____

February 25, 2004

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TO: Examiner Chris Revak

FAX NO.: 703-746-7622

COMPANY: U.S. Patent and Trademark Office

PHONE NO.: 703-305-1843

FROM: Marc A. Sockol

DIRECT DIAL NO.: +1.650.843.3392

E-MAIL: MSockol@ssd.com

RE: U.S. Patent Application

Entitled: "System and Method for Protecting a Computer and a Network
from Hostile Downloadables"

Serial No.: 09/539,667

Inventor: Shlomo Touboul

Filing Date: March 30, 2000

Our Ref.: 43426.00011

Dear Chris,

Attached please find a courtesy copy of the Amendment and Response with RCE which we filed via U.S. mail today. If you have any questions, please contact me at 650-843-3392. Thank you for your time and consideration.

Sincerely,

Marc 

CONFIDENTIALITY NOTICE:

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43426.00011

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SQUIRE SANDERS

LEGAL
COUNSEL
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SQUIRE, SANDERS & DEMPSEY L.L.P.

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February 25, 2004

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Number Of Pages (including cover): 7

To: Examiner Chris Revak

FAX NO.: 703-746-7622

COMPANY: U.S. Patent and Trademark Office

PHONE NO.: 703-305-1843

FROM: Marc A. Sockol

DIRECT DIAL NO.: +1.650.843.3392

E-MAIL: MSockol@ssd.com

RE: U.S. Patent Application

Entitled: "System and Method for Protecting a Computer and a Network
from Hostile Downloadables"

Serial No.: 09/539,667

Inventor: Shlomo Touboul

Filing Date: March 30 2000

Blue Coat Systems - Exhibit 1004



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,667	03/30/2000	Shlomo Touboul	40492.00011 43426	8436
30256	7590	10/27/2003	EXAMINER REVAK, CHRISTOPHER A	
SQUIRE, SANDERS & DEMPSEY L.L.P 600 HANSEN WAY PALO ALTO, CA 94304-1043			ART UNIT PAPER NUMBER 2131	

DATE MAILED: 10/27/2003

Response to FINAL OA Due: 1/27/04
Notice of Appeal: 4/27/04

Please find below and/or attached an Office communication concerning this application or proceeding.

DATES ENTERED _____
Response Due
1/27/04

OCT 30 2003

CALENDARED
BY _____ *SAJ*
ATTORNEY _____
SQUIRE, SANDERS & DEMPSEY

Office Action Summary	Application No. 09/539,667	Applicant(s) TOUBOUL, SHLOMO	
	Examiner Christopher A. Revak	Art Unit 2131	

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 04 August 2003.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-8,10-18 and 20-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-8,10-18,20-22 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) Interview Summary (PTO-413) Paper No(s). _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

1.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed on August 4, 2003 have been fully considered but they are not persuasive. The examiner notes the applicant's arguments pertaining to Apperson et al failing to recite of "obtaining one or more references to software components required by the downloadable" and "performing a function on the downloadable and the fetched software components to generate a downloadable ID," however the examiner has not been persuaded by the applicant's remarks. As support of the examiner's stance taken on it being obvious for "executable code (downloadable) includes any references", the examiner has provided the teachings of Doyle et al as support for the stance taken. Doyle et al recites of dynamic link libraries allow executables (downloadables) to be stored separately with as files with calling extensions and to be loaded only when needed by the program (pg 137-138). Although Doyle et al discloses of the storing the dlls separately, they access functions (obtaining one or more references on the downloadable) for the executable. Furthermore, the use of dynamic link libraries are associated with the executable file the teachings of Apperson et al perform the function of a SHA-hash (function) on the executable code (col. 4, lines 44-48) that includes the dynamic link library.

Claim Rejections - 35 USC § 103

I. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

II. Claims 1,5-8,10,11,15-18,20,21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al.

As per claims 1,11,21, and 22, Apperson et al discloses of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). Also recited by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories (first and all components referenced) that the executable code (downloadable) may try to perform on the client machine (one or more references to a component)(col. 2, lines 43-47). The teachings of Apperson et al are silent in disclosing that the executable code (downloadable) does not include any references. The examiner hereby asserts that it is obvious for the teachings of Apperson et al to make use of this feature. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to include or exclude components in executable code (downloadable). The governing factor would be the intent of the executable code (downloadable) and

how it was designed. If it were a independent of any other function within an interactive environment, such as documents on the World Wide Web, then it could be executed independent of any other components once downloaded onto a user's computer. Otherwise, if downloaded executable code was dependent on functions on a user's computer as is explicitly disclosed by Apperson et al (col. 2, lines 43-47), then the specific functions would be referenced by the executable code (downloadable). It is obvious that the teachings of Apperson et al could have include executable code (downloadable) without including any references since there exists various types of executable code that may or may not reference other components.

As per claims 5,6,15, and 16, it is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as including HTML code or an application program. The examiner hereby takes official notice that it is notoriously well known that HTML code and application programs include executable code. It would have been obvious to a person of ordinary skill in the art to have been motivated to interpret the teachings of Apperson et al to have included the use of HTML code and application programs as specific forms of executable code. It is notoriously well known that HTML code and application programs are information that is transferred across the Internet and downloaded by a client

computer's browser which reads and executes the executable code. An application program is known as being a program in assisting in the performance of a specific task, namely a web based document processing and HTML is known as a markup language used for documents on the World Wide Web and indicates how web browsers should display the elements of a web document to a user. It is obvious that the teachings of Apperson et al could have included HTML code and application code as forms of executable code (downloadables) since it is executable information which is transferred across the Internet.

As per claims 7 and 17, Apperson et al discloses of performing the function of a SHA-hash (function) on the executable code (col. 4, lines 44-48).

As per claims 8, 10, 18, and 20, it is taught by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories (first and all components referenced) that the executable code (downloadable) may try to perform on the client machine (col. 2, lines 43-47).

III. Claims 2-4 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al in view of Khare.

It is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a

known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as being an applet, active software control, or a plug-in. It is disclosed by Khare of an identical teaching which discloses Microsoft announcing a tool that allows vendors to digitally sign active software controls, Java (applets), and plug-in components (pg 1). It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to apply code signing to information such as active software controls, Java applets, and plug-in components. The teachings of Khare disclose that the intent of code signing is to identify a creator of an Internet based applet before a user downloads it and it is designed to provide users with the same level of security found in marketed software which is based on a level of trust and place pressure on independent service vendors (ISVs) honest and the additionally issue digital certificates to the executables (downloadable) components such as ActiveX (active software) controls (pg 1). Apperson et al additional recites of motivation that enables servers to download executables (downloadables) with full client validation of their origin and authenticity (col. 2, lines 34-38) and the teachings of Khare are an obvious extension of the teachings of Apperson et al as a means of identifying specific components such as an applet, active software control, or a plug-in to provide a user/client with information about the executable (downloadable) and if it is trusted from an external source and if it has been authenticated.

Conclusion

IV. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

V. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Doyle et al, "Microsoft Press Computer Dictionary"

VI. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Revak whose telephone number is (703) 305-1843. The examiner can normally be reached on Monday-Thursday from 6:30 am to 4:00 pm. The examiner can also be reached on alternate Fridays from 6:30 am to 3:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh, can be reached at (703) 305-9648. The fax phone number for the organization where this application or proceeding is assigned as follows:

for After-Final Communications: (703) 746-7238;
for Official Communications: (703) 746-7239;
for Non-Official Communications: (703) 746-7240.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Application/Control Number: 09/539,667
Art Unit: 2131

Page 9

CR
im
October 13, 2003



FRANTZ B. JEAN
PRIMARY EXAMINER

Notice of References Cited	Application/Control No. 09/539,667	Applicant(s)/Patent Under Reexamination TOUBOUL, SHLOMO	
	Examiner Christopher A. Revak	Art Unit 2131	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A US-			
	B US-			
	C US-			
	D US-			
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	O				
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	S				
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NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	Doyle et al, "Microsoft Press Computer Dictionary" 1993, Microsoft Press, 2nd Edition, pg 137-138
V	
W	
X	

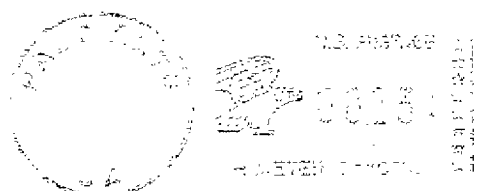
*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a))
 Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Date Mailed: July 31, 2003 | By: MAS/emj | PTO DATE STAMP:
 Application No.: 09/539,667 | Docket No.: 43426.0001
 Applicant: Shiomo Touboul
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application ___ Pages ___ Claims
- Drawings Informal ___ Sheets
- General Authorization / Request to Petition for Extensions of Time
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- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (§1.53(d))
- Provisional Application ___ Pages
- Design Application ___ Pages ___ Drawings
- Status Letter
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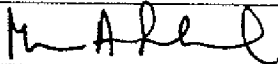


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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>		Application Number	09/539,667
		Filing Date	March 30, 2000
		First Named Inventor	Shlomo Touboul
		Art Unit	2131
		Examiner Name	Christopher A. Revak
Total Number of Pages in This Submission	13	Attorney Docket Number	43426.00011


ENCLOSURES (check all that apply)		
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Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	July 31, 2003

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Eileen M. Janikowski		
Signature		Date	July 31, 2003

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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 110

Complete if Known

Application Number	09/539,667
Filing Date	March 30, 2000
First Named Inventor	Shlomo Touboul
Examiner Name	Christopher A. Revak
Art Unit	2131
Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Other None Order

Deposit Account:

Deposit Account Number: 05-0150

Deposit Account Name: Squire, Sanders & Dempsey, L.L.P.

The Director is authorized to: (check all that apply)

Charge fee(s) indicated below Credit any overpayments
 Charge any additional fee(s) during the pendency of this application
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FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	
SUBTOTAL (1)					(\$ 0)

SUBTOTAL (1) (\$ 0)

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
20 **	0		0
Independent Claims	3 **	0	0
Multiple Dependent			0

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	18	2202	9	Claims in excess of 20	
1201	84	2201	42	Independent claims in excess of 3	
1203	280	2203	140	Multiple dependent claim, if not paid	
1204	84	2204	42	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)					(\$ 0)

SUBTOTAL (2) (\$ 0)

**or number previously paid, if greater; For Reissues, see above

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,300	2453	650	Petition to revive - unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (g)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
Other fee (specify) Terminal Disclaimer Fee					110
*Reduced by Basic Filing Fee Paid					
SUBTOTAL (3)					(\$ 110)

SUBMITTED BY

Name (Print/Type)	Registration No. Attorney/Agent)	Telephone	Date
Marc A. Sockol	40,823	(850) 856-6500	July 31, 2003

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This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 110

Complete if Known

Application Number	09/539,667
Filing Date	March 30, 2000
First Named Inventor	Shiomo Touboul
Examiner Name	Christopher A. Revak
Art Unit	2131
Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Other None Order

Deposit Account:

Deposit Account Number: 05-0150

Deposit Account Name: Squire, Sanders & Dempsey, LLP.

The Director is authorized to: (check all that apply)

Charge fee(s) indicated below Credit any overpayments
 Charge any additional fee(s) during the pendency of this application
 Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	
SUBTOTAL (1)					(\$) 0

2. EXTRA CLAIM FEES

Total Claims	-20 **	=	0	X	0	=	0
Independent Claims	-3 **	=	0	X	0	=	0
Multiple Dependent		X		=	0		

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	16	2202	9	Claims in excess of 20	
1201	84	2201	42	Independent claims in excess of 3	
1203	250	2203	140	Multiple dependent claim, if not paid	
1204	84	2204	42	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)					(\$) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	
1403	250	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,300	2453	650	Petition to revive - unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) Terminal Disclaimer Fee

110

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$) 110

SUBMITTED BY

Name (Print/Type)	Marc A. Sockol	Registration No. Attorney/Agent	40,823	Telephone	(650) 856-6500
Signature		Date	July 31, 2003		

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

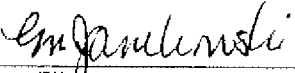
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

Date: July 31, 2003

By: 
Eileen M. Janikowski

In Re Patent Application of:)	
)	Examiner: Christopher A. Revak
Shlomo Touboul)	
)	Art Unit: 2131
Application No: 09/539,667)	
)	
Filed: March 30, 2000)	
)	
For: SYSTEM AND METHOD FOR)	
PROTECTING A COMPUTER)	
AND A NETWORK FROM)	
HOSTILE DOWNLOADABLES)	
)	

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO OFFICE ACTION
UNDER 37 C.F.R. §1.111

Sir:

In response to the Office Action dated July 1, 2003 and pursuant to 37 C.F.R. §1.111, applicant respectfully requests that the above-identified application be amended as follows:

IN THE ABSTRACT OF THE DISCLOSURE:

Kindly replace the Abstract of the Disclosure with the following text:

-- A computer-based method for generating a Downloadable ID to identify a Downloadable, including obtaining a Downloadable that includes one or more references to software components required by the Downloadable, fetching at least one software component identified by the one or more references, and performing a function on the Downloadable and the fetched software components to generate a Downloadable ID. A system and a computer-readable storage medium are also described and claimed. --

IN THE CLAIMS:

Kindly cancel claims 9 and 19 without prejudice.

Please substitute the following claims for the pending claims with the same number:

- 1 1. (Currently amended) A computer-based method for generating a
2 Downloadable ID to identify a Downloadable, comprising [the steps of]:
3 obtaining a Downloadable that includes one or more references
4 to software components required by the Downloadable;
5 fetching[, if the Downloadable includes one or more references
6 to a component,] at least one software component identified by the one or more
7 references; and
8 performing a function on the Downloadable and [all] the fetched
9 software components [fetched] to generate a Downloadable ID.
- 1 2. (Original) The method of claim 1, wherein the Downloadable includes an
2 applet.
- 1 3. (Currently amended) The method of claim 1, wherein the Downloadable
2 includes an [ActiveXTM] active software control.
- 1 4. (Original) The method of claim 1, wherein the Downloadable includes a
2 plugin.
- 1 5. (Original) The method of claim 1, wherein the Downloadable includes
2 HTML code.
- 1 6. (Original) The method of claim 1, wherein the Downloadable includes an
2 application program.
- 1 7. (Original) The method of claim 1, wherein the function includes a hashing
2 function.

1 8. (Currently amended) The method of claim 1, wherein [the step of] said
2 fetching includes [the step of] fetching the first software component referenced by
3 the Downloadable.

1 9. (Cancelled)

1 10. (Currently amended) The method of claim 1, wherein [the step of] said
2 fetching includes fetching all software components referenced by the
3 Downloadable.

1 11. (Currently amended) A system for generating a Downloadable ID to identify
2 a Downloadable, comprising:
3 a communications engine for obtaining a Downloadable that
4 includes one or more references to software components required by the
5 Downloadable; and
6 an ID generator coupled to the communications engine for
7 fetching[, if the Downloadable includes one or more references to a component,]
8 at least one software component identified by the one or more references, and for
9 performing a function on the Downloadable and [all] the fetched software
10 components [fetched] to generate a Downloadable ID.

1 12. (Original) The system of claim 11, wherein the Downloadable includes an
2 applet.

1 13. (Currently amended) The system of claim 11, wherein the
2 Downloadable includes an [ActiveXTM] active software control.

1 14. (Original) The system of claim 11, wherein the Downloadable includes a
2 plugin.

1 15. (Original) The system of claim 11, wherein the Downloadable includes
2 HTML code.

1 16. (Original) The system of claim 11, wherein the Downloadable includes an
2 application program.

1 17. (Original) The system of claim 11, wherein the function includes a hashing
2 function.

1 18. (Currently amended) The system of claim 11, wherein the ID generator
2 fetches the first software component referenced by the Downloadable.

1 19. (Cancelled)

1 20. (Currently amended) The method of claim 11, wherein the ID generator
2 fetches all software components referenced by the Downloadable.

1 21. (Currently amended) A system for generating a Downloadable ID to identify
2 a Downloadable, comprising:

3 means for obtaining a Downloadable that includes one or more
4 references to software components required by the Downloadable;

5 means for fetching[, if the Downloadable includes one or more
6 references to a component,] at least one software component identified by the one
7 or more references; and

8 means for performing a function on the Downloadable and [all]
9 the fetched software components [fetched] to generate a Downloadable ID.

1 22. (Currently amended) A computer-readable storage medium storing program
2 code for causing a computer to perform the steps of:

3 obtaining a Downloadable that includes one or more references
4 to software components required by the Downloadable;

5 fetching[, if the Downloadable includes one or more references
6 to a component,] at least one software component identified by the one or more
7 references; and

8 performing a function on the Downloadable and [all] the fetched
9 software components [fetched] to generate a Downloadable ID.

REMARKS

Applicant has carefully studied the outstanding Office Action. The present amendment is intended to place the application in condition for allowance and is believed to overcome all of the objections and rejections made by the Examiner. Favorable reconsideration and allowance of the application are respectfully requested.

Applicant has canceled claims 9 and 19, and amended claims 1, 3, 8, 10, 11, 13, 18 and 20 - 22 to more properly claim the present invention. No new matter has been added. Claims 1 - 8, 10 - 18 and 20 - 22 are presented for examination.

Applicant notes that the page headers of the Office Action indicate an incorrect Application/Control Number.

In paragraphs 2 and 3 of the Office Action, the Examiner has objected to the abstract of the disclosure. Accordingly, applicant has amended the abstract so as to conform to the proper language and format.

In paragraphs 4 and 5 of the Office Action, the Examiner has rejected claims 1, 11, 21 and 22 under the judicially created doctrine of double patenting. Accordingly, applicant is submitting a terminal disclaimer with the present amendment.

In paragraphs 6 and 7 of the Office Action, the Examiner has rejected claims 3 and 13 under 35 U.S.C. §112, second paragraph as being indefinite. Applicant has amended these claims accordingly.

In paragraphs 8 and 9 of the Office Action, the Examiner has rejected claims 1, 7, 8, 10, 11, 17, 18, and 20 - 22 under 35 U.S.C. §102(e) as being anticipated by Apperson et al., U.S. Patent No. 5,978,484 ("Apperson").

In paragraphs 10 and 11 of the Office Action, the Examiner has rejected claims 2 - 4 and 12 - 14 under 35 U.S.C. §103(a) as being unpatentable over Apperson in view of Khare, "Microsoft Authenticode Analyzed", July 22, 1996, xent.com/FoRK-archive/summer96/0338.html, pg. 1 and 2 ("Khare").

In paragraph 12 of the Office Action, the Examiner has rejected claims 5, 6, 9, 15, 16 and 19 under 35 U.S.C. §103(a) as being unpatentable over Apperson. Applicant has canceled claims 9 and 19 without acquiescence to the Examiner's reasons for rejection and respectfully submits that rejection of those claims is thus rendered moot.

Distinctions between Claimed Invention and U.S. Patent No. 5,978,484 to Apperson et al in view of Khare, "Microsoft Authenticode Analyzed", July 22, 1996, xent.com/FoRK-archive/summer96/0338.html, pg. 1 and 2

The present invention concerns generation of an ID for mobile code downloaded to a client computer, referred to as a Downloadable. Specifically, the present invention fetches software components required by the Downloadable, and performs a hashing function on the Downloadable together with its fetched components (original specification / page 3, lines 11 – 14; page 15, lines 21 – 24; page 19, line 21 – page 20, line 6; FIG. 8). Thus, for a Java applet, the present invention fetches Java classes identified by the applet bytecode, and generates the Downloadable ID from the applet and the fetched Java classes; and for an ActiveXTM control, the present invention fetches components listed in its .INF file, and generates a Downloadable ID from the ActiveXTM control and the fetched components (original specification / page 9, lines 15 – 18).

An advantage of the present invention is that it produces the same ID for a Downloadable, regardless of which software components are included with the Downloadable and which software components are only referenced (original specification / page 9, lines 18 – 20; page 20, lines 5 and 6). The same Downloadable may be delivered with some required software components included and others missing, and in each case the generated Downloadable ID will be the same. Thus the same Downloadable is recognized through many equivalent guises.

Apperson describes use of digital certificates to authorize privileges for executable code, such as file I/O privileges, network privileges and registry privileges (Apperson / col. 2, lines 41 – 53; col. 4, lines 33 – 43; FIG. 2).

Khare describes Microsoft Corporation's implementation of digital signatures, referred to as Authenticode, as applied to ActiveX controls and Java applets.

In distinction to the present invention, Apperson and Khare do not teach fetching software components of executable code. In order to further clarify this distinction, applicant has amended the claims so as to refer to software components required by the Downloadable.

In paragraph 9 of the Office Action, the Examiner has indicated that Apperson discloses fetching components of a Downloadable. Applicant respectfully submits that Apperson's privilege request code does not include components of a Downloadable, but instead includes a list of "*privileges or*

privilege categories that the executable code might perform on the client machine" (Apperson / col. 2, lines 45 – 47).

The rejections of claims 1 –8 and 10 in paragraphs 8 - 12 of the Office Action will now be dealt with specifically.

As to amended independent method claim 1, applicant respectfully submits that the limitation in claim 1 of:

"fetching at least one software component identified by the one or more references"

is neither shown nor suggested in Apperson or Khare.

Because claims 2 – 8 and 10 depend from claim 1 and include additional features, applicant respectfully submits that claims 2 - 8 and 10 are not anticipated or rendered obvious by Apperson and Khare, taken alone or in combination.

Accordingly claims 1 – 8 and 10 are deemed to be allowable.

As to amended independent system claim 11, applicant respectfully submits that the limitation in claim 11 of:

"an ID generator coupled to the communications engine for fetching at least one software component identified by the one or more references"

is neither shown nor suggested in Apperson or Khare.

Because claims 12 – 18 and 20 depend from claim 11 and include additional features, applicant respectfully submits that claims 12 – 18 and 20 are not anticipated or rendered obvious by Apperson and Khare, taken alone or in combination.

Accordingly claims 12 – 18 and 20 are deemed to be allowable.

As to amended independent system claim 21, applicant respectfully submits that the limitation in claim 21 of:

"means for fetching at least one software component identified by the one or more references"

is neither shown nor suggested in Apperson or Khare.

Accordingly claim 21 is deemed to be allowable.

As to amended independent system claim 22, applicant respectfully submits that the limitation in claim 22 of:

"fetching at least one software component identified by the one or more references"

is neither shown nor suggested in Apperson or Khare.

Accordingly claim 22 is deemed to be allowable.

Support for Amended Claims in Original Specification

Regarding amended claims 1, 8, 10, 11, 18 and 20 - 22, fetching software components is described in the original specification on page 9, lines 13 - 18 and FIG. 8.

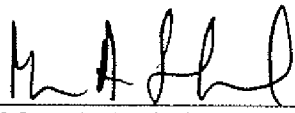
For the foregoing reasons, applicant respectfully submits that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

If the Examiner has any questions or needs any additional information, the Examiner is invited to telephone the undersigned attorney at (650) 843-3392. If for any reason an insufficient fee has been paid, please charge the insufficiency to Deposit Account No. 05-0150.

Date: July 31, 2003

Respectfully submitted,

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: (650) 856-6500
Facsimile: (650) 843-8777

By: 

Marc A. Sockol
Attorney for Applicant
Registration No. 40,823

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**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING
REJECTION OVER A PRIOR PATENT**

Docket Number (Optional)
43426.00011

In re Application of: Shlomo Touboul

Application No. 09/539,667

Filed: March 30, 2000

For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADING

The owner*, Finjan Software, Ltd. of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application, which would extend beyond the expiration date of the full statutory term defined in 35 U.S.C. 154 and 173, as presently shortened by any terminal disclaimer, of prior Patent No. 6,092,194. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of the prior patent, as presently shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims cancelled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. For submissions on behalf of an organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. The undersigned is an attorney of record.



July 31, 2003

Signature

Date

Marc A. Sockol, Reg. No. 40,823

Typed or printed name

(650) 856-6500

Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) is included.

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*Certification under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/539,667	03/30/2000	Shlomo Touboul	40492.00011 42926	8436
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30256 7590 07/01/2003

SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO, CA 94304-1043

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT	PAPER NUMBER
----------	--------------

2131

5

DATE MAILED: 07/01/2003

Response Due: 10/1/2003
FINAL: 1/1/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

DATES ENTERED

Response Due 10/1/2003

JUL 07 2003

CALENDARED

BY SAD
ATTORNEY
SQUIRE, SANDERS & DEMPSEY

Office Action Summary

Application No. 09/539,667	Applicant(s) TOUBOUL, SHLOMO
Examiner Christopher A. Revak	Art Unit 2131

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-22 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 - * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) Interview Summary (PTO-413) Paper No(s). _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other:

Art Unit: 2131

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement submitted is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally ***limited to a single paragraph*** on a separate sheet within the range of 50 to 250 words. It is important that the abstract not exceed 250 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

It is noted by the examiner that the abstract should be amended to be incorporated into a single paragraph.

3. The specification is objected to because the current status of application 08/964,388 is not listed. It should be included that the application is now U.S. Patent 6,092,194. Correction is required.

Art Unit: 2131

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1,11,21, and 22 are rejected under the judicially created doctrine of double patenting over claims 1,17,18,32,40, and 41 of U. S. Patent No. 6,092,194 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: It is disclosed of comprising obtaining a downloadable, fetching the downloadable includes one or more references to a component, at least one component identified by the one or more references, and performing a function on the downloadable and all components fetched to generate a downloadable ID. The language "comprising" is open-ended language which contains at least the listed elements which all the current elements in claims 1,11,21, and 22 of the instant application are taught in claims 1,17,18,32,40, and 41 of U.S. Patent 6,092,194.

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Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 3 and 13 contain the trademark/trade name "ActiveX". Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe an executable type of code and, accordingly, the identification/description is indefinite.

Art Unit: 2131

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), but another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1,7,8,10,11,17,18,20,21, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Apperson et al.

As per claims 1,11,21, and 22, Apperson et al discloses of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53).

As per claims 7 and 17, Apperson et al discloses of performing the function of a SHA-hash (function) on the executable code (col. 4, lines 44-48).

As per claims 8,10,18, and 20, it is taught by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege

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categories (first and all components referenced) that the executable code (downloadable) may try to perform on the client machine (col. 2, lines 43-47).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 2-4 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al in view of Khare.

It is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as being an applet, ActiveX control, or a plug-in. It is disclosed by Khare of an identical teaching which discloses Microsoft announcing a tool that allows vendors to digitally sign ActiveX

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(controls), Java (applets), and plug-in components (pg 1). It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to apply code signing to information such as ActiveX controls, Java applets, and plug-in components. The teachings of Khare disclose that the intent of code signing is to identify a creator of an Internet based applet before a user downloads it and it is designed to provide users with the same level of security found in marketed software which is based on a level of trust and place pressure on independent service vendors (ISVs) honest and the additionally issue digital certificates to the executables (downloadable) components such as ActiveX controls (pg 1). Apperson et al additional recites of motivation that enables servers to download executables (downloadables) with full client validation of their origin and authenticity (col. 2, lines 34-38) and the teachings of Khare are an obvious extension of the teachings of Apperson et al as a means of identifying specific components such as an applet, ActiveX control, or a plug-in to provide a user/client with information about the executable (downloadable) and if it is trusted from an external source and if it has been authenticated.

12. Claims 5,6,9,15,16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al.

As per claims 5,6,15, and 16, it is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs

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(performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as including HTML code or an application program. The examiner hereby takes official notice that it is notoriously well known that HTML code and application programs include executable code. It would have been obvious to a person of ordinary skill in the art to have been motivated to interpret the teachings of Apperson et al to have included the use of HTML code and application programs as specific forms of executable code. It is notoriously well known that HTML code and application programs are information that is transferred across the Internet and downloaded by a client computer's browser which reads and executes the executable code. An application program is known as being a program in assisting in the performance of a specific task, namely a web based document processing and HTML is known as a markup language used for documents on the World Wide Web and indicates how web browsers should display the elements of a web document to a user. It is obvious that the teachings of Apperson et al could have included HTML code and application code as forms of executable code (downloadables) since it is executable information which is transferred across the Internet.

As per claims 9 and 19, it is taught by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories (first and all components referenced) that the executable code (downloadable) may try

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to perform on the client machine (one or more references to a component)(col. 2, lines 43-47). The teachings of Apperson et al are silent in disclosing that the executable code (downloadable) does not include any references. The examiner hereby asserts that it is obvious for the teachings of Apperson et al to make use of this feature. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to include or exclude components in executable code (downloadable). The governing factor would be the intent of the executable code (downloadable) and how it was designed. If it were a independent of any other function within an interactive environment, such as documents on the World Wide Web, then it could be executed independent of any other components once downloaded onto a user's computer. Otherwise, if downloaded executable code was dependent on functions on a user's computer as is explicitly disclosed by Apperson et al (col. 2, lines 43-47), then the specific functions would be referenced by the executable code (downloadable). It is obvious that the teachings of Apperson et al could have include executable code (downloadable) without including any references since there exists various types of executable code that may or may not reference other components.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Touboul et al, U.S. Patent 6,154,844

Art Unit: 2131

Touboul, U.S. Patent 6,092,194

“Microsoft ActiveX Software Development Kit”

“Release Notes for the Microsoft ActiveX Development Kit”

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Revak whose telephone number is (703) 305-1843. The examiner can normally be reached on Monday-Thursday from 6:30 am to 4:00 pm. The examiner can also be reached on alternate Fridays from 6:30 am to 3:00 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh, can be reached at (703) 305-9648. The fax phone number for the organization where this application or proceeding is assigned as follows:

for After-Final Communications:	(703) 746-7238;
for Official Communications:	(703) 746-7239;
for Non-Official Communications:	(703) 746-7240.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

CH
CR

June 26, 2003


GAIL HAYES
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2131

Please type a plus sign (+) inside this box



PTO/SB/08A (08-00)

Approved for use through 10/31/2002. OMB 0651-0031
 U.S. Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE

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2

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

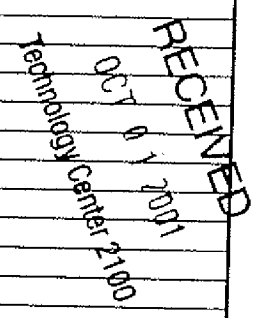
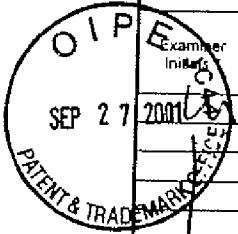
Sheet 1 of 2

Complete if Known

Application Number	09/539,667
Filing Date	March 30, 2000
First Named Inventor	Shlomo Touboul
Group Art Unit	2785
Examiner Name	Unknown
Attorney Docket Number	43426.00011

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number	Kind Code ² (if known)			
		5,077,677		John H. Murphy, et al.	12-31-1991	
		5,359,659		Doren Rosenthal	10-25-1994	
		5,361,359		Hornayoon Tajalli, et al.	11-01-1994	
		5,485,409		Sarban Gupta, et al.	01-16-1996	
		5,485,575		David M. Chess, et al.	01-16-1996	
		5,572,643		David H. Judson	11-05-1996	
		5,606,668		Gil Shwed	02-25-1997	
		5,623,600		Shuang Ji, et al.	04-22-1997	
		5,638,446		Aviel D. Rubin	06-10-1997	
		5,692,047		Charles E. McManis	11-25-1997	
		5,692,124		James M. Holden, et al.	11-25-1997	
		5,720,033		Umesh Deo	02-17-1998	
		5,724,425		Sheue-Ling Chang, et al.	03-03-1998	
		5,740,248		Helmut Fieres, et al.	04-14-1998	
		5,761,421		Arthur A. van Hoff, et al.	06-02-1998	
		5,765,205		Franklin Charles Breslau, et al.	06-09-1998	
		5,784,459		Murthy Devarakonda, et al.	07-21-1998	
		5,796,952		Owen Davis, et al.	08-18-1998	
		5,805,829		Geoffrey Alexander Cohen, et al.	09-08-1998	
		5,832,208		Chia-Hwang Chen, et al.	11-03-1998	
		5,850,559		Michael F. Angelo, et al.	12-15-1998	
		5,859,966		Kenneth John Hayman, et al.	01-12-1999	
		5,864,883		William E. Boebert, et al.	01-28-1999	
		5,892,904		Robert G. Atkinson, et al.	04-06-1999	
		5,951,888		Eva Y. Chen, et al.	09-14-1999	
		5,956,481		James E. Walsh, et al.	09-21-1999	
		5,974,549		Gilad Golan	10-26-1999	
		5,983,348		Shuang Ji	11-09-1999	



FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ₂
		Office ³	Number ⁴	Kind Code ⁵ (if known)				

Examiner Signature		Date Considered	6/25/03
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Unique citation designation number. ² See attached Kinds of U.S. Patent Documents. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

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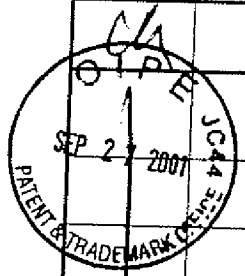
PTO/SB/08A (08-00)

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2

Substitute for form 1449A/PTO		Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Application Number	09/539,667
		Filing Date	March 30, 2000
		First Named Inventor	Shlomo Toubout
		Group Art Unit	2785
		Examiner Name	Unknown
		Attorney Docket Number	43426.00011
Sheet 1	2	of	2



OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		JIM K. OMURA, "Novel Applications of Cryptography in Digital Communications", IEEE Communications Magazine, May, 1990; pages 21-29.	
		OKAMOTO, E. et al., "ID-Based Authentication System For Computer Virus Detection", IEEE/IEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19, 1990, Abstract and pages 1169-1170. URL: http://iee.lhs.com:80/cgi-bin/iee/cgi?se...2ehts%26ViewTemplate%3ddocview%5fb%2ehts .	
		IBM AntiVirus User's Guide Version 2.4, International Business Machines Corporation, November 15, 1995, page 6-7.	
		NORVIN LEACH et al, "IE 3.0 Applets Will Earn Certification", PC Week, Vol. 13, No. 29, July 22, 1996, 2 pages.	
		"Finjan Software Releases SurfinBoard, Industry's First JAVA Security Product For the World Wide Web", Article published on the Internet by Finjan Software Ltd., July 29, 1996, 1 page.	
		"Powerful PC Security for the New World of Java™ and Downloadables, Surfin Shield™" Article published on the Internet by Finjan Software Ltd., 1996, 2 Pages.	
		Microsoft® Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet", Microsoft Corporation, October 1996, including Abstract, Contents, Introduction and pages 1-10.	
		"Finjan Announces a Personal Java™ Firewall For Web Browsers - the SurfinShield™ 1.6 (formerly known as SurfinBoard)", Press Release of Finjan Releases SurfinShield 1.6, October 21, 1996, 2 pages.	
		Company Profile "Finjan - Safe Surfing, The Java Security Solutions Provider" Article published on the Internet by Finjan Software Ltd., October 31, 1996, 3 pages.	
		"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0" Las Vegas Convention Center/Pavilion 5 P5551, November 18, 1996, 3 pages.	
		"Java Security: Issues & Solutions" Article published on the Internet by Finjan Software Ltd., 1996, 8 pages.	
		"Products" Article published on the Internet, 7 pages.	
		MARK LaDUE, "Online Business Consultant: Java Security: Whose Business Is It?" Article published on the Internet, Home Page Press, Inc. 1996, 4 pages.	
		Web Page Article "Frequently Asked Questions About Authenticode", Microsoft Corporation, last updated February 17, 1997, Printed December 23, 1998. URL: http://www.microsoft.com/workshop/security/authcode/signfaq.asp#9 , pages 1-13.	
CR		ZHANG, X.N., "Secure Code Distribution", IEEE/IEE Electronic Library online, Computer, Vol. 30, Issue 8, June, 1997, Pages: 76-79.	

Examiner Signature	<i>CR</i>	Date Considered	6/25/05
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Notice of References Cited	Application/Control No. 09/539,667	Applicant(s)/Patent Under Reexamination TOUBOUL, SHLOMO	
	Examiner Christopher A. Revak	Art Unit 2131	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
A	US-6,154,844 A	11-2000	Touboul et al.	713/201
B	US-6,092,194 A	07-2000	Touboul, Shlomo	713/200
C	US-5,978,484 A	11-1999	Apperson et al.	705/54
D	US-			
E	US-			
F	US-			
G	US-			
H	US-			
I	US-			
J	US-			
K	US-			
L	US-			
M	US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
N					
O					
P					
Q					
R					
S					
T					

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	Khare, "Microsoft Authenticode Analyzed" July 22, 1996, xent.com/ForK-archive/summer96/0338.html, pg 1-2
V	"Release Notes for the Microsoft ActiveX Development Kit", August 13, 1996, activex.adsp.or.jp/inetsdk/readme.bt, pg 1-10
W	"Microsoft ActiveX Software Development Kit" August 12, 1996, activex.adsp.or.jp/inetsdk/help/overview.htm, pg 1-6
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,667	03/30/2000	Shlomo Touboul	40492.00011 4226	8436

30256 7590 07/01/2003
SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO, CA 94304-1043

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT	PAPER NUMBER
2131	5

DATE MAILED: 07/01/2003

Response Due: 10/1/2003
FINAL: 1/1/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

DATES ENTERED
Response Due 10/1/2003

JUL 07 2003

CALENDARED
BY SKL
ATTORNEY
SQUIRE, SANDERS & DEMPSEY

Office Action Summary	Application No. 09/539,667	Applicant(s) TOUBOUL, SHLOMO	
	Examiner Christopher A. Revak	Art Unit 2131	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.138(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on _____.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-22 is/are pending in the application.

 4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-22 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892) 4) Interview Summary (PTO-413) Paper No(s). _____

2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) Notice of Informal Patent Application (PTO-152)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) Other:

Art Unit: 2131

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement submitted is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally *limited to a single paragraph* on a separate sheet within the range of 50 to 250 words. It is important that the abstract not exceed 250 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

It is noted by the examiner that the abstract should be amended to be incorporated into a single paragraph.

3. The specification is objected to because the current status of application 08/964,388 is not listed. It should be included that the application is now U.S. Patent 6,092,194. Correction is required.

Art Unit: 2131

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1,11,21, and 22 are rejected under the judicially created doctrine of double patenting over claims 1,17,18,32,40, and 41 of U. S. Patent No. 6,092,194 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: It is disclosed of comprising obtaining a downloadable, fetching the downloadable includes one or more references to a component, at least one component identified by the one or more references, and performing a function on the downloadable and all components fetched to generate a downloadable ID. The language "comprising" is open-ended language which contains atleast the listed elements which all the current elements in claims 1,11,21, and 22 of the instant application are taught in claims 1,17,18,32,40, and 41 of U.S. Patent 6,092,194.

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Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 3 and 13 contain the trademark/trade name "ActiveX". Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe an executable type of code and, accordingly, the identification/description is indefinite.

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Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), but another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1,7,8,10,11,17,18,20,21, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Apperson et al.

As per claims 1,11,21, and 22, Apperson et al discloses of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53).

As per claims 7 and 17, Apperson et al discloses of performing the function of a SHA-hash (function) on the executable code (col. 4, lines 44-48).

As per claims 8,10,18, and 20, it is taught by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege

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categories (first and all components referenced) that the executable code (downloadable) may try to perform on the client machine (col. 2, lines 43-47).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 2-4 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al in view of Khare.

It is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs (performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as being an applet, ActiveX control, or a plug-in. It is disclosed by Khare of an identical teaching which discloses Microsoft announcing a tool that allows vendors to digitally sign ActiveX

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(controls), Java (applets), and plug-in components (pg 1). It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to apply code signing to information such as ActiveX controls, Java applets, and plug-in components. The teachings of Khare disclose that the intent of code signing is to identify a creator of an Internet based applet before a user downloads it and it is designed to provide users with the same level of security found in marketed software which is based on a level of trust and place pressure on independent service vendors (ISVs) honest and the additionally issue digital certificates to the executables (downloadable) components such as ActiveX controls (pg 1). Apperson et al additional recites of motivation that enables servers to download executables (downloadables) with full client validation of their origin and authenticity (col. 2, lines 34-38) and the teachings of Khare are an obvious extension of the teachings of Apperson et al as a means of identifying specific components such as an applet, ActiveX control, or a plug-in to provide a user/client with information about the executable (downloadable) and if it is trusted from an external source and if it has been authenticated.

12. Claims 5,6,9,15,16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apperson et al.

As per claims 5,6,15, and 16, it is disclosed by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories that the executable code (downloadable) may try to perform on the client machine (one or more references to a component). The distributing authority digitally signs

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(performs a function) the executable code and the privilege request code and provides a certificate (generated downloadable ID) that can be traced by a client to a known certifying authority (col. 2, lines 43-53). The teachings of Apperson et al disclose of digitally signing executable code (downloadables), but do not identify that the executable code (downloadable) contains specific privilege request code such as including HTML code or an application program. The examiner hereby takes official notice that it is notoriously well known that HTML code and application programs include executable code. It would have been obvious to a person of ordinary skill in the art to have been motivated to interpret the teachings of Apperson et al to have included the use of HTML code and application programs as specific forms of executable code. It is notoriously well known that HTML code and application programs are information that is transferred across the Internet and downloaded by a client computer's browser which reads and executes the executable code. An application program is known as being a program in assisting in the performance of a specific task, namely a web based document processing and HTML is known as a markup language used for documents on the World Wide Web and indicates how web browsers should display the elements of a web document to a user. It is obvious that the teachings of Apperson et al could have included HTML code and application code as forms of executable code (downloadables) since it is executable information which is transferred across the Internet.

As per claims 9 and 19, it is taught by Apperson et al of providing executable code (downloadable) with privilege request code that indicates (fetches) a set of privileges or privilege categories (first and all components referenced) that the executable code (downloadable) may try

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to perform on the client machine (one or more references to a component)(col. 2, lines 43-47). The teachings of Apperson et al are silent in disclosing that the executable code (downloadable) does not include any references. The examiner hereby asserts that it is obvious for the teachings of Apperson et al to make use of this feature. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have been motivated to include or exclude components in executable code (downloadable). The governing factor would be the intent of the executable code (downloadable) and how it was designed. If it were a independent of any other function within an interactive environment, such as documents on the World Wide Web, then it could be executed independent of any other components once downloaded onto a user's computer. Otherwise, if downloaded executable code was dependent on functions on a user's computer as is explicitly disclosed by Apperson et al (col. 2, lines 43-47), then the specific functions would be referenced by the executable code (downloadable). It is obvious that the teachings of Apperson et al could have include executable code (downloadable) without including any references since there exists various types of executable code that may or may not reference other components.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Touboul et al, U.S. Patent 6,154,844

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Touboul, U.S. Patent 6,092,194

"Microsoft ActiveX Software Development Kit"

"Release Notes for the Microsoft ActiveX Development Kit"

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Revak whose telephone number is (703) 305-1843. The examiner can normally be reached on Monday-Thursday from 6:30 am to 4:00 pm. The examiner can also be reached on alternate Fridays from 6:30 am to 3:00 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ayaz Sheikh, can be reached at (703) 305-9648. The fax phone number for the organization where this application or proceeding is assigned as follows:

for After-Final Communications:	(703) 746-7238;
for Official Communications:	(703) 746-7239;
for Non-Official Communications:	(703) 746-7240.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

CH
CR

June 26, 2003


GAIL HAYES
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2131

United States Patent [19]
Apperson et al.

[11] **Patent Number:** 5,978,484
 [45] **Date of Patent:** Nov. 2, 1999

- [54] **SYSTEM AND METHOD FOR SAFETY DISTRIBUTING EXECUTABLE OBJECTS**
- [75] **Inventors:** Norman Apperson, Bellevue; Brian C. Beckman, Renton, both of Wash.
- [73] **Assignee:** Microsoft Corporation, Redmond, Wash.
- [21] **Appl. No.:** 08/639,290
- [22] **Filed:** Apr. 25, 1996
- [51] **Int. Cl.:** H04K 1/00; H04L 9/00
- [52] **U.S. Cl.:** 380/25; 380/4
- [58] **Field of Search:** 380/25, 24, 23, 380/4; 395/157

Bank, Joseph A., "Java Security," (Dec. 8, 1995), found at Internet URL <http://swissnet.ai.mit.edu/~jbank/javapaper/javapaper.html>.

Primary Examiner—Benjamin R. Fuller
Assistant Examiner—Robin Clark
Attorney, Agent, or Firm—Lee & Hayes, PLLC

[57] **ABSTRACT**

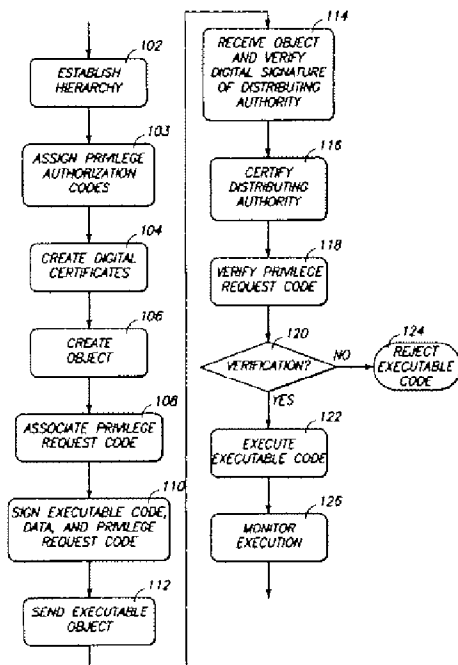
The invention includes a method and system for distributing and executing executable code. Before sending executable code to a client, a distributing authority associates a privilege request code with the executable code. The privilege request code indicates a requested set of privileges that the executable code will potentially exercise during execution. The distributing authority digitally signs the executable code and associated privilege request code and then distributes it for eventual execution by clients. Before executing the executable code, a client verifies the digital signature to confirm the authenticity and integrity of the executable code and associated privilege request code. This verification utilizes a hierarchy of certifying authorities. While the code executes, the client monitors it and prevents it from exercising privileges that are not in the requested set of privileges.

- [56] **References Cited**
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| 5,214,702 | 5/1993 | Fischer | 380/25 |
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| 5,745,574 | 4/1998 | Muftic | 380/25 |
| 5,825,877 | 10/1998 | Daa et al. | 380/25 |

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20 Claims, 4 Drawing Sheets



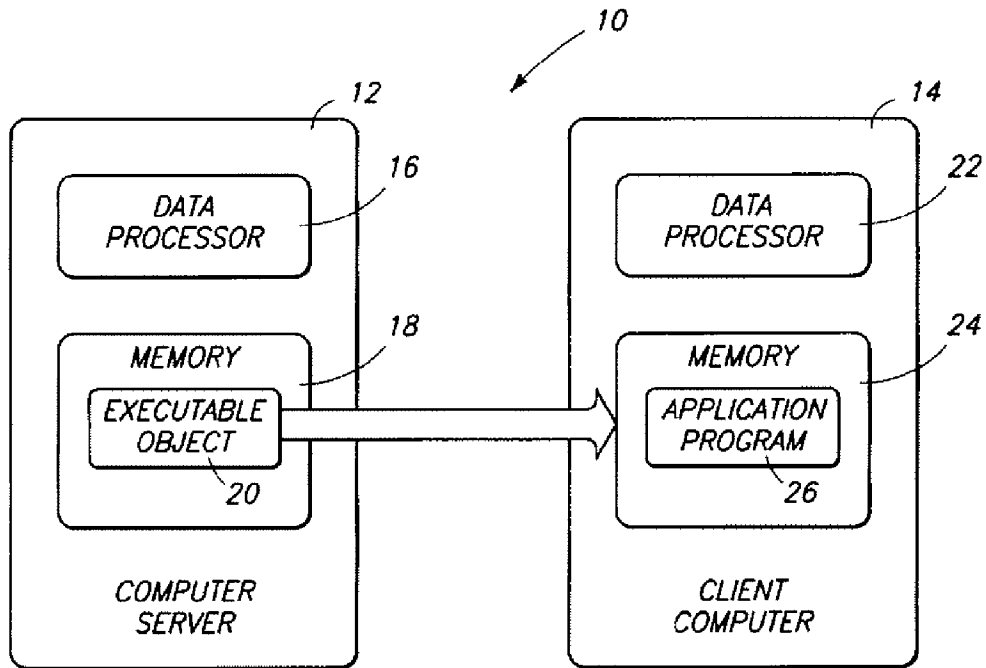


Fig 1

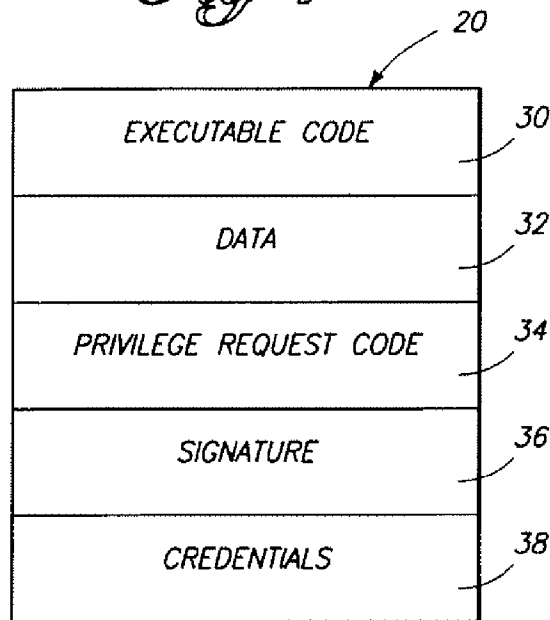


Fig 2

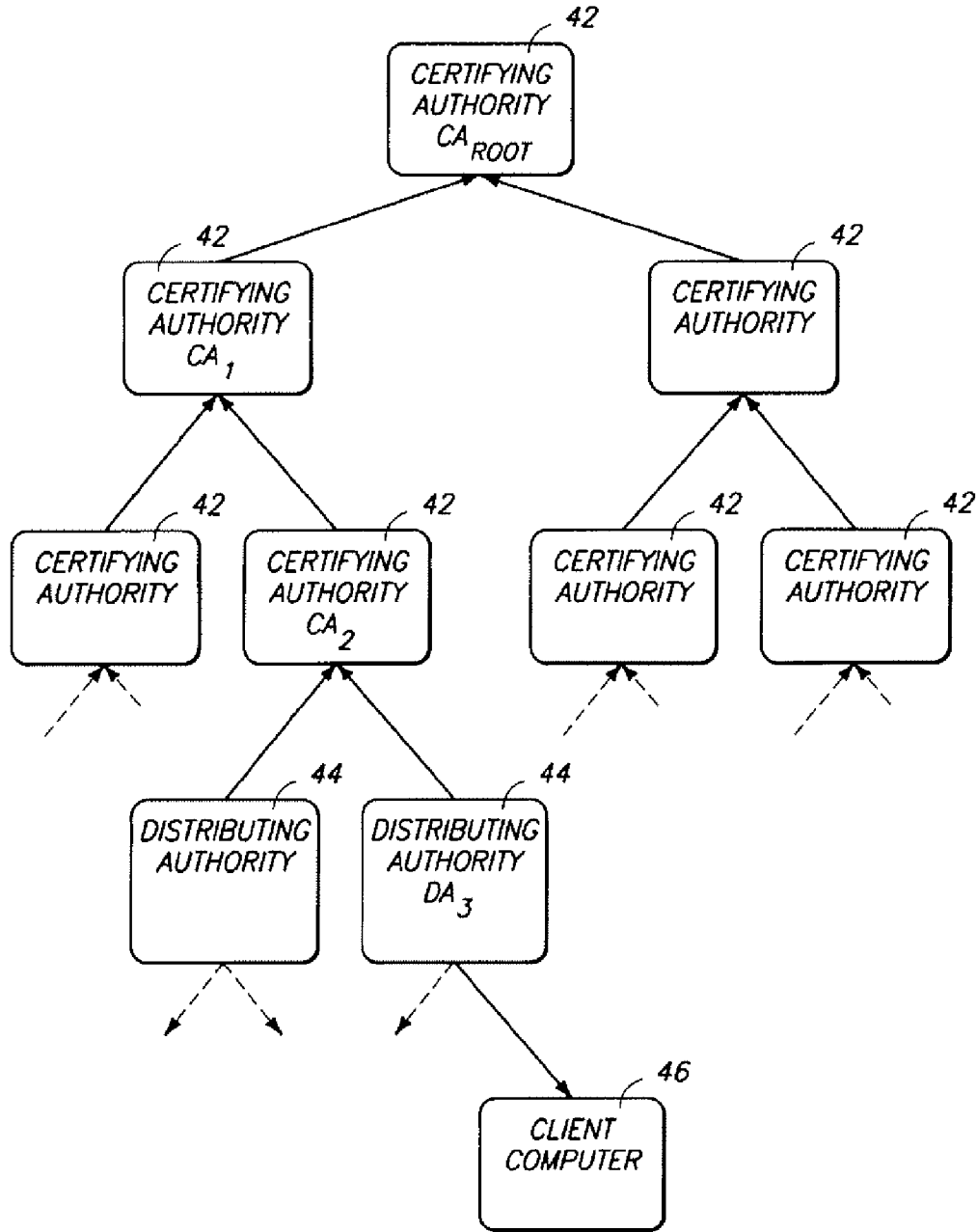


Fig 3

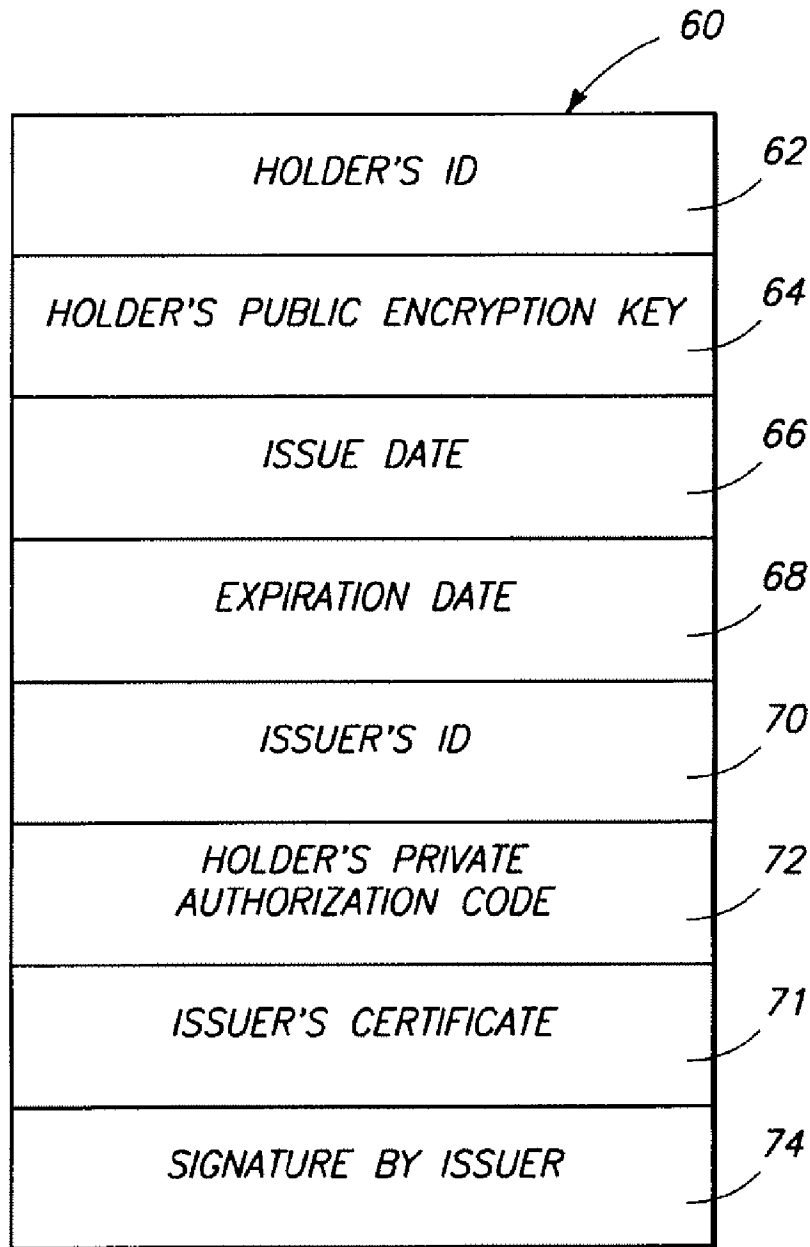


Fig 4

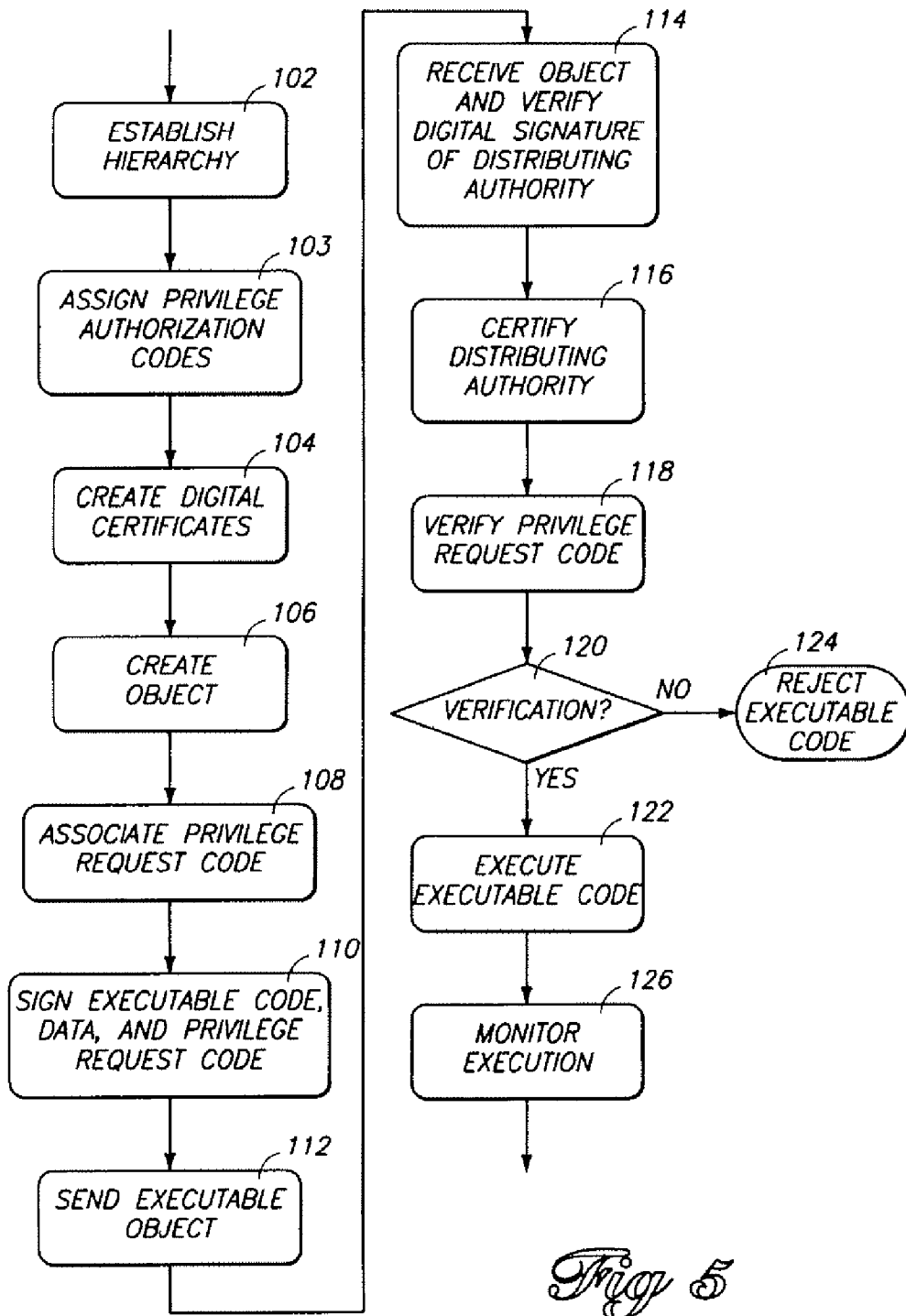


Fig 5

SYSTEM AND METHOD FOR SAFETY DISTRIBUTING EXECUTABLE OBJECTS

TECHNICAL FIELD

This invention relates to client-server environments in which executable objects are downloaded or otherwise distributed from a distributing authority and executed on a different computer.

BACKGROUND OF THE INVENTION

There has been a dramatic increase in reliance upon service providers accessible via electronic data communications networks such as the Internet. Such service providers are generally interested in providing access to the widest possible client audience at the lowest cost. Very recently, a number of solutions have emerged that allow service providers to achieve these goals. In particular, there has been very rapid growth in the use of the standardized hypertext capabilities of the World Wide Web (WWW) on the Internet. The standardized nature of the WWW, as well as the very low costs involved in accessing the Internet, have eliminated many of the previous hurdles to service development and distribution.

While the Internet's World Wide Web and other similar environments allow service providers to build systems that can efficiently deliver information to potentially large numbers of clients, they also impose limitations. These limitations are a direct consequence of the desire to provide a simple, generic processing model for multiple purposes.

It has been recognized that these limitations can be addressed to some degree by allowing servers to send executable code to clients, for execution by the clients themselves. This allows a server to build client software for a specific purpose, thereby allowing the service provider to add functionality to existing client software. An advantage of this approach is that it can in many cases reduce both the processing burdens on the server and the communications requirements between the server and the client.

While it might be very desirable for a client to execute server-provided software, the potential threat to security is a serious drawback. For a client to be willing to execute server-defined functionality, the client must be assured that no adverse effects will occur. Specifically, there must be a guarantee that existing client data will not be read or modified and that hostile code (viruses, Trojan horses, etc.) will not be generated and installed on the client system.

This is particularly problematic in the public network environment since mechanisms for establishing trust between a client and server are not widely deployed, and data communications channels are open to eavesdropping and tampering. Because of this, general purpose compiled programming languages are not a solution. It is inherently unsafe in a public network environment for a client to accept binary executable images from a server and execute them. Since the server-provided programs would have access to the full resources of the client computer environment, they could potentially perform any of various different types of dangerous or hostile operations.

Binary executable code also has the disadvantage of being architecture-specific. It is a significant complication for the server to determine the computer hardware in use by the client and the operating system, and to provide different executable modules for use with different systems.

These issues lead naturally to consideration of an interpreted language. This approach allows a server to create

program scripts that can be executed on the client to extend its functionality, while providing a more controlled execution environment and architecture neutrality. Interpreters can be implemented on a variety of computer platforms and operating systems to provide an isolation layer between the language specification and the underlying architecture. Hence, a server can provide scripts for extensions that are executable on a variety of client machines. Interpreters can also perform runtime checking of various sorts to enforce access of specific resources and to detect when scripts have been tampered with. Sun Microsystem's recently announced Java language is an example of this approach.

From a client's perspective, the optimal situation is one in which it needs only trust the interpreter. Once a client has an interpreter from a trusted source, the client should be able to execute any script with complete safety. This is where existing approaches fail. Java, for example, is a general purpose programming environment which allows the generation of complex applications including I/O operations. Java is specifically designed to allow easy access to network facilities, hence it has the potential to surreptitiously transmit client confidential information; destroy client data, and perform other hostile actions. The protection against such behavior relies on the ability to validate Java scripts and determine their authenticity. Importantly, however, Java and many other systems rely on a trust relationship between the server and the client as the basis for their safety. We believe that this is a significant limitation which our invention addresses.

In addition to eliminating the requirement of a trust relationship between the client and server, our invention provides for situations in which a client may wish to execute server-provided code that performs I/O and other potentially dangerous operations. Our invention provides a secure extension mechanism that enables servers to download general purpose executables with full client validation of their origin and authenticity.

SUMMARY OF THE INVENTION

The invention classifies different types of security-related operations and services, which might potentially be performed by externally-provided code, into different categories. When providing executable code, a distributing authority also provides a privilege request code, indicating a set of privileges or privilege categories that the executable code might perform on the client machine. The distributing authority digitally signs the executable code and the privilege request code, and also provides a certificate that can be traced by the client to a known certifying authority. The certificate indicates an authorized set of privileges that the distributing authority has been authorized to include in distributed code.

The certificate is issued to the distributing authority by a certifying authority that is a member of a hierarchy of authorities. The certificate is signed by the certifying authority, and includes or refers to the certificate of an even higher certifying authority. Each certificate therefore relies for its verification upon a higher certifying authority, except for a root authority that is known to be trustworthy.

Each certificate indicates an authorized set of privileges that the holder of the certificate is authorized pass on to lower members of the hierarchy. When a distributing authority distributes actual executable code, the associated privilege request code must indicate a subset of the privileges indicated by the privilege authorization code of the certificate held by the distributing authority. Before executing

code provided from some external source such as a server, the client traces the authority of the distributing authority that signed the code, through one or more certifying authorities to one that is known to the client independently of the server. For each certifying authority, the client verifies that the privilege authorization code indicates privileges that are a subset of the privileges indicated by the certificate of the next-higher certifying authority.

If the client verifies the signature and digital certificate of the distributing authority by tracing to an authority that is already known to the client, the client executes the provided code. However, it monitors the code, and prevents it from exercising any privileges that are not indicated in the associated privilege request code.

In practice, the client creates a granted privilege set for a particular executable object, and prevents the object from exercising any privileges not in the granted privilege set. The granted privilege set is preferably created by intersecting the privilege authorization sets from the digital certificate of the distributing authority and of any higher authorities encountered while tracing the certificate of the distributing authority. Any failure while checking the authority of the distributing authority results in an empty granted privilege set. Every executable statement in the executable object is then checked against the granted privilege set before execution.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a computer system in accordance with the invention.

FIG. 2 is a block diagram of an executable object in accordance with the invention.

FIG. 3 is a block diagram of a hierarchy of authorities in accordance with the invention.

FIG. 4 is illustrates an example of a digital certificate in accordance with the invention.

FIG. 5 is a flow chart showing preferred methodical steps in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention described below utilizes well-known digital encryption and signing techniques. The following discussion therefore assumes familiarity with these topics. For example, the invention utilizes public-key cryptography techniques such as described in Schneier, Bruce; *Applied Cryptography Second Edition: Protocols, Algorithms, and Source Code in C*; New York: John Wiley & Sons, 1996, which is hereby incorporated by reference. Particularly, the invention utilizes the RSA (Rivest, Shamir, and Adleman) public-key algorithm for digital signatures, in conjunction with a hashing algorithm referred to as SHA (secure hash algorithm), although other public-key signature schemes, such as DSS, ElGamal, Elliptic Curve, can alternatively be used.

FIG. 1 shows a computer system 10 in accordance with a preferred embodiment of the invention. Computer system 10 includes a computer server 12 and a client computer 14. Computer server 12 includes a data processor 16, a computer-readable storage medium or memory 18, and other components (not shown) typical of a computer network server. Memory 18 includes both electronic and magnetic or optical mass storage memory.

Computer server 12, in this case also referred to as a distributing authority, is configured to provide or distribute

one or more signed executable objects 20 for execution by client computer 14. An object 20 is initially stored by server 12 in memory 18. Computer server 12 is connected to download such executable objects to client computer 14 over a communications channel or link, such as a local area network connection, a wide area network connection, or a remote connection from an online service provider. The executable objects comprise both executable code and associated data. The code might be in the form of textual scripts, byte codes, P-code, or binary object code.

Client computer 14 is similarly connected to download and execute executable objects 20 from the computer server. Client computer 14 includes a processing unit or data processor 22 and memory 24. Memory 24 includes electronic and optional mass-storage memory such as a magnetic or optical storage medium. Client computer 14 includes other components (not shown) such as are commonly incorporated in a personal or desktop computer.

An application program 26 executes on data processor 22 from memory 24. The application program in the preferred embodiment of the invention is a client program that interacts with computer server 20. As an example, application program 26 might be a "browser" application such as is commonly used to access resources on a public network such as the Internet or on a private "intranet." The client program is configured to accept and execute executable code provided by computer server 20.

FIG. 2 shows preferred components of executable object 20. The object includes executable code 30, associated data 32, a privilege request code 34, a digital signature 36, and digital credentials 38.

Privilege request code 34 is a code that indicates a set of security-related privileges that executable code 30 of object 20 will potentially execute on client 14. The facilities of the client operating system or script interpreter are divided up into a set of privileges or privilege classes. In the Windows NT® operating system for example, these privilege classes might relate individually to file I/O, network operations, registry read/write rights, graphics operations, window management, and user list read/write rights. The privilege request code indicates which of these classes of services are potentially required by executable code 30.

Digital signature 36 is a digital signature of the concatenated executable code, data, and privilege request code from the executable object 20. More particularly, this is an RSA-encrypted SHA-hash of the concatenated executable code, data, and privilege request code. This signature can be verified by a client computer to confirm the authenticity and integrity of the executable code, data, and associated privilege authorization code. As will be explained more fully below, the digital signature has the further important property that it can be verified without relying on the trustworthiness of server 12.

Credentials 38, associated with the server computer or distributing authority, include a privilege authorization code indicating which privileges or privilege classes are allowed to be exercised by code distributed from server 12 or another distributing authority. The credentials are issued to server 12 or to a distributing authority by one or more certifying authorities and are digitally signed by the certifying authorities. The digital signature of at least one of the certifying authorities can be verified by the client without relying on the trustworthiness of the server or other distributing authority, as will be demonstrated below.

The certifying authorities are responsible for verifying the trustworthiness of the distributing authority that provided

the executable code and the level of trust that should be placed in the executable code and distributing authority. More specifically, the certifying authorities determine which privileges any particular server or distributing authority should be allowed to authorize. For instance, a certifying authority might issue credentials to one distributing authority allowing it to distribute code that exercises a full range of security-related privileges on a client computer, while the executable code from another distributing authority might be precluded from performing file I/O.

Note that in the case shown in FIG. 1, server 12 is a distributing authority. While this configuration has advantages, executable code might be signed by a distributing authority that is independent of the actual server that provides the code to client 14. In fact, the distribution path from a distributing authority to a client computer might take many forms. In the example shown, the distribution path is a network connection formed between a server (acting as the distributing authority) and a client of the server. In other cases, the executable code might be distributed by floppy disk or some other portable storage medium from a distributing authority to a user's computer. In still other cases, the executable code might be provided to various online servers from the distributing authorities, and users would obtain the executable code from the servers. In each of these cases, the executable code and associated privilege request code would be signed by the distributing authority, even though the code might be obtained by a user from an entity that has no direct connection to the distributing authority—such as an independent online service provider. In this latter case, the online service provider would act as a code repository, without participating directly in security measures. Thus, while the service provider might not wish to participate in the security scheme described herein, a client computer could nevertheless rely on the verifiable digital signature of the distributing authority to establish the trustworthiness of the executable code.

The certifying authorities and distributing authorities are members of a hierarchy of authorities as shown in FIG. 3. The members of the hierarchy have different levels of authority, depending on their positions in the hierarchy and the privileges granted them by higher levels of the hierarchy. The structure of the hierarchy resembles a tree structure, with a "root" member at the top connected to lower "leaf" members by "branches." This "tree of trust" is utilized to verify signatures of distributing authorities and certifying authorities, and to verify the authority of a distributing authority to distribute code with a particular privilege request code.

At the top of the hierarchy is a "root" certifying authority 40, also designated CA_{ROOT}. This entity has authority over all possible privileges that an executable object might potentially exercise. Beneath the root are different levels of certifying authorities 42, including a plurality of distributing authorities 44. Each certifying authority has authority over a potentially different set of privileges.

Each certifying authority and distributing authority is assigned a privilege authorization code by the next-higher certifying authority in the hierarchy. The privilege authorization code of any particular authority indicates a set of privileges that can be authorized by that authority. In addition, the privilege authorization code indicates whether an entity is authorized to certify lower members of the hierarchy and whether the entity is authorized to act as a distributing authority. The privilege authorization code held by any particular entity must indicate a subset of the privileges indicated by the privilege authorization code of the next-higher authority.

In general, any certifying authority can also act as a distributing authority. When acting as a certifying authority, an entity grants or assigns privilege authorization codes to lower members of the hierarchy. The granted privilege authorization codes must indicate a subset of the privileges indicated by the certifying authority's own privilege authorization code. When acting as a distributing authority, an entity distributes executable objects that include privilege request codes. Each such privilege request code must indicate a subset of the privileges indicated by the distributing authority's privilege authorization code.

With this structure, each lower level of authority in the hierarchy potentially has less and less authority for granting privileges to other members of the hierarchy or for distributing executable objects.

In the example of FIG. 3, a client computer 46 receives an executable object from a distributing authority 44 designated as DA₃. The executable object is signed by DA₃ and includes the privilege authorization code of DA₃. Distributing authority DA₃, in turn, receives its privilege authorization code from a certifying authority CA₂. DA₃'s privilege authorization code is a subset of CA₂'s privilege authorization code. CA₂ receives its privilege authorization code from a higher certifying authority CA₁, and CA₁ receives its privilege authorization code from the root certifying authority CA_{ROOT}. CA_{ROOT} has a privilege authorization code that includes all possible privileges that might be exercised by executable objects.

To enforce this scheme, the authority of each certifying authority and distributing authority is recorded in a digital certificate, issued and signed by the next higher member of the hierarchy. The credentials discussed above comprise such a digital certificate.

FIG. 4 shows an example of a digital certificate 60. It includes an identification 62 of the holder of the certificate, the public encryption key 64 of the holder, the date 66 the certificate was issued, the date 68 of its expiration, the privilege authorization code 72 authorized for the holder of the certificate by the certifying authority that issued the certificate, and an identification 70 of the certifying authority that issued the certificate (at the next higher level of the hierarchy). It also includes or refers to the certificate 71 of the certifying authority. Certificate 60 is digitally signed by the certifying authority, using the private signature key of the certifying authority. The digital signature 74 of the certifying authority is appended to and becomes part of the certificate.

The certificate of the root certifying authority is slightly different in that it does not include the certificate or digital signature of any higher authority. Its privilege authorization code indicates all possible privileges.

This scheme results in a chain of digital certificates leading from a distributing authority all the way up the hierarchy to the root certifying authority. The chain of certificates can be traced upward through the hierarchy until reaching the certificate of an authority whose digital signature can be verified without relying on information obtained from the distributing authority.

Referring back to FIG. 3, assume that distributing authority DA₃ downloads or otherwise provides a signed executable object that is eventually executed by client computer 46. The object includes credentials of distributing authority DA₃, comprising a digital certificate as described above. The digital certificate includes the public signing key of distributing authority DA₃, allowing client computer 46 to verify the digital signature performed by distributing authority

DA₃ on the executable code and the privilege request code. The digital certificate also indicates information relating to the certifying authority CA₂ that issued the certificate, including the certificate of certifying authority CA₂.

The certificate of distributing authority DA₃, issued and signed by next higher certifying authority CA₂, verifies or confirms the public signing key and the privilege authorization code of distributing authority DA₃. The signature and privilege authority of certifying authority CA₂ can in turn be verified through information in CA₂'s digital certificate, issued by certifying authority CA₁.

Now suppose that certifying authority CA₁ is known to the client computer, independently of the executable object. If this is the case, client computer 46 can verify the certificate of certifying authority CA₂ without tracing any farther up the hierarchy. That is, client computer 46 will know the public signing key of certifying authority CA₁, independently of the downloaded executable object, and will thus be able to verify that CA₁ signed the digital certificate of certifying authority CA₂. Client computer 46 can rely on the known trustworthiness of certifying authority CA₁ to confirm the trustworthiness (and digital signature) of CA₂, and can then rely on the trustworthiness of CA₂ to confirm the trustworthiness (and digital signature) of CA₃.

Any certificate (except the certificate of the root authority) can be traced to a higher authority by following the chain of digital certificates up the hierarchy. As used here, the term "tracing" refers to the process of following a chain of digital certificates up through a hierarchy of authorities, while verifying the signature and authority of any particular member of the hierarchy with reference to a certificate that is digitally signed and authorized by a higher level of the hierarchy.

The invention includes a method as illustrated in FIG. 5 of distributing and executing executable objects or code. The method includes a first step 102 of establishing a hierarchy of authorities comprising a plurality of certifying authorities, including the root authority, and a plurality of distributing authorities. The members of the hierarchy are preferably computers connected for communications over a network or other communications medium.

The method includes a step 103 of assigning a privilege authorization code to each member of the hierarchy. The privilege authorization code of any particular member of the hierarchy indicates a set of privileges that the particular member is authorized to incorporate in executable objects that might be provided from that member for execution on other computers. In addition, the privilege authorization code indicates the maximum set of privileges that member can include in the assigned privilege authorization codes of other, lower members of the hierarchy. According to this scheme, the privilege authorization code of any member is assigned to that member by a higher member of the hierarchy, and indicates a subset of the privileges indicated in the privilege authorization code of the higher member.

Step 104 includes creating and signing a digital certificate for each member of the hierarchy, wherein the certificate of any particular member (except that of the root authority) includes or refers to the digital certificate of that higher member. This results in a chain of certificates and corresponding digital signatures, as already described, that can be used for certifying the trustworthiness and authority of any particular member of the hierarchy. The digital certificate of a member also includes the privilege authorization code for that member, assigned to that member by a higher member of the hierarchy.

A step 106, performed by a distributing authority that is a member of the hierarchy of authorities, comprises creating an executable object as shown in FIG. 2. The object includes executable code and optional data, as well as signed credentials of the distributing authority. In the preferred embodiment of the invention, the credentials comprise the digital certificate of the distributing authority, formatted as shown in FIG. 4.

Step 108, also performed by the distributing authority, comprises associating a privilege request code with the executable code and the optional data. The privilege request code indicates a requested set of privileges that the executable code will potentially exercise on a client computer during execution. The requested set of privileges is a subset of the authorized set of privileges indicated the distributing authority's credentials.

A step 110 comprises digitally signing the executable code, any associated data, and the associated privilege request code. This step is performed by the distributing authority, using its private signing key. Specifically, the distributing authority produces an SHA hash of the concatenated executable code, data, and privilege request code, and encrypts the hash using an RSA encryption algorithm in conjunction with the distributing authority's private signing key.

Step 112 comprises sending or otherwise distributing the executable object, including the privilege request code, credentials and digital signature of the distributing authority, from the distributing authority to a client computer. This step might make use of a network communications medium, or might take place using a portable storage medium such as a floppy disk.

Step 114, performed by the client computer, comprises receiving the object sent in step 112 and verifying the digital signature of the distributing authority to confirm the authenticity and integrity of the executable code, associated data, and associated privilege request code. This step is performed by decrypting (using the RSA algorithm) the digital signature with the public signing key of the distributing authority (as set forth in the credentials of the distributing authority) and comparing this with an SHA hash of the concatenated executable code, data, and privilege request code.

Step 116, also performed by the client computer, comprises certifying the trustworthiness of the distributing authority, the validity of the privilege request code, and the authenticity of the distributing authority's credentials. This step includes verifying the digital signature of at least one certifying authority that signed the credentials of the distributing authority, in a way that is not dependent on the trustworthiness of the distributing authority itself. More broadly, this step comprises tracing the chain of digital signatures, contained in the certificate of the distributing authority, to one that can be verified without relying on the trustworthiness of the distributing authority. This involves first verifying the signature of a first member of the hierarchy that signed the credentials or certificate of the distributing authority, then verifying the signature of a second member that signed the certificate of the first member, and so on up the chain of authorities until reaching a digital signature that can be verified without relying on information derived from the certificate of the distributing authority—such as a signature that can be verified using a public signing key that is already known to the client computer.

When tracing the chain of digital signatures, the client computer performs a step of verifying that each particular certificate's indicated authorized set of privileges (indicated

by its privilege authorization code) is a subset of the authorized set of privileges indicated in the digital certificate of the next-higher member of the hierarchy that digitally signed the particular certificate.

A further step 118 comprises verifying that the privilege request code included in the executable object indicates a set of requested privileges that is a subset of the privileges indicated by the privilege authorization code of the distributing authority. This step is necessary to ensure that the distributing authority has not exceeded its granted authority.

Decision block 120 indicates the action taken as a result of the verification steps performed by the client computer. If these steps indicate that no certifying or distributing authority has exceeded its granted authority, and that all digital signatures are valid, step 122 is performed of executing the executable code. Otherwise, the executable code is rejected, as indicated by termination block 124.

During execution, as indicated by step 126, the executable code is monitored to prevent it from exercising unauthorized privileges. Specifically, this involves preventing the executable code from exercising any privileges that are not in the requested set of privileges indicated by the privilege request code. This inherently prevents exercise of any privileges that are not in the authorized set of privileges of the certifying authority that signed the certificate of the distributing authority, as well as any privileges not indicated by the privilege authorization codes of the higher certifying authorities encountered while tracing the chain of digital signatures.

The monitoring step can be implemented by an interpreter, if the executable code is a script, or by use of operating system facilities if the executable code is a binary executable. The Windows NT® operating system, for example, allows strict control over which operations can be performed by individual executing programs. In the future, it might be possible to modify the Windows® operating system to integrate more fully with the scheme described herein.

The methods described above are advantageous because they do not require a trust relationship between a server and its client, or even between the distributing authority and the eventual user of the executable code. Maintaining trust relationships with a plurality of servers or distributing authorities would be troublesome because of the potentially great number of such entities. Using the scheme described above, however, a client can maintain a trust relationship with a fewer number of certifying authorities at higher levels of the hierarchy, and rely on the enforceable safety and security policy maintained by the root authority and other certifying authorities within the hierarchy.

As a further feature, each client can maintain its own database describing the sets of privileges the client is willing to grant different authorities. Each such set is indicated by a signer-specific privilege code, indicating a signer-specific set of privileges. These sets exist independently of any downloaded executable code. Before executing any particular executable object, the client identifies all members whose certificates have been referred to in the credentials of the distributing authority. This includes the certificates of all hierarchy members in the chain of authorities above the distributing authority, all the way up to the root authority. The client then checks its database to see whether any signer-specific privilege codes exist for these members, and takes the intersection of the privileges indicated by any such signer-specific privilege codes. The executable object is prevented from exercising any privileges that are not in this intersection.

In practice, the client creates a granted privilege set for a particular executable object, and prevents the object from exercising any privileges not in the granted privilege set. The granted privilege set is preferably created by intersecting the privilege authorization sets from the digital certificate of the distributing authority and of any higher members encountered while tracing the certificate of the distributing authority. If signer-specific privilege sets exist for any of these hierarchy members, they are intersected with the results of the previous intersection, and the executable object is prevented from executing any privileges not included in the resulting intersection set.

It is advantageous to maintain privilege sets as bit vectors: multi-bit codes wherein each bit corresponds to a specific privilege or classification of privileges. Using this format, intersections can be easily performed by simple logical operations, such as logically ANDing the vectors.

In compliance with the statute, the invention has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the invention is not limited to the specific features described, since the means herein disclosed comprise preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents.

We claim:

1. A method of distributing and executing executable code, comprising:
 - creating digital certificates for a plurality of distributing authorities, each such digital certificate indicating an authorized set of privileges for its distributing authority;
 - associating a privilege request code with the executable code, the privilege request code indicating a requested set of privileges that the executable code will potentially exercise during execution;
 - defining signer-specific privilege sets at a client computer for different ones of the plurality of distributing authorities, each signer-specific privilege set indicating privileges allowed to executable code signed by the corresponding distributing authority;
 - digitally signing the executable code and associated privilege request code by a particular one of the plurality of distributing authorities;
 - receiving the executable code, associated privilege request code, and digital signature at the client computer;
 - preventing the executable code from executing if the digital signature of the executable code and associated privilege request code cannot be verified;
 - preventing the executable code from executing if the privilege request code indicates privileges that are not in the signer-specific privilege set of the distributing authority that signed the executable code.
2. A method as recited in claim 1, further comprising preventing the executable code from exercising privileges that are not indicated by the privilege request code.
3. A method as recited in claim 1, further comprising:
 - digitally signing the digital certificate of said particular distributing authority by one or more certifying authorities;
 - before executing the executable code, verifying the digital signature of at least one of the certifying authorities without relying on the trustworthiness of said particular distributing authority.

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4. A method as recited in claim 1, further comprising:
 certifying the trustworthiness of said particular distrib-
 uting authority with a chain of digital signatures by one
 or more certifying authorities;
 associating the chain of digital signatures with the execut- 5
 able code;
 before executing the executable code, tracing the chain of
 digital signatures to one that can be verified without
 relying on the trustworthiness of said particular distrib-
 uting authority. 10

5. A method as recited in claim 1, wherein said particular
 distributing authority is a memory of a hierarchy of
 authorities, further comprising the following step:
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is 15
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member.

6. A method as recited in claim 1, wherein said particular
 distributing authority is a memory of a hierarchy of
 authorities, further comprising the following steps: 20
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member;
 before executing the executable code, tracing the digital
 certificate of the distributing authority that signed the
 executable code to an upper member of the hierarchy of
 authorities whose digital signature can be verified with- 25
 out relying on the trustworthiness of said particular
 distributing authority.

7. A method as recited in claim 1, wherein said distrib-
 uting authority is a memory of a hierarchy of authorities,
 further comprising the following steps:
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is 30
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member;
 before executing the executable code, tracing the digital
 certificate of said particular distributing authority to an
 upper member of the hierarchy of authorities whose
 digital signature can be verified without relying on the
 trustworthiness of said particular distributing authority;
 when tracing the digital certificate of said particular
 distributing authority, verifying that each particular
 certificate's indicated authorized set of privileges is a 35
 subset of the authorized set of privileges indicated in
 the digital certificate of the higher member that digi-
 tally signed the particular digital certificate.

8. A method of distributing and executing executable
 code, comprising:
 creating digital certificates for a plurality of distributing
 authorities, each such digital certificate indicating an
 authorized set of privileges for its distributing author- 40
 ity,
 defining signer-specific privilege sets at a client computer
 for different ones of the distributing authorities, each
 signer-specific privilege set indicating privileges
 allowed to executable code signed by the correspond-
 ing distributing authority;
 digitally signing the executable code by one of the plu- 45
 rality of distributing authorities;
 receiving the executable code and digital signature at the
 client computer;
 preventing the executable code from executing if the 50
 digital signature of the executable code cannot be
 verified;

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preventing the executable code from exercising privileges
 that are not in both (a) the authorized set of privileges
 from the digital certificate of the distributing authority
 that signed the executable code and (b) the signer-
 specific privilege set corresponding to the distributing
 authority that signed the executable code.

9. A method as recited in claim 8, further comprising:
 digitally signing the digital certificate by one or more
 certifying authorities;
 before executing the executable code, verifying the digital
 signature of at least one of the certifying authorities
 without relying on the trustworthiness of the distrib- 10
 uting authority.

10. A method as recited in claim 8, further comprising:
 certifying the trustworthiness of the distributing authority
 that signs the executable code with a chain of digital
 signatures by one or more certifying authorities;
 associating the chain of digital signatures with the execut-
 able code;
 before executing the executable code, tracing the chain of
 digital signatures to one that can be verified without
 relying on the trustworthiness of the distributing
 authority that signs the executable code.

11. A method as recited in claim 8, wherein the distrib-
 uting authority that signs the executable code is a memory
 of a hierarchy of authorities, further comprising the follow-
 ing step:
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member.

12. A method as recited in claim 8, wherein the distrib-
 uting authority that signs the executable code is a memory
 of a hierarchy of authorities, further comprising the follow-
 ing steps:
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member;
 before executing the executable code, tracing the digital
 certificate of the distributing authority that signed the
 executable code to an upper member of the hierarchy of
 authorities whose digital signature can be verified with-
 out relying on the trustworthiness of the distributing
 authority that signed the executable code.

13. A method as recited in claim 8, wherein the distrib-
 uting authority that signs the executable code is a memory
 of a hierarchy of authorities, further comprising the follow-
 ing steps:
 creating digital certificates for members of the hierarchy,
 wherein the digital certificate of a particular member is
 signed by a higher member of the hierarchy and refers
 to the signed digital certificate of said higher member;
 before executing the executable code, tracing the digital
 certificate of the distributing authority that signed the
 executable code to an upper member of the hierarchy of
 authorities whose digital signature can be verified with-
 out relying on the trustworthiness of the distributing
 authority that signed the executable code;
 when tracing the digital certificate of the distributing
 authority that signed the executable code, verifying that
 each particular certificate's indicated authorized set of
 privileges is a subset of the authorized set of privileges
 indicated in the digital certificate of the higher member
 that digitally signed the particular digital certificate.

14. One or more computer programs stored on one or more computer-readable storage media for execution by a client computer, the one or more programs comprising the following steps:

5 defining signer-specific privilege sets at the client computer for different ones of a plurality of distributing authorities, each signer-specific privilege set indicating privileges allowed to executable code signed by the corresponding distributing authority;

10 receiving executable code and an associated privilege request code, the executable code and associated privilege request code being digitally signed by a particular one of the distributing authorities;

15 preventing the executable code from executing if the digital signature of the executable code and associated privilege request code cannot be verified;

20 preventing the executable code from executing if the privilege request code indicates privileges that are not in the signer-specific privilege set corresponding to the distributing authority that signed the executable code.

15. One or more computer programs stored on one or more computer-readable storage media as recited in claim 14, the one or more programs further comprising a step of preventing the executable code from exercising privileges that are not indicated by the privilege request code.

25 16. One or more computer programs stored on one or more computer-readable storage media as recited in claim 14, wherein said particular one of the distributing authorities produces a digital certificate indicating an authorized set of privileges, the one or more programs further comprising a step of preventing the executable code from exercising privileges that are not in the authorized set of privileges indicated by the digital certificate.

30 17. One or more computer programs stored on one or more computer-readable storage media as recited in claim 16, wherein the digital certificate is digitally signed by one or more certifying authorities, said one or more computer programs further comprising:

35 before executing the executable code, verifying the digital signature of at least one of the certifying authorities without relying on the trustworthiness of said particular one of the distributing authorities.

40 18. One or more computer programs stored on one or more computer-readable storage media as recited in claim 16, wherein the trustworthiness of said particular one of the

distributing authorities is certified with a chain of digital signatures by one or more certifying authorities, the chain of digital signatures being associated with the executable code, said one or more computer programs further comprising:

5 before executing the executable code, tracing the chain of digital signatures to one that can be verified without relying on the trustworthiness of the distributing authority.

10 19. One or more computer programs stored on one or more computer-readable storage media as recited in claim 16, wherein the distributing authority that signs the executable code is a memory of a hierarchy of authorities, the members of the hierarchy having digital certificates, wherein the digital certificate of a particular member is signed by a higher member of the hierarchy and refers to the signed digital certificate of said higher member, said one or more computer programs further comprising the following step:

15 before executing the executable code, tracing the digital certificate of the distributing authority that signed the executable code to an upper member of the hierarchy of authorities whose digital signature can be verified without relying on the trustworthiness of the distributing authority that signed the executable code.

20 20. One or more computer programs stored on one or more computer-readable storage media as recited in claim 16, wherein the distributing authority that signs the executable code is a memory of a hierarchy of authorities, the members of the hierarchy having digital certificates, wherein the digital certificate of a particular member is signed by a higher member of the hierarchy and refers to the signed digital certificate of said higher member, said one or more computer programs further comprising the following step:

25 before executing the executable code, tracing the digital certificate of the distributing authority that signed the executable code to an upper member of the hierarchy of authorities whose digital signature can be verified without relying on the trustworthiness of the distributing authority that signed the executable code;

30 when tracing the digital certificate of the distributing authority that signed the executable code, verifying that each particular certificate's indicated authorized set of privileges is a subset of the authorized set of privileges indicated in the digital certificate of the higher member that digitally signed the particular digital certificate.

* * * * *

Microsoft Authenticode analyzed

Rohit Khare (khare@pest.w3.org)

Mon, 22 Jul 96 17:52:07 -0400

- Messages sorted by: [date] [thread] [subject] [author]
- Next message: Rohit Khare: "[Andreesen moving sloooooowly to objects](#)"
- Previous message: Rohit Khare: "[Tim's comments on W3C appear in PCWeek](#)"

[private w3c editorial comments expurgated]

July 22, 1996 10:00 AM ET

IE 3.0 applets will earn certification

By Norvin Leach and Michael Moeller

In preparation for the mid-August launch of Internet Explorer 3.0, Microsoft Corp. next week will announce tools and services that let vendors digitally sign ActiveX, Java and Netscape Communications Corp. plug-in components.

As a result, users of Internet Explorer 3.0 will be able to identify the creator of an Internet-based applet before downloading it.

But for some IS managers, this approach misses the point of Internet security by a long shot. Many say they are less interested in knowing who built a component than in providing seamless protection for users, as the Java "sandbox" model does.

The Microsoft model, designed to provide users with the same level of security found in shrink-wrapped software, is based primarily on a level of trust and market pressure to keep ISVs honest.

To put the digital signature architecture in place, VeriSign Inc. and, in the future, other certificate authorities will issue digital certificates to ISVs for a \$20 fee. Several hundred ActiveX controls will be digitally signed by the time Internet Explorer 3.0 ships, sources said.

But such a certificate does not authenticate the specific applet--it only certifies that the vendor has pledged not to build any malicious code into its software. "If a user downloads a buggy piece of signed code, then he will never go back to that vendor again," said Rob Price, group product manager for Internet security at Microsoft.

Beyond the credibility aspect, the signature concept raises a broader issue for some IS managers.

"Just the fact that they have to create this kind of workaround causes me

<http://www.xent.com/FoRK-archive/summer96/0338.html>

6/25/03

concern," said Eric Goldreich, information manager with Sheppard, Mullin, Richter & Hampton, a Los Angeles law firm.

Other IS managers are worried that digital signatures may add complexity to an already complicated method of trying to manage who downloads what from the Internet.

Internet Explorer 3.0 will modify a user's system files to detect digital certificates as components are downloaded. Once found, a dialog box will appear, stating where the component came from and asking if users want to continue downloading the component.

System administrations will be able to restrict users from downloading any components, and users will be able to list "trusted" companies that can load components onto their client machine without confirmation.

Security "should be something the end user isn't aware of," said Erik Goldoff, computer specialist for the Centers for Disease Control, in Atlanta. "End users don't even understand Internet busy signals today."

The issue of component security has not been widely discussed because the technology is only beginning to mature; Internet Explorer 3.0 is the first browser to apply the digital signature approach.

Two Microsoft competitors, Netscape and Sun Microsystems Inc., are adding digital signature schemes as a means of extending the functionality of software and components found on the Internet. However, officials at both companies believe digital signatures alone perpetuate a flawed model found in shrink-wrapped software.

"Digital signatures are just a part of the answer, not the whole solution," said Jeff Treuhaft, director of security at Netscape, of Mountain View, Calif. "Besides, you need to sign the code, not the vendor."

-
- **Next message:** [Rohit Khare: "Andreesen moving sloooowly to objects"](#)
 - **Previous message:** [Rohit Khare: "Tim's comments on W3C appear in PCWeek"](#)

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TOTAL AMOUNT OF PAYMENT	(\$)	0	Application Number	09/539,667
			Filing Date	March 30, 2000
			First Named Inventor	Shlomo Touboul
			Examiner Name	Unknown
			Group / Art Unit	2785
			Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)	FEE CALCULATION (continued)																																																																																																																																																																														
<input type="checkbox"/> Check <input type="checkbox"/> Credit card <input type="checkbox"/> Money Order <input type="checkbox"/> Other <input type="checkbox"/> None <input checked="" type="checkbox"/> Deposit Account: Deposit Account Number: 05-0150 Deposit Account Name: Squire, Sanders & Dempsey, L.L.P. The Commissioner is authorized to: (check all that apply) <input type="checkbox"/> Charge fee(s) indicated below <input checked="" type="checkbox"/> Credit any overpayments <input checked="" type="checkbox"/> Charge any additional fee(s) during the pendency of this application <input type="checkbox"/> Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.	3. ADDITIONAL FEES <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Fee Code</th> <th>Large Entity Fee (\$)</th> <th>Fee Code</th> <th>Small Entity Fee (\$)</th> <th>Fee Description</th> <th>Fee Paid</th> </tr> </thead> <tbody> <tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr> <tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td></td></tr> <tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr> <tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for reexamination</td><td></td></tr> <tr><td>112</td><td>820*</td><td>112</td><td>820*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr> <tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr> <tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr> <tr><td>116</td><td>400</td><td>216</td><td>200</td><td>Extension for reply within second month</td><td></td></tr> <tr><td>117</td><td>920</td><td>217</td><td>460</td><td>Extension for reply within third month</td><td></td></tr> <tr><td>118</td><td>1,440</td><td>218</td><td>720</td><td>Extension for reply within fourth month</td><td></td></tr> <tr><td>128</td><td>1,960</td><td>228</td><td>980</td><td>Extension for reply within fifth month</td><td></td></tr> <tr><td>119</td><td>320</td><td>219</td><td>160</td><td>Notice of Appeal</td><td></td></tr> <tr><td>120</td><td>320</td><td>220</td><td>160</td><td>Filing a brief in support of an appeal</td><td></td></tr> <tr><td>121</td><td>280</td><td>221</td><td>140</td><td>Request for oral hearing</td><td></td></tr> <tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr> <tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - unavoidable</td><td></td></tr> <tr><td>141</td><td>1,280</td><td>241</td><td>640</td><td>Petition to revive - unintentional</td><td></td></tr> <tr><td>142</td><td>1,280</td><td>242</td><td>640</td><td>Utility issue fee (or reissue)</td><td></td></tr> <tr><td>143</td><td>460</td><td>243</td><td>230</td><td>Design issue fee</td><td></td></tr> <tr><td>144</td><td>620</td><td>244</td><td>310</td><td>Plant issue fee</td><td></td></tr> <tr><td>122</td><td>130</td><td>122</td><td>130</td><td>Petitions to the Commissioner</td><td></td></tr> <tr><td>123</td><td>50</td><td>123</td><td>50</td><td>Processing fee under 37 CFR 1.17 (q)</td><td></td></tr> <tr><td>126</td><td>180</td><td>126</td><td>180</td><td>Submission of Information Disclosure Stmt</td><td></td></tr> <tr><td>581</td><td>40</td><td>581</td><td>40</td><td>Recording each patent assignment per property (times number of properties)</td><td></td></tr> <tr><td>146</td><td>740</td><td>246</td><td>370</td><td>Filing a submission after final rejection (37 CFR § 1.129(a))</td><td></td></tr> <tr><td>148</td><td>740</td><td>249</td><td>370</td><td>For each additional invention to be examined (37 CFR § 1.129(b))</td><td></td></tr> <tr><td>179</td><td>740</td><td>279</td><td>370</td><td>Request for Continued Examination (RCE)</td><td></td></tr> <tr><td>188</td><td>900</td><td>188</td><td>900</td><td>Request for expedited examination of a design application</td><td></td></tr> </tbody> </table>	Fee Code	Large Entity Fee (\$)	Fee Code	Small Entity Fee (\$)	Fee Description	Fee Paid	105	130	205	65	Surcharge - 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SUBMITTED BY		<i>Complete (if applicable)</i>			
Name (Print/Type)	Aaron Winger	Registration No. Attorney/Agent	45,229	Telephone	650.656.6500
Signature				Date	August 29, 2002

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Date: 8/29/02

By: [Signature]
Aaron Wininger

In Re Application of	
Shlomo Touboul	
Serial No. 09/539,667	Examiner: Unknown
Filing Date: March 30, 2000	Group Art Unit: 2785
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES	

Office of Initial Patent Examination
Customer Service Center
Commissioner for Patents
Washington, D.C. 20231

REQUEST TO CORRECT FILING RECEIPT

- Attached is a copy of the Official Filing Receipt as received from the U.S. Patent And Trademark Office with regard to the above-identified patent application for which issuance of a corrected Filing Receipt is respectfully requested. The errors are shown in red on the Filing Receipt as well as described below.
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 - Attorney Docket No.
 - Other – Continuing Data As Claimed by Applicant

in that the filing receipt should read as follows:

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THIS APPLICATION IS A CON OF 08/964,388 11/06/1997
WHICH CLAIMS BENEFIT OF 60/030,639 11/08/1996


3. Please issue a corrected Filing Receipt rectifying the above errors.

If for any reason an insufficient fee has been paid, please charge the insufficiency to
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Date: August 29, 2002

Respectfully submitted,

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: 650-856-6500
Facsimile: 650-843-8777

By: 
Aaron Winger
Attorney for Applicant
Reg. No. 45,229

FILING RECEIPT



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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2785	402	40492.00011	10	22	4

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043

Date Mailed: 06/14/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Continuing Data as Claimed by Applicant

~~THIS APPLN CLAIMS BENEFIT OF 60/030,699 11/07/1996~~
THIS Application is a CON of 08/964,388 11/06/1997
WHICH CLAIMS Benefit of 60/030,639 11/08/1996

Foreign Applications

DATES ENTERED: No Action

JUN 20 2000

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ATTORNEY
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** SMALL ENTITY **

Title

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

713

Data entry by : BURNS, DORIS

Team : OIPE

Date: 06/14/2000



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ATTORNEY _____
SQUIRE, SANDERS & DEMPSEY

Date Mailed: September 17, 2001 | By: MAS/say | PTO DATE STAMP:
Serial No.: 09/539,667 | Docket No.: 43426.00011
Applicant(s): Shlomo Touboul
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
DOWNLOADABLES

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- Patent Application ___ Pages ___ Claims
- Drawings Formal/Informal _____ Sheets
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- Oath/Declaration/Power of Attorney
- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (\$1.53(d) CPA - in duplicate)
- Provisional Application _____ Pages
- Design Application ___ Pages ___ Drawings
- Status Letter
- Check No. _____ for \$ _____
- Certificate(s) of First Class Mailing
- Amendment/Response
- Petition for Extension of Time
- Transmittal Form
- Fee Transmittal for FY 2001 (in duplicate)
- Appeal Brief (in triplicate)
- Issue Fee Transmittal with PTO-85b Drawings
- Copy of PTO-1533, Notice to File Missing Parts
- Info. Disclosure Statement (2 pages) & PTO-1449 (2 pages) w/ 43 References
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- Check No. _____ for \$ _____

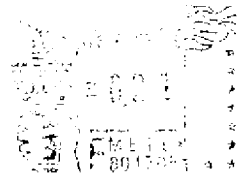


Date Mailed: September 17, 2001 | By: MAS/say | PTO DATE STAMP:
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- Certificate(s) of First Class Mailing
- Amendment/Response
- Petition for Extension of Time
- Transmittal Form
- Fee Transmittal for FY 2001 (in duplicate)
- Appeal Brief (in triplicate)
- Issue Fee Transmittal with PTO-85b Drawings
- Copy of PTO-1533, Notice to File Missing Parts
- Info. Disclosure Statement (2 pages) & PTO-1449 (2 pages) w/ 43 References
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PTO/SB/21 (08-00)

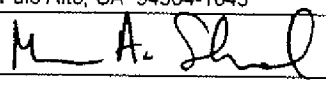
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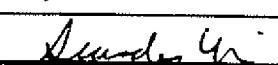
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<h2>TRANSMITTAL FORM</h2> <p><i>(to be used for all correspondence after initial filing)</i></p>	Application Number	09/539,667
	Filing Date	March 30, 2000
	First Named Inventor	Shlomo Touboul
	Group Art Unit	2785
	Examiner Name	Unknown
Total Number of Pages in This Submission	Attorney Docket Number	43426.00011

ENCLOSURES <i>(check all that apply)</i>		
<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Deposit Account Authorization on Fee Transmittal Form <input type="checkbox"/> Amendment / Response <input type="checkbox"/> After Final <input type="checkbox"/> Signed Oath/Declaration <input type="checkbox"/> Extension of Time Request <input checked="" type="checkbox"/> Return Postcard <input checked="" type="checkbox"/> Information Disclosure Statement (2 pages) & PTO Form 1449 (2 pages) <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts <input type="checkbox"/> Response to Incomplete Application	<input type="checkbox"/> Assignment & Cover Sheet <i>(for an Application)</i> <input type="checkbox"/> Drawing(s) _____ sheets <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group <i>(Appeal Notice, Brief, Reply Brief)</i> <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) <i>(please identify below):</i> <p style="text-align: center;">43 References</p>
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	September 17, 2001

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		Group / Art Unit	2785		
TOTAL AMOUNT OF PAYMENT		Attorney Docket No.	43426.00011		
		(\$)	0		

METHOD OF PAYMENT (check one)					FEE CALCULATION (continued)																																																																																																																																																																																		
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SUBMITTED BY		<i>Complete (if applicable)</i>			
Name (Print/Type)	Marc A. Sockol	Registration No. Attorney/Agent	40,823	Telephone	650.856.6500
Signature				Date	September 17, 2001

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ADDITIONAL FEES <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Fee Code</th> <th>Large Entity Fee (\$)</th> <th>Small Entity Fee Code</th> <th>Small Entity Fee (\$)</th> <th>Fee Description</th> <th>Fee Paid</th> </tr> </thead> <tbody> <tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr> <tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet</td><td></td></tr> <tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr> <tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for reexamination</td><td></td></tr> <tr><td>112</td><td>920*</td><td>112</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr> <tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr> <tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr> <tr><td>116</td><td>390</td><td>216</td><td>195</td><td>Extension for reply within second month</td><td></td></tr> <tr><td>117</td><td>890</td><td>217</td><td>445</td><td>Extension for reply within third month</td><td></td></tr> <tr><td>118</td><td>1,380</td><td>218</td><td>695</td><td>Extension for reply within fourth month</td><td></td></tr> <tr><td>128</td><td>1,890</td><td>228</td><td>945</td><td>Extension for reply within fifth month</td><td></td></tr> <tr><td>119</td><td>310</td><td>219</td><td>155</td><td>Notice of Appeal</td><td></td></tr> <tr><td>120</td><td>310</td><td>220</td><td>155</td><td>Filing a brief in support of an appeal</td><td></td></tr> <tr><td>121</td><td>270</td><td>221</td><td>135</td><td>Request for oral hearing</td><td></td></tr> <tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr> <tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - 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SUBMITTED BY		<i>Complete (if applicable)</i>			
Name (Print/Type)	Marc A. Sockol	Registration No. Attorney/Agent)	40,823	Telephone	650.856.6500
Signature				Date	September 17, 2001

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Date: 9/17/01

By: Sandy Yi
Sandy Yi

In re Application of:			
	Shlomo Touboul	Examiner:	Unknown
Serial No.:	09/539,667	Art Unit:	2785
Filed:	March 30, 2000		
Title:	SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES		

Commissioner for Patents
Washington, D.C. 20231

**INFORMATION DISCLOSURE STATEMENT PURSUANT TO
37 C.F.R. §§1.97-1.98**

Sir:

In accordance with the duty of disclosure under 37 C.F.R. §1.56 and pursuant to 37 C.F.R. §§1.97-1.98, Applicant hereby notifies the U.S. Patent and Trademark Office of the references listed on the attached Form PTO-1449. One copy of each cited reference is submitted herewith.

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant reserves the right to dispute any of the listed documents as prior art during examination. Furthermore, Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application. The submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other material information may exist.

The Examiner is requested to initial the enclosed Form PTO-1449 and return a copy thereof to the undersigned.

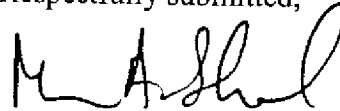
The present Information Disclosure Statement is being filed before receiving the first Office Action. Therefore, no certification under 37 C.F.R. §1.97(e) or fee under 37 C.F.R. §1.17(p) is required.

However, if for any reason an insufficient fee has been paid, please charge the insufficiency to Deposit Account No. 05-0150.

Date: September 17, 2001

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone (650) 856-6500
Facsimile (650) 843-8777

Respectfully submitted,



Marc A. Sockol
Attorney for Applicant
Reg. No. 40,823

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Substitute for form 1449A/PTO			Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>			Application Number	09/539,667
			Filing Date	March 30, 2000
			First Named Inventor	Shlomo Touboul
			Group Art Unit	2785
			Examiner Name	Unknown
			Attorney Docket Number	43426.00011
Sheet	1	of	2	

U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number	Kind Code ² (if known)			
		5,077,677		John H. Murphy, et al.	12-31-1991	
		5,359,659		Doren Rosenthal	10-25-1994	
		5,361,359		Homayoon Tajalli, et al.	11-01-1994	
		5,485,409		Sarbari Gupta, et al.	01-16-1996	
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		5,572,643		David H. Judson	11-05-1996	
		5,606,668		Gil Shwed	02-25-1997	
		5,623,600		Shuang Ji, et al.	04-22-1997	
		5,638,446		Aviel D. Rubin	06-10-1997	
		5,692,047		Charles E. McManis	11-25-1997	
		5,692,124		James M. Holden, et al.	11-25-1997	
		5,720,033		Umesh Deo	02-17-1998	
		5,724,425		Sheue-Ling Chang, et al.	03-03-1998	
		5,740,248		Helmut Fieres, et al.	04-14-1998	
		5,761,421		Arthur A. van Hoff, et al.	06-02-1998	
		5,765,205		Franklin Charles Breslau, et al.	06-09-1998	
		5,784,459		Murthy Devarakonda, et al.	07-21-1998	
		5,796,952		Owen Davis, et al.	08-18-1998	
		5,805,829		Geoffrey Alexander Cohen, et al.	09-08-1998	
		5,832,208		Chia-Hwang Chen, et al.	11-03-1998	
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		5,859,966		Kenneth John Hayman, et al.	01-12-1999	
		5,864,683		William E. Boebert, et al.	01-26-1999	
		5,862,904		Robert G. Atkinson, et al.	04-06-1999	
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		5,956,481		James E. Walsh, et al.	09-21-1999	
		5,974,549		Gilad Golan	10-26-1999	
		5,983,348		Shuang Ji	11-09-1999	

FOREIGN PATENT DOCUMENTS								
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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Unique citation designation number. ² See attached Kinds of U.S. Patent Documents. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

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Sheet	2	of	2
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		JIM K. OMURA, "Novel Applications of Cryptography in Digital Communications", IEEE Communications Magazine, May, 1990, pages 21-29.	
		OKAMOTO, E. et al., "ID-Based Authentication System For Computer Virus Detection", IEEE/IEE Electronic Library online, Electronics Letters, Vol. 26, Issue 15, ISSN 0013-5194, July 19, 1990, Abstract and pages 1169-1170. URL: http://iel.ihp.com:80/cgi-bin/iel_cgl?se...2ehls%26ViewTemplate%3ddocview%5fb%2ehls .	
		IBM AntiVirus User's Guide Version 2.4, International Business Machines Corporation, November 15, 1995, page 6-7.	
		NORVIN LEACH et al, "IE 3.0 Applets Will Earn Certification", PC Week, Vol. 13, No. 29, July 22, 1996, 2 pages.	
		"Finjan Software Releases SurfinBoard, Industry's First JAVA Security Product For the World Wide Web", Article published on the Internet by Finjan Software Ltd., July 29, 1996, 1 page.	
		"Powerful PC Security for the New World of Java™ and Downloadables, Surfin Shield™" Article published on the Internet by Finjan Software Ltd., 1996, 2 Pages.	
		Microsoft Authenticode Technology, "Ensuring Accountability and Authenticity for Software Components on the Internet", Microsoft Corporation, October 1996, including Abstract, Contents, Introduction and pages 1-10.	
		"Finjan Announces a Personal Java™ Firewall For Web Browsers - the SurfinShield™ 1.6 (formerly known as SurfinBoard)", Press Release of Finjan Releases SurfinShield 1.6, October 21, 1996, 2 pages.	
		Company Profile "Finjan - Safe Surfing, The Java Security Solutions Provider" Article published on the Internet by Finjan Software Ltd., October 31, 1996, 3 pages.	
		"Finjan Announces Major Power Boost and New Features for SurfinShield™ 2.0" Las Vegas Convention Center/Pavilion 5 P5551, November 18, 1996, 3 pages.	
		"Java Security: Issues & Solutions" Article published on the Internet by Finjan Software Ltd., 1996, 8 pages.	
		"Products" Article published on the Internet, 7 pages.	
		MARK LaDUE, "Online Business Consultant: Java Security: Whose Business Is It?" Article published on the Internet. Home Page Press, Inc. 1996, 4 pages.	
		Web Page Article "Frequently Asked Questions About Authenticode", Microsoft Corporation, last updated February 17, 1997, Printed December 23, 1998. URL: http://www.microsoft.com/workshop/security/authcode/signfaq.asp#9 , pages 1-13.	
		ZHANG, X.N., "Secure Code Distribution", IEEE/IEE Electronic Library online, Computer, Vol. 30, Issue 6, June, 1997, Pages: 76-79.	

Examiner Signature	Date Considered
--------------------	-----------------

*EXAMINER Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Unique citation designation number. ² Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

FILING RECEIPT



OC000000005176721



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Patent and Trademark Office**

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Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2785	402	40492.00011	10	22	4

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043

Date Mailed: 06/14/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Continuing Data as Claimed by Applicant

THIS APPLN CLAIMS BENEFIT OF 60/030,699 11/07/1996

DATES ENTERED: No Action

Foreign Applications

JUN 20 2000

If Required, Foreign Filing License Granted 06/14/2000

CALENDARED
BY MD
ATTORNEY
GRAHAM & JAMES (PA) IP DEPT.

**** SMALL ENTITY ****

Title

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

713

Data entry by : BURNS, DORIS

Team : OIPE

Date: 06/14/2000



**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 36 CFR 1.53(d). This license is not retroactive.

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PLEASE NOTE the following information about the Filing Receipt:

- The articles such as "a," "an" and "the" are not included as the first words in the title of an application. They are considered to be unnecessary to the understanding of the title.
- The words "new," "improved," "improvements in" or "relating to" are not included as first words in the title of an application because a patent application, by nature, is a new idea or improvement.
- The title may be truncated if it consists of more than 600 characters (letters and spaces combined).
- The docket number allows a maximum of 25 characters.
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DATES ENTERED: No Actia


APR 11 2000

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BY MD
ATTORNEY
GRAHAM & JAMES (PA) IP DEPT.

Date Mailed: March 30, 2000	By: MAS/md	PTO DATE STAMP:
Serial No.: Unassigned		Docket No.: 40492.00011
Applicant(s): Shlomo Touboul		
Title: System And Method For Protecting A Computer And A Network From Hostile Downloadables		

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application 26 Pages 22 Claims (Cont.)
- Drawings Formal 10 Sheets
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration/Power of Attorney (copy)
- Assignment & Recordation Cover Sheet (copy)
- Verified Statement Claiming Small Entity Status (copy)
- Continued Prosecution Application (\$1.53(d) CPA - in duplicate)
- Provisional Application _____ Pages
- Design Application __ Pages __ Drawings
- Status Letter
- Check No. _____ for \$ _____
- Other: _____
- Express Mail # EL515155991US
- Amendment/Response
- Petition for Extension of Time
- Transmittal Letter
- Notice of Appeal
- Appeal Brief (in triplicate)
- Issue Fee Transmittal with PTO-85b Drawings
- Copy of PTO-1533, Notice to File Missing Parts
- Info. Disclosure Statement & PTO-1449/Refs . .
- Request to Correct Filing Receipt
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BOX - NEW PATENT APPLICATION

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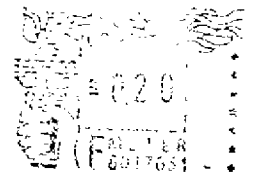
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Date Mailed: March 30, 2000 | By: MAS/md | PTO DATE STAMP:
 Serial No.: Unassigned | Docket No.: 40492.00011
 Applicant(s): Shlomo Touboul
 Title: System And Method For Protecting A Computer And A Network From Hostile Downloadables

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application 26 Pages 22 Claims (Cont.) Amendment/Response
- Drawings Formal 10 Sheets Petition for Extension of Time
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration/Power of Attorney (copy) Transmittal Letter
- Assignment & Recordation Cover Sheet (copy) Notice of Appeal
- Verified Statement Claiming Small Entity Status (copy) Appeal Brief (in triplicate)
- Continued Prosecution Application (\$1.53(d) CPA - in duplicate) Issue Fee Transmittal with PTO-85b Drawings
- Provisional Application _____ Pages Copy of PTO-1533, Notice to File Missing Parts
- Design Application ___ Pages ___ Drawings Info. Disclosure Statement & PTO-1449/Refs ..
- Status Letter Request to Correct Filing Receipt
- Check No. _____ for \$ _____ Check No. 24243 for \$402.00
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131/200701.01

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24243

004032 40492 00011 42

402.00 Patent & T Filing of a Continued Patent Application

03/30/08

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ATTORNEYS AT LAW
GENERAL ACCOUNT
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PALO ALTO, CA 94306

24243

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TWO SIGNATURES REQUIRED FOR \$2,500 AND ABOVE

UTILITY PATENT APPLICATION TRANSMITTAL (Small Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
40492.00011

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTS

Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

and invented by:

Shlomo Touboul

If a CONTINUATION APPLICATION, check appropriate box and supply the requisite information:

Continuation Divisional Continuation-in-part (CIP) of prior application No.: 08/964,388

Which is a:

Continuation Divisional Continuation-in-part (CIP) of prior application No.:

Which is a:

Continuation Divisional Continuation-in-part (CIP) of prior application No.:

Enclosed are:

Application Elements

1. Filing fee as calculated and transmitted as described below
2. Specification having 26 pages and including the following:
 - a. Descriptive Title of the Invention
 - b. Cross References to Related Applications (if applicable)
 - c. Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. Reference to Microfiche Appendix (if applicable)
 - e. Background of the Invention
 - f. Brief Summary of the Invention
 - g. Brief Description of the Drawings (if drawings filed)
 - h. Detailed Description
 - i. Claim(s) as Classified Below
 - j. Abstract of the Disclosure

**UTILITY PATENT APPLICATION TRANSMITTAL
(Small Entity)**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
40492.00011

Total Pages in this Submission

Application Elements (Continued)

3. Drawing(s) *(when necessary as prescribed by 35 USC 113)*
a. Formal b. Informal Number of Sheets 10

4. Oath or Declaration
a. Newly executed *(original or copy)* Unexecuted
b. Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
c. With Power of Attorney Without Power of Attorney
d. DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. Incorporation By Reference *(usable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. Computer Program in Microfiche

7. Genetic Sequence Submission *(if applicable, all must be included)*

- a. Paper Copy
b. Computer Readable Copy
c. Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. Assignment Papers *(cover sheet & documents)*
9. 37 CFR 3.73(b) Statement *(when there is an assignee)*
10. English Translation Document *(if applicable)*
11. Information Disclosure Statement/PTO-1449 Copies of IDS Citations
12. Preliminary Amendment
13. Acknowledgment postcard
14. Certificate of Mailing
 First Class Express Mail *(Specify Label No.):* EL515155991US

**UTILITY PATENT APPLICATION TRANSMITTAL
(Small Entity)**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
40492.00011

Total Pages in this Submission

Accompanying Application Parts (Continued)

- 15. Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
- 16. Small Entity Statement(s) - Specify Number of Statements Submitted: 1
- 17. Additional Enclosures *(please identify below):*

General Authorization/Request to Petition for Extensions of Time

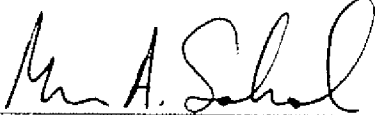
Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	22	- 20 =	2	x \$9.00	\$18.00
Indep. Claims	4	- 3 =	1	x \$39.00	\$39.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$345.00
OTHER FEE (specify purpose)					\$0.00
TOTAL FILING FEE					\$402.00

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 - Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
 - Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: **March 30, 2000**


Signature

Marc A. Sockol, Reg. No. 40,823
Attorney for Applicant
Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043
Tel: (650) 856-6500
Fax: (650) 856-3619

cc:

As a below named inventor, I hereby declare that:

The information given herein is true:

My residence, post office address and citizenship are as stated below next to my name:

I BELIEVE I AM THE ORIGINAL FIRST AND SOLE INVENTOR (if only one name is listed below) OR AN ORIGINAL FIRST AND JOINT INVENTOR (if plural names are listed below) OF THE SUBJECT MATTER WHICH IS CLAIMED AND FOR WHICH A PATENT IS SOUGHT ON THE INVENTION ENTITLED:

SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

the specification of which (check only one item below):

- is attached hereto;
- was filed on 11/06/97 United States
Application Serial No. 08/064,388
and was amended on _____ (if applicable).
- was filed on _____ as PCT International
Application Serial No. _____
and was amended under PCT Article 19 _____ (if applicable).

I hereby state that I have reviewed and understand the content of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations Section 1.56(a).

I hereby claim the benefit under Title 35, United States, §119(a) of any United States provisional application(s) listed below.

60/030,639
(Application Number)

November 8, 1996
(Filing Date)

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America having a filing date before that of the application(s) on which priority is claimed.

FOREIGN APPLICATION(S), IF ANY, FILED WITHIN 12 (6 if a Design) MONTHS PRIOR TO THE FILING DATE OF THIS APPLICATION THE PRIORITY OF WHICH WHERE PERMITTED IS HEREBY CLAIMED UNDER 35 U.S.C. SEC. 119.

COUNTRY	APPLICATION OF NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)	PRIORITY CLAIMED
				yes
				yes
				yes

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.58(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

COMBINED DECLARATION (PAT)		APPLICATION & POWER OF ATTORNEY - Cont'd		ATTORNEY'S DOCKET NO: 40492.00002	
U.S. APPLICATION NO.		U.S. FILING DATE		PATENTED	
				PENDING	
				ABANDONED	
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.		PCT FILING DATE		U.S. SERIAL NUMBERS	
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or Agent(s) to prosecute the application and transact all business in the Patent and Trademark Office connected therewith. David L. Fehman, Reg. No. 28,600; David L. Nenty, Reg. No. 31,323; William J. Robinson, Reg. No. 29,430; Stuart L. Merkadeau, Reg. No. 33,262; David B. Abel, Reg. No. 32,394; Hisako Muramatsu, Reg. No. 34,955; Brian M. Berliner, Reg. No. 34,649; David J. Meyer, Reg. No. 33,425; Vincent J. Belusko, Reg. No. 30,820; Minda Schechter, Reg. No. 38,296; William G. Anderson, Reg. No. 27,851; Victor Do Gyartas, Reg. No. 40,583; Dennis R. Gallagher, Reg. No. 42,563; Jonathan L. Pebit, Reg. No. 40,770; Wayne Smith, Reg. No. 42,160; Lawrence W. Granatelli, Reg. No. 32,228; Laura A. Majerus, Reg. No. 33,417; Joseph K. Hollinger, Reg. No. 40,649; Jonathan T. Kaplan, Reg. No. 34,935; Marc A. Sockol, Reg. No. 40,823; Ian Cartier, Reg. No. 38,406; Linda Beach, Reg. No. 28,448.					
Send correspondence to			GRAHAM & JAMES LLP 600 Hansen Way Palo Alto, CA 94304-1043		Direct Phone Calls To: Lawrence Granatelli - 650-856-6500
1	FULL NAME OF INVENTOR	LAST NAME	FIRST NAME	MIDDLE NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	POST OFFICE ADDRESS	STREET	CITY	STATE OR COUNTRY	ZIP CODE
		TOUBOUL	SHILOMO	-	ISRAEL
		KEFAR-HAIM	ISRAEL	ISRAEL	42945
		-	KEFAR-HAIM	ISRAEL	42945
2	FULL NAME OF INVENTOR	LAST NAME	FIRST NAME	MIDDLE NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	POST OFFICE ADDRESS	STREET	CITY	STATE OR COUNTRY	ZIP CODE
2	FULL NAME OF INVENTOR	LAST NAME	FIRST NAME	MIDDLE NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	POST OFFICE ADDRESS	STREET	CITY	STATE OR COUNTRY	ZIP CODE
I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the lies so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.					
SIGNATURE OF INVENTOR 1	SIGNATURE OF INVENTOR 2	SIGNATURE OF INVENTOR 3	SIGNATURE OF INVENTOR 4		
DATE	DATE	DATE	DATE		

131/125253.01.00
033198/1111/40492.00002

VERIFIED STATEMENT (SEC. 1.9(d) AND 1.27(c)) CLAIMING SMALL BUSINESS STATUS (37 CFR 1.9(d) AND 1.27(c)) - SMALL BUSINESS CONCERN

Docket No.
40492.00002

Serial No.
08/964,388

Filing Date
November 6, 1997

Patent No.
Unassigned

Issue Date
Unassigned

Applicant/
Patentee: Shlomo Touboul

Invention: System and Method for Protecting a Computer and a Network from Hostile Downloadables

I hereby declare that I am:

- the owner of the small business concern identified below.
 an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: Finjan Software, Ltd.

ADDRESS OF CONCERN: Netanya, Israel 42504

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:

- the specification filed herewith with title as listed above.
 the application identified above.
 the patent identified above.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

COPY

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- no such person, concern or organization exists.
- each such person, concern or organization is listed below.

FULL NAME _____
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- Individual Small Business Concern Nonprofit Organization

FULL NAME _____
ADDRESS _____

- Individual Small Business Concern Nonprofit Organization

FULL NAME _____
ADDRESS _____

- Individual Small Business Concern Nonprofit Organization

FULL NAME _____
ADDRESS _____

- Individual Small Business Concern Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))


I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Shlomo Toaboul

TITLE OF PERSON SIGNING _____

OTHER THAN OWNER: Chairman of the Board

ADDRESS OF PERSON SIGNING: Kefar-Haim, Israel 42945

SIGNATURE: _____  _____ DATE: 13.5.98



UNITED STATES DEPARTMENT OF COMMERCE
 Patent and Trademark Office
 ASSISTANT SECRETARY AND COMMISSIONER
 OF PATENTS AND TRADEMARKS
 Washington, D.C. 20231

DECEMBER 04, 1998

PTAS

GRAHAM & JAMES LLP
 MARC A. SOCKOL
 600 HANSEN WAY
 PALO ALTO, CALIFORNIA 94304-1043



COPY

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PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 08/17/1998

REEL/FRAME: 9402/0752
 NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

TOUBOUL, SHLOMO

DOC DATE: 07/07/1998

ASSIGNEE:

FINJAN SOFTWARE, LTD.
 GIBORAI ISRAEL STREET
 NETANYA, ISRAEL 42504

SERIAL NUMBER: 08964388

PATENT NUMBER:

FILING DATE: 11/06/1997

ISSUE DATE:

DATES ENTERED: No Action

LAWAN FLETCHER, EXAMINER
 ASSIGNMENT DIVISION
 OFFICE OF PUBLIC RECORDS

DEC 15 1998

BY JMF CALENDARED
 ATTORNEY
 GRAHAM & JAMES (PAT) DEPT.

08-27-1998

Docket No. 40492.00002 (558)

FORM PTO 1595 (Modified)
(Rev. 6-93)
OMB No. 0651-0011 (exp 4/94)
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To the Honorable Commissioner of Patents and Trademarks: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies):
Shlomo Touboul

2. Name and address of receiving party(ies):

Name: Finjan Software, Ltd.

Address: Giborai Israel Street

City: Netanya 07

State/Prov.: _____

Country: Israel

ZIP: 42504

Additional name(s) & address(es)

Yes No

Additional names(s) of conveying party(ies)

Yes No

3. Nature of conveyance:

Assignment

Merger

Security Agreement

Change of Name

Other _____

Execution Date: 7/07/98

4. Application number(s) or registration numbers(s):

If this document is being filed together with a new application, the execution date of the application is:

Patent Application No.

Filing date

B. Patent No.(s)

08/964,388

11/06/97

Additional numbers

Yes No

5. Name and address of party to whom correspondence concerning document should be mailed:

6. Total number of applications and patents involved: 1

Name: Marc A. Sockol

7. Total fee (37 CFR 3.41):.....\$ 40.00

Registration No. 40,823

Enclosed - Any excess or insufficiency should be credited or debited to deposit account

Address: Graham & James LLP

Authorized to be charged to deposit account

600 Hansen Way

8. Deposit account number:

City: Palo Alto

State/Prov.: CA

05-0150

Country: USA

ZIP: 94304-1043

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9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Marc A. Sockol, Reg. No. 40,823.

Name of Person Signing

Marc A. Sockol

Signature

August 17, 1998

Date

Total number of pages including cover sheet, attachments, and

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Blue Coat Systems - Exhibit 1004

00735
F9N 013156

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08/25/1998 JWR/KLS 00000045 08964388
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ASSIGNMENT

Attorney Docket No. 40492.00002

(1) Shlomo Touboul (5) _____
 (1-8) *Insert Name(s) of Inventor(s)* (2) _____ (6) _____
 (3) _____ (7) _____
 (4) _____ (8) _____

For good and valuable consideration receipt of which is hereby acknowledged, the undersigned agree(s) to assign, and hereby do(es) assign, transfer and set over to:

(9) *Insert name of Assignee* (9) Finjan Software, Ltd.
 (10) *Insert state of incorporation of Assignee* (10) Israel
 (11) *Insert address of Assignee* (11) Giborai Israel Street, Netania Israel 42504
 (hereinafter designated as the Assignee) the entire worldwide right, title and interest in the invention known as
 (12) *Insert Identification of Invention, such as Title, Case Number or Foreign Application Number* (12) SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES
 (Case No. 40492.00002) (Serial No. 08/964,388) for which the undersigned has (have) executed an application for patent in United States of America
 (13) *Insert Date of Signing of Application* (13) on May 13, 1998

1) The undersigned agree(s) to execute all papers necessary in connection with the application and any continuing or divisional applications thereof and also to execute separate assignments in connection with such applications as the Assignee may deem necessary or expedient.

2) The undersigned agree(s) to execute all papers necessary in connection with any interference which may be declared concerning this application or continuation or division thereof and to cooperate with the Assignee in every way possible in obtaining evidence and going forward with such interference.

3) The undersigned agree(s) to execute all papers and documents and perform any act which may be necessary in connection with claims or provisions of the International Convention for Protection of Industrial Property or similar agreements.

4) The undersigned agree(s) to perform all affirmative acts which may be necessary to obtain a grant of a valid United States patent to the Assignee.

131/139340.01.00
062998/1543/40492.00002

5) The undersigned hereby authorize(s) and request(s) the Commissioner of Patents and the duly constituted authorities of foreign countries to issue any and all Letters Patents resulting from said application or any division or divisions or continuing or reissue applications thereof to the said Assignee, its successors and assigns, as Assignee of the entire right, title and interest, and hereby covenants that he has (they have) full right to convey the entire interest herein assigned, and that he has (they have) not executed and will not execute, any agreement in conflict herewith.

6) *The undersigned hereby grant(s)*

David L. Fehrman, Reg. No. 28,600; David L. Henty, Reg. No. 31,323; William J. Robinson, Reg. No. 29,430; Stuart L. Merkadeau, Reg. No. 33,262; David B. Abel Reg. No. 32,394; Hisako Muramatsu, Reg. No. 34,955; Brian M. Berliner, Reg. No. 34,549; David J. Meyer, Reg. No. 33,425;; Vincent J. Belusko, Reg. No. 30,820; Minda Schechter, Reg. No. 38,296; William G. Anderson, Reg. No. 27,851; Victor De Gyarfas, Reg. No. 40,583; Dennis R. Gallagher, Reg. No. 42,563; Jonathan L. Pettit, Reg. No. 40,770; Wayne Smith, Reg. No.42,160; Lawrence W. Granatelli, Reg. No. 32,228; Laura A. Majerus, Reg. No. 33,417; Joseph K. Hollinger Reg. No. 40,649; Jonathan T. Kaplan Reg. No. 38,935; Marc A. Sockol Reg. No. 40,823 ;Ian Cartier Reg. No. 38,406; Linda Beach Reg. No. 36,446.

the power to insert on this assignment any further identification which may be necessary or desirable in order to comply with the rules of the United States Patent and Trademark Office for recordation of this document.

Date	<u>7/2/98</u>	Name of Inventor(s)	<u>Shlomo Tabouk J12/c</u>
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____
Date	_____	Name of Inventor(s)	_____

131/139340.01.00
062998/1543/40492.00002

TOTAL P.03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Shlomo Touboul

Serial No. Unassigned

Filed: Unassigned

For: SYSTEM AND METHOD FOR
PROTECTING A COMPUTER AND A
NETWORK FROM HOSTILE
DOWNLOADABLES

Examiner: Unassigned

Art Unit: Unassigned

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

GENERAL AUTHORIZATION/REQUEST TO PETITION
FOR EXTENSIONS OF TIME

Dear Sir:

With reference to the subject application, and pursuant to 37 C.F.R. § 1.136, Applicant(s) hereby authorize(s) and request(s) the Commissioner to treat any correspondence requiring a petition for extension of time as containing such a request therefor for the appropriate length of time. This general authorization is effective during the pendency of this application, including any division or continuing application therefrom.

131/201261.01
033000/1007/40492.00011

EXPRESS MAIL LABEL NO: EL515155991US

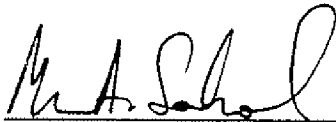
PATENT
Docket No.: 40492.00011

Where no check is received by the Commissioner, you are hereby authorized to charge payment of the requisite petition fees, or charge any additional fee required under 37 C.F.R. § 1.17, or credit any overpayment of same, to Deposit Account No. 05-0150.

Date: March 30, 2000

Respectfully submitted,

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: (650) 856-6500
Facsimile: (650) 856-3619

By: 
Marc A. Sockol
Attorney for Applicant(s)
Registration No: 40,823

131/201261.01
033000/1007/40492.00011



United States Patent And Trademark Office

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Date: 4/1/03

SQUIRE, SANDERS & DEMPSEY L.L.P
600 HANSEN WAY
PALO ALTO CA 94304-1043

DATES ENTERED _____

Exam & 1st OA 7/104

APR - 8 2003

CALENDARED

To: Applicant of Serial Number 09539667

BY SKJ
ATTORNEY
SQUIRE, SANDERS & DEMPSEY

We currently project that it will be more than 15 months before this application will receive a first office action. This is because the application is classified in a technology that has experienced a large filing rate growth over the last few years. The Office is addressing the growth by adjusting examination resources accordingly. You may wish to consult the MPEP (708.02) to see if filing a petition to make special is appropriate.

Customer Service Office in Technology Center: 09534

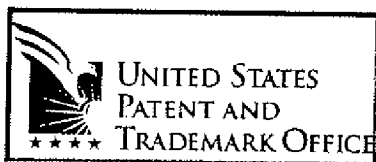
Phone Number: 703-306-5631

FAX Number: 703-746-7240

Applicant/Attorney Contact Information:

Telephone: (650)856-6500

Fax: (650)843-8777



United States Patent And Trademark Office

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Date: 4/1/03

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 600 HANSEN WAY
 PALO ALTO CA 94304-1043

DATES ENTERED _____

Super & 1st OA 7/1/04

APR - 8 2003

CALENDARED

To: Applicant of Serial Number 09539667

BY SKJ
 ATTORNEY
 SQUIRE, SANDERS & DEMPSEY

We currently project that it will be more than 15 months before this application will receive a first office action. This is because the application is classified in a technology that has experienced a large filing rate growth over the last few years. The Office is addressing the growth by adjusting examination resources accordingly. You may wish to consult the MPEP (708.02) to see if filing a petition to make special is appropriate.

Customer Service Office in Technology Center: 09534

Phone Number: 703-306-5631

FAX Number: 703-746-7240

Applicant/Attorney Contact Information:

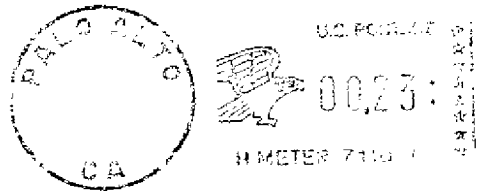
Telephone: (650)856-6500

Fax: (650)843-8777

Date Mailed: March 17, 2003 | By: MAS/say | PTO DATE STAMP:
 Serial No.: 09/539,667 | Docket No.: 43426.00011
 Applicant: Shlomo Touboul
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
 DOWNLOADABLES

- The following has been received in the U.S. Patent Office on the date stamped hereon:
- Patent Application ___ Pages ___ Claims
 - Drawings Informal ___ Sheets
 - General Authorization / Request to Petition for Extensions of Time
 - Oath/Declaration/Power of Attorney (signed)
 - Assignment & Recordation Cover Sheet
 - Verified Statement Claiming Small Entity Status
 - Continued Prosecution Application (§1.53(d))
 - Provisional Application _____ Pages
 - Design Application ___ Pages ___ Drawings
 - Request for Status of Application
 - Check No. for \$
 - Other:
 - Certificate(s) of First Class Mailing
 - Amendment/Response
 - Petition for Extension of Time
 - Transmittal Form
 - Fee Transmittal for FY 2003 (in duplicate)
 - Appeal Brief (in triplicate)
 - Issue Fee Transmittal with PTO-85b
 - Copy of PTO-1533, Notice to File Missing Parts
 - Info. Disclosure Statement & PTO-1449/Refs _____
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 600 Hansen Way, Suite 100
 Palo Alto, CA 94304-1043



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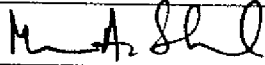
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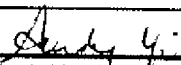
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<h2>TRANSMITTAL FORM</h2> <p><i>(to be used for all correspondence after initial filing)</i></p>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2131	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	2	Attorney Docket Number	43426.00011

ENCLOSURES <i>(check all that apply)</i>		
<input type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Amendment / Response <input type="checkbox"/> With RCE <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request (in duplicate) <input type="checkbox"/> _____ Reference(s) <input type="checkbox"/> IDS and Form 1449 <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Declaration/Oath	<input type="checkbox"/> Assignment and Recordation Cover Sheet <i>(for an Application)</i> <input type="checkbox"/> Drawing(s) _____ Sheets <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Request for Continued Examination <input type="checkbox"/> Power of Attorney <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> Request to Correct Filing Receipt <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group <i>(Appeal Notice, Brief, Reply Brief)</i> <input checked="" type="checkbox"/> Return Postcard <input checked="" type="checkbox"/> Request for Status of Application <input type="checkbox"/> Other Enclosure(s) <i>(please identify below):</i>
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	March 17, 2003

CERTIFICATE OF MAILING			
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Typed or printed name	Sandy Yi		
Signature		Date	March 17, 2003

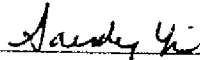
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Date: 3-17-2003

By: 
Sandy Yi

In Re Application Of: Shlomo Touboul	Examiner: Unknown Art Unit: 2131
Serial No.: 09/539,667	
Filed: March 30, 2000	
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES	

Commissioner for Patents
Washington, D.C. 20231

REQUEST FOR STATUS OF APPLICATION

Sir:

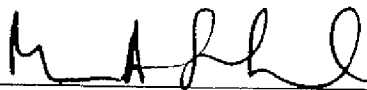
Applicant requests the status of the above-identified patent application. Applicant has not received a communication from the U.S. Patent and Trademark Office since receiving a corrected filing receipt mailed September 13, 2002.

Should the Examiner have any questions regarding this matter, please contact the undersigned at the telephone number shown below.

Date: 3-17-03

SQUIRE, SANDERS & DEMPSEY L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone (650) 856-6500
Facsimile (650) 843-8777

Respectfully submitted,



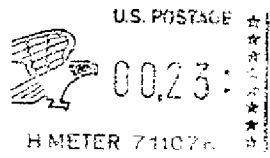
Marc A. Sockol, Esq.
Attorney for Applicant
Registration No.: 40,823

Date Mailed: February 13, 2003 | By: MAS/sav | PTO DATE STAMP:
 Serial No.: 09/539,667 | Docket No.: 43426.00011
 Applicant(s): Shlomo Touboul
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application ___ Pages ___ Claims
- Drawings Formal/Informal _____ Sheets
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration/Power of Attorney
- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (\$1.53(d) CPA - in duplicate)
- Design Application ___ Pages ___ Drawings
- Status Letter
- Other: Associate Power of Attorney
- Certificate(s) of First Class Mailing
- Amendment/Response
- Petition for Extension of Time
- Transmittal Form
- Fee Transmittal for FY 2003 (in duplicate)
- Notice of Change of Attorney Docket Number
- Issue Fee Transmittal with PTO-85b Drawings
- Info. Disclosure Statement & PTO-1449/Refs
- Request for Corrected Filing Receipt

U.S. DEPARTMENT OF COMMERCE
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 WASHINGTON, D.C. 20231



Squire, Sanders & Dempsey L.L.P.
 600 Hansen Way, Suite 100
 Palo Alto, CA 94304-1043



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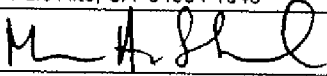
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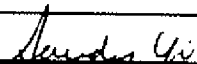
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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<h2>TRANSMITTAL FORM</h2> <p><i>(to be used for all correspondence after initial filing)</i></p>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2131	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	3	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Amendment / Response <input type="checkbox"/> With RCE <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request (in duplicate) <input type="checkbox"/> _____ Reference(s) <input type="checkbox"/> IDS and Form 1449 <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Declaration/Oath	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application) <input type="checkbox"/> Drawing(s) _____ Sheets <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Request for Continued Examination <input checked="" type="checkbox"/> Associate Power of Attorney <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> Request to Correct Filing Receipt <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input checked="" type="checkbox"/> Return Postcard <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Marc A. Sockol, Reg. No. 40,823 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	February 13, 2003

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Typed or printed name	Sandy Yi		
Signature		Date	February 13, 2003

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Date: 2-13-2003

By: *Sandy Yi*
Sandy Yi

In re Application of: Shlomo Touboul	Examiner: Unknown
Serial No.: 09/539,667	Art Unit: 2131
Filed: March 30, 2000	
Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FOR HOSTILE DOWNLOADABLES	

Commissioner of Patents
Washington, DC 20231

ASSOCIATE POWER OF ATTORNEY

Sir:

Please recognize the following attorney as an associate attorney in the above-referenced application:

Marc A. Berger, Reg. No. 44,029.

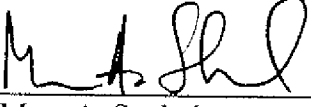
Please continue to address all correspondence and communications to:

Marc A. Sockol
Customer No. 30256
Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
650-856-6500

Dated: 2-13-03

Respectfully submitted

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Tel (650) 856-6500
Fax (650) 843-8777

By: 

Marc A. Sockol
Attorney for Applicant
Registration No. 40,823

PaloAlto Doc #: 49230v1



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COMMISSIONER FOR PATENTS
 UNITED STATES PATENT AND TRADEMARK OFFICE
 WASHINGTON, D.C. 20231
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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2131	402	40492.00011	10	22	4

30256
 SQUIRE, SANDERS & DEMPSEY L.L.P
 600 HANSEN WAY
 PALO ALTO, CA 94304-1043

CONFIRMATION NO. 8436

CORRECTED FILING RECEIPT



OC000000008790619

Date Mailed: 09/13/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Domestic Priority data as claimed by applicant

THIS APPLICATION IS A CON OF 08/964,388 11/06/1997 PAT 6,092,194
 WHICH CLAIMS BENEFIT OF 60/030,639 11/08/1996

Foreign Applications

If Required, Foreign Filing License Granted 06/14/2000

Projected Publication Date: Not Applicable, filed prior to November 29, 2000

DATES ENTERED _____

Non-Publication Request: No

Early Publication Request: No

SEP 27 2002

**** SMALL ENTITY ****

BY _____ CALENDARED
 ATTORNEY _____
 SQUIRE, SANDERS & DEMPSEY

Title

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

713

**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

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NOT GRANTED

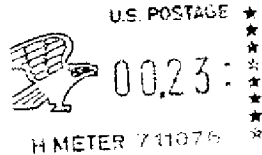
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Date Mailed: August 29, 2002 | By: AW/say | PTO DATE STAMP:
 Serial No.: 09/539,667 | Docket No.: 43426.00011
 Applicant(s): Shlomo Touboul
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE
 DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application ___ Pages ___ Claims
- Drawings Formal/Informal _____ Sheets
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration/Power of Attorney
- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (§1.53(d) CPA - in duplicate)
- Design Application ___ Pages ___ Drawings
- Status Letter
- Other: Copy of Official Filing Receipt Mailed 06/14/2000 With Changes Indicated In Red
- Certificate(s) of First Class Mailing
- Amendment/Response
- Petition for Extension of Time
- Transmittal Form
- Fee Transmittal for FY 2002 (in duplicate)
- Notice of Change of Attorney Docket Number
- Issue Fee Transmittal with PTO-85b Drawings
- Info. Disclosure Statement & PTO-1449/Refs
- Request for Corrected Filing Receipt

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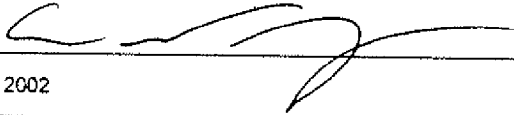
Approved for use through 10/31/2002. OMB 0651-0031

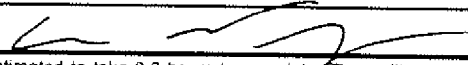
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<h2>TRANSMITTAL FORM</h2> <p><i>(to be used for all correspondence after initial filing)</i></p>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2785	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	7	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Amendment / Response <input type="checkbox"/> With RCE <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request (in duplicate) <input type="checkbox"/> ___ Reference(s) <input type="checkbox"/> IDS and Form 1449 <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Declaration/Oath	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application) <input type="checkbox"/> Drawing(s) ___ Sheets <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Request for Continued Examination <input type="checkbox"/> Power of Attorney <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) ___	<input checked="" type="checkbox"/> Request to Correct Filing Receipt <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input checked="" type="checkbox"/> Return Postcard <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): <p style="text-align: center;">Copy of Filing Receipt Mailed 06/14/2000 With Changes Indicated in Red</p>
Remarks		

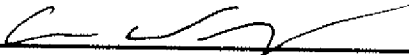
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Aaron Winger, Reg. No. 45,229 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	August 29, 2002

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this date: <input type="text" value="August 29, 2002"/>			
Typed or printed name	Aaron Winger		
Signature		Date	August 29, 2002

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FEE TRANSMITTAL for FY 2002		<i>Complete if Known</i>	
		Application Number	09/539,667
		Filing Date	March 30, 2000
		First Named Inventor	Shlomo Touboul
		Examiner Name	Unknown
		Group / Art Unit	2785
<i>Patent fees are subject to annual revision.</i>		Attorney Docket No.	43426.00011
TOTAL AMOUNT OF PAYMENT		(\$) 0	

METHOD OF PAYMENT (check all that apply)					FEE CALCULATION (continued)																																																																																																																																																																																																				
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ADDITIONAL FEES <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Fee Code</th> <th>Large Entity Fee (\$)</th> <th>Fee Code</th> <th>Small Entity Fee (\$)</th> <th>Fee Description</th> <th>Fee Paid</th> </tr> </thead> <tbody> <tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr> <tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet.</td><td></td></tr> <tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr> <tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for reexamination</td><td></td></tr> <tr><td>112</td><td>920*</td><td>112</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr> <tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr> <tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr> <tr><td>116</td><td>400</td><td>216</td><td>200</td><td>Extension for reply within second month</td><td></td></tr> <tr><td>117</td><td>920</td><td>217</td><td>460</td><td>Extension for reply within third month</td><td></td></tr> <tr><td>118</td><td>1,440</td><td>218</td><td>720</td><td>Extension for reply within fourth month</td><td></td></tr> <tr><td>128</td><td>1,960</td><td>228</td><td>980</td><td>Extension for reply within fifth month</td><td></td></tr> <tr><td>119</td><td>320</td><td>219</td><td>160</td><td>Notice of Appeal</td><td></td></tr> <tr><td>120</td><td>320</td><td>220</td><td>160</td><td>Filing a brief in support of an appeal</td><td></td></tr> <tr><td>121</td><td>280</td><td>221</td><td>140</td><td>Request for oral hearing</td><td></td></tr> <tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr> <tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - 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SUBMITTED BY		<i>Complete (if applicable)</i>			
Name (Print/Type)	Aaron Wninger	Registration No. Attorney/Agent	45,229	Telephone	650.855.6500
Signature				Date	August 29, 2002

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 U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

Complete if Known

Application Number		09/539,667	
Filing Date		March 30, 2000	
First Named Inventor		Shlomo Touboul	
Examiner Name		Unknown	
Group / Art Unit		2785	
TOTAL AMOUNT OF PAYMENT		(\$) 0	
Attorney Docket No.		43426.00011	

METHOD OF PAYMENT (check all that apply)					FEE CALCULATION (continued)																																																																																																																																																																																		
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unavoidable</td><td></td></tr> <tr><td>141</td><td>1,280</td><td>241</td><td>640</td><td>Petition to revive - unintentional</td><td></td></tr> <tr><td>142</td><td>1,280</td><td>242</td><td>640</td><td>Utility issue fee (or reissue)</td><td></td></tr> <tr><td>143</td><td>460</td><td>243</td><td>230</td><td>Design issue fee</td><td></td></tr> <tr><td>144</td><td>520</td><td>244</td><td>310</td><td>Plant issue fee</td><td></td></tr> <tr><td>122</td><td>130</td><td>122</td><td>130</td><td>Petitions to the Commissioner</td><td></td></tr> <tr><td>123</td><td>50</td><td>123</td><td>50</td><td>Processing fee under 37 CFR 1.17 (q)</td><td></td></tr> <tr><td>126</td><td>180</td><td>126</td><td>180</td><td>Submission of Information Disclosure Stmt</td><td></td></tr> <tr><td>581</td><td>40</td><td>581</td><td>40</td><td>Recording each patent assignment per property (times number of properties)</td><td></td></tr> <tr><td>146</td><td>740</td><td>246</td><td>370</td><td>Filing a submission after final rejection (37 CFR § 1.129(a))</td><td></td></tr> <tr><td>149</td><td>740</td><td>249</td><td>370</td><td>For each additional invention to be examined (37 CFR § 1.129(b))</td><td></td></tr> <tr><td>179</td><td>740</td><td>279</td><td>370</td><td>Request for Continued Examination (RCE)</td><td></td></tr> <tr><td>169</td><td>900</td><td>169</td><td>900</td><td>Request for expedited examination of a design application</td><td></td></tr> </tbody> </table>					Fee Code	Large Entity Fee (\$)	Fee Code	Small Entity Fee (\$)	Fee Description	Fee Paid	105	130	205	65	Surcharge - late filing fee or oath		127	50	227	25	Surcharge - late provisional filing fee or cover sheet.		139	130	139	130	Non-English specification		147	2,520	147	2,520	For filing a request for reexamination		112	920*	112	920*	Requesting publication of SIR prior to Examiner action		113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action		115	110	215	55	Extension for reply within first month		116	400	216	200	Extension for reply within second month		117	920	217	460	Extension for reply within third month		118	1,440	218	720	Extension for reply within fourth month		128	1,960	228	980	Extension for reply within fifth month		119	320	219	160	Notice of Appeal		120	320	220	160	Filing a brief in support of an appeal		121	280	221	140	Request for oral hearing		138	1,510	138	1,510	Petition to institute a public use proceeding		140	110	240	55	Petition to revive - unavoidable		141	1,280	241	640	Petition to revive - unintentional		142	1,280	242	640	Utility issue fee (or reissue)		143	460	243	230	Design issue fee		144	520	244	310	Plant issue fee		122	130	122	130	Petitions to the Commissioner		123	50	123	50	Processing fee under 37 CFR 1.17 (q)		126	180	126	180	Submission of Information Disclosure Stmt		581	40	581	40	Recording each patent assignment per property (times number of properties)		146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))		149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))		179	740	279	370	Request for Continued Examination (RCE)		169	900	169	900	Request for expedited examination of a design application	
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The Commissioner is authorized to: (check all that apply) <input type="checkbox"/> Charge fee(s) indicated below <input checked="" type="checkbox"/> Credit any overpayments <input checked="" type="checkbox"/> Charge any additional fee(s) during the pendency of this application <input type="checkbox"/> Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.																																																																																																																																																																																							
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SUBMITTED BY		Complete (if applicable)			
Name (Print/Type)	Aaron Winingar	Registration No. Attorney/Agent	45,229	Telephone	650.856.6500
Signature		Date	August 29, 2002		


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Date: 8/29/02

By: 
Aaron Wininger

In Re Application of	
Shlomo Touboul	
Serial No. 09/539,667	Examiner: Unknown
Filing Date: March 30, 2000	Group Art Unit: 2785
For: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES	

Office of Initial Patent Examination
Customer Service Center
Commissioner for Patents
Washington, D.C. 20231

REQUEST TO CORRECT FILING RECEIPT

1. Attached is a copy of the Official Filing Receipt as received from the U.S. Patent And Trademark Office with regard to the above-identified patent application for which issuance of a corrected Filing Receipt is respectfully requested. The errors are shown in red on the Filing Receipt as well as described below.

2. There is an error in that the following data is:

- incorrectly entered
and/or
- omitted
- Applicant's name
- Applicant's address
- Title
- Filing Date
- Serial Number
- Foreign Application Reference
- Attorney Docket No.
- Other – Continuing Data As Claimed by Applicant

in that the filing receipt should read as follows:

Continuing Data as Claimed by Applicant

THIS APPLICATION IS A CON OF 08/964,388 11/06/1997
WHICH CLAIMS BENEFIT OF 60/030,639 11/08/1996

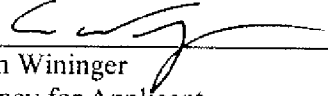
3. Please issue a corrected Filing Receipt rectifying the above errors.

If for any reason an insufficient fee has been paid, please charge the insufficiency to Deposit Account No. 05-0150.

Date: August 29, 2002

Respectfully submitted,

Squire, Sanders & Dempsey L.L.P.
600 Hansen Way
Palo Alto, CA 94304-1043
Telephone: 650-856-6500
Facsimile: 650-843-8777

By: 
Aaron Winger
Attorney for Applicant
Reg. No. 45,229

FILING RECEIPT



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**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address: ASSISTANT SECRETARY AND
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Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/539,667	03/30/2000	2785	402	40492.00011	10	22	4

Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043

Date Mailed: 06/14/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Shlomo Touboul, Kefar-haim, ISRAEL;

Continuing Data as Claimed by Applicant

THIS APPLN CLAIMS BENEFIT OF 60/030,699 11/07/1996
THIS Application is a CON of 08/964,388 11/06/1997
WHICH CLAIMS Benefit of 60/030,639 11/08/1996

Foreign Applications

DATES ENTERED: No Action

JUN 20 2000

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BY MD
ATTORNEY
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Title

System and method for protecting a computer and a network from hostile downloadables

Preliminary Class

713

Data entry by : BURNS, DORIS

Team : OIPE

Date: 06/14/2000



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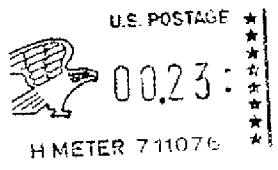
Assistant Commissioner for Patents
Office of Initial Patent Examination
Customer Service Center
Washington, DC 20231

Date Mailed: August 29, 2002 | By: AW/say | PTO DATE STAMP:
 Serial No.: 09/539,667 | Docket No.: 43426.00011
 Applicant(s): Shlomo Touboul
 Title: SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK FROM HOSTILE DOWNLOADABLES

The following has been received in the U.S. Patent Office on the date stamped hereon:

- Patent Application — Pages — Claims
- Drawings Formal/Informal — Sheets
- General Authorization / Request to Petition for Extensions of Time
- Oath/Declaration/Power of Attorney
- Assignment & Recordation Cover Sheet
- Verified Statement Claiming Small Entity Status
- Continued Prosecution Application (§1.53(d) CPA - in duplicate)
- Design Application — Pages — Drawings
- Status Letter
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- Certificate(s) of First Class Mailing
- Amendment/Response
- Petition for Extension of Time
- Transmittal Form
- Fee Transmittal for FY 2002 (in duplicate)
- Notice of Change of Attorney Docket Number
- Issue Fee Transmittal with PTO-85b Drawings
- Info. Disclosure Statement & PTO-1449/Refs
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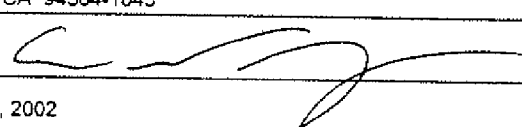
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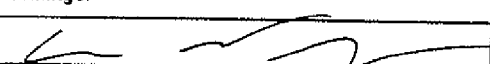
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<h2>TRANSMITTAL FORM</h2> <p><i>(to be used for all correspondence after initial filing)</i></p>	Application Number	09/539,667	
	Filing Date	March 30, 2000	
	First Named Inventor	Shlomo Touboul	
	Group Art Unit	2785	
	Examiner Name	Unknown	
Total Number of Pages in This Submission	7	Attorney Docket Number	43426.00011

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Amendment / Response <input type="checkbox"/> With RCE <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request (in duplicate) <input type="checkbox"/> _____ Reference(s) <input type="checkbox"/> IDS and Form 1449 <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Declaration/Oath	<input type="checkbox"/> Assignment and Recordation Cover Sheet (for an Application) <input type="checkbox"/> Drawing(s) _____ Sheets <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Request for Continued Examination <input type="checkbox"/> Power of Attorney <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input checked="" type="checkbox"/> Request to Correct Filing Receipt <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input checked="" type="checkbox"/> Return Postcard <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): <p style="text-align: center;">Copy of Filing Receipt Mailed 06/14/2000 With Changes Indicated in Red</p>
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Aaron Winger, Reg. No. 45,229 Squire, Sanders & Dempsey, L.L.P. 600 Hansen Way Palo Alto, CA 94304-1043
Signature	
Date	August 29, 2002

CERTIFICATE OF MAILING			
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FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT (\$) 0

Complete if Known

Application Number	09/539,667
Filing Date	March 30, 2000
First Named Inventor	Shlomo Touboul
Examiner Name	Unknown
Group / Art Unit	2785
Attorney Docket No.	43426.00011

METHOD OF PAYMENT (check all that apply)

Check Credit card Money Order Other None

Deposit Account:

Deposit Account Number: 05-0150

Deposit Account Name: Squire, Sanders & Dempsey, L.L.P.

The Commissioner is authorized to: (check all that apply)

Charge fee(s) indicated below Credit any overpayments
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FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity (\$)	Small Fee Code	Entity (\$)	Fee Description	Fee Paid
101	740	201	370	Utility filing fee	
106	330	206	165	Design filing fee	
107	510	207	255	Plant filing fee	
108	740	208	370	Reissue filing fee	
114	160	214	80	Provisional filing fee	
SUBTOTAL (1)					(\$ 0)

2. EXTRA CLAIM FEES

Total Claims	-20**	=	0	X	0	=	0
Independent Claims	-3**	=	0	X	0	=	0
Multiple Dependent		=		X		=	0

Large Fee Code	Entity (\$)	Small Fee Code	Entity (\$)	Fee Description	Fee Paid
103	18	203	9	Claims in excess of 20	
102	84	202	42	Independent claims in excess of 3	
104	280	204	140	Multiple dependent claim, if not paid	
109	84	209	42	** Reissue independent claims over original patent	
110	18	210	9	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)					(\$ 0)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Fee Code	Large Entity (\$)	Fee Code	Small Entity (\$)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	920	217	460	Extension for reply within third month	
118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	
121	260	221	140	Request for oral hearing	
136	1,510	136	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
143	460	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17 (q)	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	
Other fee (specify): _____					
*Reduced by Basic Filing Fee Paid					
SUBTOTAL (3)					(\$ 0)

SUBMITTED BY

Name (Print/Type)	Aaron Winger	Registration No. Attorney/Agent)	45,229	Telephone	650.856.6500
Signature				Date	August 29, 2002

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MULTIPLE DEPENDENT CLAIM
 FEE CALCULATION SHEET
 (FOR USE WITH FORM PTO-875)

SERIAL NO.

FILING DATE

APPLICANT(S)

to 492.11

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			*		*		*	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1	✓						51						
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49							99						
50							100						
TOTAL IND.	4						TOTAL IND.						
TOTAL DEP.	18						TOTAL DEP.						
TOTAL CLAIMS	22						TOTAL CLAIMS						

PTO 1360 (3 78)

*MAY BE USED FOR ADDITIONAL CLAIMS OR AMENDMENTS

U.S. DEPARTMENT OF COMMERCE
 PATENT AND TRADEMARK OFFICE

**APPLICATION FOR
UNITED STATES PATENT
IN THE NAME OF**

Shlomo Touboul

OF

FINJAN SOFTWARE, LTD.

**SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A
NETWORK FROM HOSTILE DOWNLOADABLES**

DOCKET NO. 40492.00011

Please direct communications to:

**Intellectual Property Department
Graham & James LLP
600 Hansen Way
Palo Alto, CA 94304-1043
(650) 856-6500**

Express Mail Number EL515155991US

SYSTEM AND METHOD FOR PROTECTING A COMPUTER AND A NETWORK
FROM HOSTILE DOWNLOADABLES

PRIORITY REFERENCE TO RELATED APPLICATION

5 This application is a continuation of and hereby incorporates by reference U.S.
patent application serial no. 08/964,388, entitled "System and Method for Protecting a
Computer and a Network from Hostile Downloadables," filed November 6, 1997, which
claims priority to provisional application serial number 60/030,639, entitled "System and
Method for Protecting a Computer from Hostile Downloadables," filed on November 8,
10 1996, by inventor Shlomo Touboul.

INCORPORATION BY REFERENCE TO RELATED APPLICATIONS

 This application hereby incorporates by reference related U.S. patent application
serial number 08/790,097, entitled "System and Method for Protecting a Client from
15 Hostile Downloadables," filed on January 29, 1997, by inventor Shlomo Touboul; and
hereby incorporates by reference provisional application serial number 60/030,639,
entitled "System and Method for Protecting a Computer from Hostile Downloadables,"
filed on November 8, 1996, by inventor Shlomo Touboul.

BACKGROUND OF THE INVENTION

20 1. Field of the Invention

 This invention relates generally to computer networks, and more particularly
provides a system and method for protecting a computer and a network from hostile
Downloadables.

25 2. Description of the Background Art

The Internet is currently a collection of over 100,000 individual computer networks owned by governments, universities, nonprofit groups and companies, and is expanding at an accelerating rate. Because the Internet is public, the Internet has become a major source of many system damaging and system fatal application programs,
5 commonly referred to as "viruses."

Accordingly, programmers continue to design computer and computer network security systems for blocking these viruses from attacking both individual and network computers. On the most part, these security systems have been relatively successful. However, these security systems are not configured to recognize computer viruses which
10 have been attached to or configured as Downloadable application programs, commonly referred to as "Downloadables." A Downloadable is an executable application program, which is downloaded from a source computer and run on the destination computer. Downloadable is typically requested by an ongoing process such as by an Internet browser or web engine. Examples of Downloadables include Java™ applets designed for
15 use in the Java™ distributing environment developed by Sun Microsystems, Inc., JavaScript scripts also developed by Sun Microsystems, Inc., ActiveX™ controls designed for use in the ActiveX™ distributing environment developed by the Microsoft Corporation, and Visual Basic also developed by the Microsoft Corporation. Therefore, a system and method are needed to protect a network from hostile Downloadables.

SUMMARY OF THE INVENTION

The present invention provides a system for protecting a network from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, a specific security policy to be applied based on the client or the group to which the client belongs, or a specific policy to be applied based on the client/group and on the particular Downloadable received. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components.

Further, the security policy may indicate several tests to perform, including (1) a comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

The present invention further provides a method for protecting a computer from suspicious Downloadables. The method comprises the steps of receiving a Downloadable, comparing the Downloadable against a security policy to determine if the security policy has been violated, and discarding the Downloadable if the security policy
5 has been violated.

It will be appreciated that the system and method of the present invention may provide computer protection from known hostile Downloadables. The system and method of the present invention may identify Downloadables that perform operations deemed suspicious. The system and method of the present invention may examine the
10 Downloadable code to determine whether the code contains any suspicious operations, and thus may allow or block the Downloadable accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating a network system, in accordance with the present invention;

FIG. 2 is a block diagram illustrating details of the internal network security system of FIG. 1;

FIG. 3 is a block diagram illustrating details of the security program and the security database of FIG. 2;

FIG. 4 is a block diagram illustrating details of the security policies of FIG. 3;

FIG. 5 is a block diagram illustrating details of the security management console of FIG. 1;

FIG. 6A is a flowchart illustrating a method of examining for suspicious Downloadables, in accordance with the present invention;

FIG. 6B is a flowchart illustrating details of the step for finding the appropriate security policy of FIG. 6A;

FIG. 6C is a flowchart illustrating a method for determining whether an incoming Downloadable is to be deemed suspicious;

FIG. 7 is a flowchart illustrating details of the FIG. 6 step of decomposing a Downloadable; and

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a block diagram illustrating a network system 100, in accordance with the present invention. The network system 100 includes an external computer network 105, such as the Wide Area Network (WAN) commonly referred to as the Internet, coupled via a communications channel 125 to an internal network security system 110. The network system 100 further includes an internal computer network 115, such as a corporate Local Area Network (LAN), coupled via a communications channel 130 to the internal network computer system 110 and coupled via a communications channel 135 to a security management console 120.

The internal network security system 110 examines Downloadables received from external computer network 105, and prevents Downloadables deemed suspicious from reaching the internal computer network 115. It will be further appreciated that a Downloadable is deemed suspicious if it performs or may perform any undesirable operation, or if it threatens or may threaten the integrity of an internal computer network 115 component. It is to be understood that the term "suspicious" includes hostile, potentially hostile, undesirable, potentially undesirable, etc. Security management console 120 enables viewing, modification and configuration of the internal network security system 110.

FIG. 2 is a block diagram illustrating details of the internal network security system 110, which includes a Central Processing Unit (CPU) 205, such as an Intel Pentium® microprocessor or a Motorola Power PC® microprocessor, coupled to a signal bus 220. The internal network security system 110 further includes an external communications interface 210 coupled between the communications channel 125 and

the signal bus 220 for receiving Downloadables from external computer network 105, and an internal communications interface 225 coupled between the signal bus 220 and the communications channel 130 for forwarding Downloadables not deemed suspicious to the internal computer network 115. The external communications interface 210 and
5 the internal communications interface 225 may be functional components of an integral communications interface (not shown) for both receiving Downloadables from the external computer network 105 and forwarding Downloadables to the internal computer network 115.

Internal network security system 110 further includes Input/Output (I/O)
10 interfaces 215 (such as a keyboard, mouse and Cathode Ray Tube (CRT) display), a data storage device 230 such as a magnetic disk, and a Random-Access Memory (RAM) 235, each coupled to the signal bus 220. The data storage device 230 stores a security database 240, which includes security information for determining whether a received Downloadable is to be deemed suspicious. The data storage device 230 further stores a
15 users list 260 identifying the users within the internal computer network 115 who may receive Downloadables, and an event log 245 which includes determination results for each Downloadable examined and runtime indications of the internal network security system 110. An operating system 250 controls processing by CPU 205, and is typically stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution.
20 A security program 255 controls examination of incoming Downloadables, and also may be stored in data storage device 230 and loaded into RAM 235 (as illustrated) for execution by CPU 205.

FIG. 3 is a block diagram illustrating details of the security program 255 and the security database 240. The security program 255 includes an ID generator 315, a policy finder 317 coupled to the ID generator 315, and a first comparator 320 coupled to the policy finder 317. The first comparator 320 is coupled to a logical engine 333 via four
5 separate paths, namely, via Path 1, via Path 2, via Path 3 and via Path 4. Path 1 includes a direct connection from the first comparator 320 to the logical engine 333. Path 2 includes a code scanner coupled to the first comparator 320, and an Access Control List (ACL) comparator 330 coupling the code scanner 325 to the logical engine 333. Path 3 includes a certificate scanner 340 coupled to the first comparator 320, and a certificate
10 comparator 345 coupling the certificate scanner 340 to the logical engine 333. Path 4 includes a Uniform Resource Locator (URL) comparator 350 coupling the first comparator 320 to the logical engine 333. A record-keeping engine 335 is coupled between the logical engine 333 and the event log 245.

The security program 255 operates in conjunction with the security database 240,
15 which includes security policies 305, known Downloadables 307, known Certificates 309 and Downloadable Security Profile (DSP) data 310 corresponding to the known Downloadables 307. Security policies 305 includes policies specific to particular users 260 and default (or generic) policies for determining whether to allow or block an incoming Downloadable. These security policies 305 may identify specific
20 Downloadables to block, specific Downloadables to allow, or necessary criteria for allowing an unknown Downloadable. Referring to FIG. 4, security policies 305 include policy selectors 405, access control lists 410, trusted certificate lists 415, URL rule bases 420, and lists 425 of Downloadables to allow or to block per administrative override.

Known Downloadables 307 include lists of Downloadables which Original
Equipment Manufacturers (OEMs) know to be hostile, of Downloadables which OEMs
know to be non-hostile, and of Downloadables previously received by this security
program 255. DSP data 310 includes the list of all potentially hostile or suspicious
5 computer operations that may be attempted by each known Downloadable 307, and may
also include the respective arguments of these operations. An identified argument of an
operation is referred to as "resolved." An unidentified argument is referred to as
"unresolved." DSP data 310 is described below with reference to the code scanner 325.

The ID generator 315 receives a Downloadable (including the URL from which
10 it came and the userID of the intended recipient) from the external computer network
105 via the external communications interface 210, and generates a Downloadable ID
for identifying each Downloadable. The Downloadable ID preferably includes a digital
hash of the complete Downloadable code. The ID generator 315 preferably prefetches
all components embodied in or identified by the code for Downloadable ID generation.
15 For example, the ID generator 315 may prefetch all classes embodied in or identified by
the Java™ applet bytecode to generate the Downloadable ID. Similarly, the ID
generator 315 may retrieve all components listed in the .INF file for an ActiveX™
control to compute a Downloadable ID. Accordingly, the Downloadable ID for the
Downloadable will be the same each time the ID generator 315 receives the same
20 Downloadable. The ID generator 315 adds the generated Downloadable ID to the list of
known Downloadables 307 (if it is not already listed). The ID generator 315 then
forwards the Downloadable and Downloadable ID to the policy finder 317.

The policy finder 317 uses the userID of the intended user and the Downloadable ID to select the specific security policy 305 that shall be applied on the received Downloadable. If there is a specific policy 305 that was defined for the user (or for one of its super groups) and the Downloadable, then the policy is selected. Otherwise the
5 generic policy 305 that was defined for the user (or for one of its super groups) is selected. The policy finder 317 then sends the policy to the first comparator 320.

The first comparator 320 receives the Downloadable, the Downloadable ID and the security policy 305 from the policy finder 317. The first comparator 320 examines the security policy 305 to determine which steps are needed for allowing the
10 Downloadable. For example, the security policy 305 may indicate that, in order to allow this Downloadable, it must pass all four paths, Path 1, Path 2, Path 3 and Path 4. Alternatively, the security policy 305 may indicate that to allow the Downloadable, the it must pass only one of the paths. The first comparator 320 responds by forwarding the proper information to the paths identified by the security policy 305.

15 Path 1

In path 1, the first comparator 320 checks the policy selector 405 of the security policy 305 that was received from the policy finder 317. If the policy selector 405 is either "Allowed" or "Blocked," then the first comparator 320 forwards this result directly to the logical engine 333. Otherwise, the first comparator 320 invokes the
20 comparisons in path2 and/or path 3 and/or path 4 based on the contents of policy selector 405. It will be appreciated that the first comparator 320 itself compares the Downloadable ID against the lists of Downloadables to allow or block per administrative

override 425. That is, the system security administrator can define specific Downloadables as “Allowed” or “Blocked.”

Alternatively, the logical engine 333 may receive the results of each of the paths and based on the policy selector 405 may institute the final determination whether to
5 allow or block the Downloadable. The first comparator 320 informs the logical engine 333 of the results of its comparison.

Path 2

In path 2, the first comparator 320 delivers the Downloadable, the Downloadable
10 ID and the security policy 305 to the code scanner 325. If the DSP data 310 of the received Downloadable is known, the code scanner 325 retrieves and forwards the information to the ACL comparator 330. Otherwise, the code scanner 325 resolves the DSP data 310. That is, the code scanner 325 uses conventional parsing techniques to decompose the code (including all prefetched components) of the Downloadable into the
15 DSP data 310. DSP data 310 includes the list of all potentially hostile or suspicious computer operations that may be attempted by a specific Downloadable 307, and may also include the respective arguments of these operations. For example, DSP data 310 may include a READ from a specific file, a SEND to an unresolved host, etc. The code scanner 325 may generate the DSP data 310 as a list of all operations in the
20 Downloadable code which could ever be deemed potentially hostile and a list of all files to be accessed by the Downloadable code. It will be appreciated that the code scanner 325 may search the code for any pattern, which is undesirable or suggests that the code was written by a hacker.

An Example List of Operations Deemed Potentially Hostile

File operations: READ a file, WRITE a file;

Network operations: LISTEN on a socket, CONNECT to a socket, SEND data,

5 RECEIVE data, VIEW INTRANET;

Registry operations: READ a registry item, WRITE a registry item;

Operating system operations: EXIT WINDOWS, EXIT BROWSER, START

PROCESS/THREAD, KILL PROCESS/THREAD, CHANGE PROCESS/THREAD
PRIORITY, DYNAMICALLY LOAD A CLASS/LIBRARY, etc.; and

10 Resource usage thresholds: memory, CPU, graphics, etc.

In the preferred embodiment, the code scanner 325 performs a full-content inspection.

However, for improved speed but reduced security, the code scanner 325 may examine only a portion of the Downloadable such as the Downloadable header. The code scanner 325 then stores the DSP data into DSP data 310 (corresponding to its Downloadable ID),
15 and sends the Downloadable, the DSP data to the ACL comparator 330 for comparison with the security policy 305.

The ACL comparator 330 receives the Downloadable, the corresponding DSP data and the security policy 305 from the code scanner 325, and compares the DSP data against the security policy 305. That is, the ACL comparator 330 compares the DSP data
20 of the received Downloadable against the access control lists 410 in the received security policy 305. The access control list 410 contains criteria indicating whether to pass or fail the Downloadable. For example, an access control list may indicate that the Downloadable fails if the DSP data includes a WRITE command to a system file. The ACL comparator 330 sends its results to the logical engine 333.

Path 3

In path 3, the certificate scanner 340 determines whether the received Downloadable was signed by a certificate authority, such as VeriSign, Inc., and scans for a certificate embodied in the Downloadable. The certificate scanner 340 forwards the
5 found certificate to the certificate comparator 345. The certificate comparator 345 retrieves known certificates 309 that were deemed trustworthy by the security administrator and compares the found certificate with the known certificates 309 to determine whether the Downloadable was signed by a trusted certificate. The certificate
10 comparator 345 sends the results to the logical engine 333.

Path 4:

In path 4, the URL comparator 350 examines the URL identifying the source of the Downloadable against URLs stored in the URL rule base 420 to determine whether
15 the Downloadable comes from a trusted source. Based on the security policy 305, the URL comparator 350 may deem the Downloadable suspicious if the Downloadable comes from an untrustworthy source or if the Downloadable did not come from a trusted source. For example, if the Downloadable comes from a known hacker, then the Downloadable may be deemed suspicious and presumed hostile. The URL comparator
20 350 sends its results to the logical engine 333.

The logical engine 333 examines the results of each of the paths and the policy selector 405 in the security policy 305 to determine whether to allow or block the Downloadable. The policy selector 405 includes a logical expression of the results
25 received from each of the paths. For example, the logical engine 333 may block a

Downloadable if it fails any one of the paths, i.e., if the Downloadable is known hostile (Path 1), if the Downloadable may request suspicious operations (Path 2), if the Downloadable was not signed by a trusted certificate authority (Path 3), or if the Downloadable did come from an untrustworthy source (Path 4). The logical engine 333
5 may apply other logical expressions according to the policy selector 405 embodied in the security policy 305. If the policy selector 405 indicates that the Downloadable may pass, then the logical engine 333 passes the Downloadable to its intended recipient. Otherwise, if the policy selector 405 indicates that the Downloadable should be blocked, then the logical engine 333 forwards a non-hostile Downloadable to the intended
10 recipient to inform the user that internal network security system 110 discarded the original Downloadable. Further, the logical engine 333 forwards a status report to the record-keeping engine 335, which stores the reports in event log 245 in the data storage device 230 for subsequent review, for example, by the MIS director.

15 FIG. 5 is a block diagram illustrating details of the security management console 120, which includes a security policy editor 505 coupled to the communications channel 135, an event log analysis engine 510 coupled between communications channel 135 and a user notification engine 515, and a Downloadable database review engine 520 coupled to the communications channel 135. The security management console 120
20 further includes computer components similar to the computer components illustrated in FIG. 2.

The security policy editor 505 uses an I/O interface similar to I/O interface 215 for enabling authorized user modification of the security policies 305. That is, the security policy editor 505 enables the authorized user to modify specific security policies

305 corresponding to the users 260, the default or generic security policy 305, the
Downloadables to block per administrative override, the Downloadables to allow per
administrative override, the trusted certificate lists 415, the policy selectors 405, the
access control lists 410, the URLs in the URL rule bases 420, etc. For example, if the
5 authorized user learns of a new hostile Downloadable, then the user can add the
Downloadable to the Downloadables to block per system override.

The event log analysis engine 510 examines the status reports contained in the
event log 245 stored in the data storage device 230. The event log analysis engine 510
determines whether notification of the user (e.g., the security system manager or MIS
10 director) is warranted. For example, the event log analysis engine 510 may warrant user
notification whenever ten (10) suspicious Downloadables have been discarded by
internal network security system 110 within a thirty (30) minute period, thereby flagging
a potential imminent security threat. Accordingly, the event log analysis engine 510
instructs the user notification engine 515 to inform the user. The user notification
15 engine 515 may send an e-mail via internal communications interface 220 or via external
communications interface 210 to the user, or may display a message on the user's
display device (not shown).

FIG. 6A is a flowchart illustrating a method 600 for protecting an internal
20 computer network 115 from suspicious Downloadables. Method 600 begins with the ID
generator 315 in step 602 receiving a Downloadable. The ID generator 315 in step 604
generates a Downloadable ID identifying the received Downloadable, preferably, by
generating a digital hash of the Downloadable code (including prefetched components).
The policy finder 317 in step 606 finds the appropriate security policy 305

corresponding to the userID specifying intended recipient (or the group to which the intended recipient belongs) and the Downloadable. The selected security policy 305 may be the default security policy 305. Step 606 is described in greater detail below with reference to FIG. 6B.

5 The first comparator 320 in step 608 examines the lists of Downloadables to allow or to block per administrative override 425 against the Downloadable ID of the incoming Downloadable to determine whether to allow the Downloadable automatically. If so, then in step 612 the first comparator 320 sends the results to the logical engine 333. If not, then the method 600 proceeds to step 610. In step 610, the first comparator
10 620 examines the lists of Downloadables to block per administrative override 425 against the Downloadable ID of the incoming Downloadable for determining whether to block the Downloadable automatically. If so, then the first comparator 420 in step 612 sends the results to the logical engine 333. Otherwise, method 600 proceeds to step 614.

 In step 614, the first comparator 320 determines whether the security policy 305
15 indicates that the Downloadable should be tested according to Path 4. If not, then method 600 jumps to step 618. If so, then the URL comparator 350 in step 616 compares the URL embodied in the incoming Downloadable against the URLs of the URL rules bases 420, and then method 600 proceeds to step 618.

 In step 618, the first comparator 320 determines whether the security policy 305
20 indicates that the Downloadable should be tested according to Path 2. If not, then method 600 jumps to step 620. Otherwise, the code scanner 235 in step 626 examines the DSP data 310 based on the Downloadable ID of the incoming Downloadable to determine whether the Downloadable has been previously decomposed. If so, then

method 600 jumps to step 630. Otherwise, the code scanner 325 in step 628 decomposes the Downloadable into DSP data. Downloadable decomposition is described in greater detail with reference to FIG. 7. In step 630, the ACL comparator 330 compares the DSP data of the incoming Downloadable against the access control lists 410 (which include
5 the criteria necessary for the Downloadable to fail or pass the test).

In step 620, the first comparator 320 determines whether the security policy 305 indicates that the Downloadable should be tested according to Path 3. If not, then method 600 returns to step 612 to send the results of each of the test performed to the logical engine 333. Otherwise, the certificate scanner 622 in step 622 scans the
10 Downloadable for an embodied certificate. The certificate comparator 345 in step 624 retrieves trusted certificates from the trusted certificate lists (TCL) 415 and compares the embodied certificate with the trusted certificates to determine whether the Downloadable has been signed by a trusted source. Method 600 then proceeds to step 612 by the certificate scanner 345 sending the results of each of the paths taken to the logical engine
15 333. The operations of the logical engine 333 are described in greater detail below with reference to FIG. 6C. Method 600 then ends.

One skilled in the art will recognize that the tests may be performed in a different order, and that each of the tests need not be performed. Further, one skilled in the art will recognize that, although path 1 is described in FIG. 6A as an automatic allowance or
20 blocking, the results of Path 1 may be another predicate to be applied by the logical engine 333. Further, although the tests are shown serially in FIG. 6A, the tests may be performed in parallel as illustrated in FIG. 3.

FIG. 6B is a flowchart illustrating details of step 606 of FIG. 6A (referred to herein as method 606). Method 606 begins with the policy finder 317 in step 650 determining whether security policies 305 include a specific security policy corresponding to the userID and the Downloadable. If so, then the policy finder 317 in step 654 fetches the corresponding specific policy 305. If not, then the policy finder 317 in step 652 fetches the default or generic security policy 305 corresponding to the userID. Method 606 then ends.

FIG. 6C is a flowchart illustrating details of a method 655 for determining whether to allow or to block the incoming Downloadable. Method 655 begins with the logical engine 333 in step 660 receiving the results from the first comparator 320, from the ACL comparator 330, from the certificate comparator 345 and from the URL comparator 350. The logical engine 333 in step 662 compares the results with the policy selector 405 embodied in the security policy 305, and in step 664 determines whether the policy selector 405 confirms the pass. For example, the policy selector 405 may indicate that the logical engine 333 pass the Downloadable if it passes one of the tests of Path 1, Path 2, Path 3 and Path 4. If the policy selector 405 indicates that the Downloadable should pass, then the logical engine 333 in step 666 passes the Downloadable to the intended recipient. In step 668, the logical engine 333 sends the results to the record-keeping engine 335, which in turn stores the results in the event log 245 for future review. Method 655 then ends. Otherwise, if the policy selector 405 in step 664 indicates that the Downloadable should not pass, then the logical engine 333 in step 670 stops the Downloadable and in step 672 sends a non-hostile substitute Downloadable to

inform the user that the incoming Downloadable has been blocked. Method 655 then jumps to step 668.

FIG. 7 is a flowchart illustrating details of step 628 of FIG. 6A (referred to herein as method 628) for decomposing a Downloadable into DSP data 310. Method 628 begins in step 705 with the code scanner 325 disassembling the machine code of the Downloadable. The code scanner 325 in step 710 resolves a respective command in the machine code, and in step 715 determines whether the resolved command is suspicious (e.g., whether the command is one of the operations identified in the list described above with reference to FIG. 3). If not, then the code scanner 325 in step 725 determines whether it has completed decomposition of the Downloadable, i.e., whether all operations in the Downloadable code have been resolved. If so, then method 628 ends. Otherwise, method 628 returns to step 710.

Otherwise, if the code scanner 325 in step 715 determines that the resolved command is suspect, then the code scanner 325 in step 720 decodes and registers the suspicious command and its command parameters as DSP data 310. The code scanner 325 in step 720 registers the commands and command parameters into a format based on command class (e.g., file operations, network operations, registry operations, operating system operations, resource usage thresholds). Method 628 then jumps to step 725.

FIG. 8 is a flowchart illustrating a method 800 for generating a Downloadable ID for identifying a Downloadable. Method 800 begins with the ID generator 315 in step 810 receiving a Downloadable from the external computer network 105. The ID generator 315 in step 820 may fetch some or all components referenced in the

Downloadable code, and in step 830 includes the fetched components in the
Downloadable code. The ID generator 315 in step 840 performs a hashing function on
at least a portion of the Downloadable code to generate a Downloadable ID. The ID
generator 315 in step 850 stores the generated Downloadable ID in the security database
5 240 as a reference to the DSP data 310. Accordingly, the Downloadable ID will be the
same for the identical Downloadable each time it is encountered.

The foregoing description of the preferred embodiments of the invention is by
way of example only, and other variations of the above-described embodiments and
10 methods are provided by the present invention. For example, although the invention has
been described in a system for protecting an internal computer network, the invention
can be embodied in a system for protecting an individual computer. Components of this
invention may be implemented using a programmed general purpose digital computer,
using application specific integrated circuits, or using a network of interconnected
15 conventional components and circuits. The embodiments described herein have been
presented for purposes of illustration and are not intended to be exhaustive or limiting.
Many variations and modifications are possible in light of the foregoing teaching. The
system is limited only by the following claims.

WHAT IS CLAIMED IS:

1 1. A computer-based method for generating a Downloadable ID to identify a
2 Downloadable, comprising the steps of:
3 obtaining a Downloadable;
4 fetching, if the Downloadable includes one or more references to a component, at
5 least one component identified by the one or more references; and
6 performing a function on the Downloadable and all components fetched to
7 generate a Downloadable ID.

8

9 2. The method of claim 1, wherein the Downloadable includes an applet.

10

11 3. The method of claim 1, wherein the Downloadable includes an ActiveX™
12 control.

13

14 4. The method of claim 1, wherein the Downloadable includes a plugin.

15

16 5. The method of claim 1, wherein the Downloadable includes HTML code.

17

18 6. The method of claim 1, wherein the Downloadable includes an application
19 program.

20

21 7. The method of claim 1, wherein the function includes a hashing function.

22

23 8. The method of claim 1, wherein the step of fetching includes the step of fetching
24 the first component referenced by the Downloadable.

25

26 9. The method of claim 1, wherein the Downloadable does not include any
27 references.

28

29 10. The method of claim 1, wherein the step of fetching includes fetching all
30 components referenced by the Downloadable.

31

32 11. A system for generating a Downloadable ID to identify a Downloadable,
33 comprising:

34 a communications engine for obtaining a Downloadable; and

35 an ID generator coupled to the communications engine for fetching, if the

36 Downloadable includes one or more references to a component, at least one component

37 identified by the one or more references, and for performing a function on the

38 Downloadable and all components fetched to generate a Downloadable ID.

39

40 12. The system of claim 11, wherein the Downloadable includes an applet.

41

42 13. The system of claim 11, wherein the Downloadable includes an ActiveX™

43 control.

44 14. The system of claim 11, wherein the Downloadable includes a plugin.

45

46 15. The system of claim 11, wherein the Downloadable includes HTML code.

47

48 16. The system of claim 11, wherein the Downloadable includes an application
49 program.

50

51 17. The system of claim 11, wherein the function includes a hashing function.

52

53 18. The system of claim 11, wherein the ID generator fetches the first component
54 referenced by the Downloadable.

55

56 19. The system of claim 11, wherein the Downloadable does not include any
57 references.

58

59 20. The system of claim 11, wherein the ID generator fetches all components
60 referenced by the Downloadable.

61

62 21. A system for generating a Downloadable ID to identify a Downloadable,
63 comprising:

64 means for obtaining a Downloadable;

65 means for fetching, if the Downloadable includes one or more references to a

66 component, at least one component identified by the one or more references; and

67 means for performing a function on the Downloadable and all components
68 fetched to generate a Downloadable ID.

69

70 22. A computer-readable storage medium storing program code for causing a
71 computer to perform the steps of:

72 obtaining a Downloadable;

73 fetching, if the Downloadable includes one or more references to a component, at
74 least one component identified by the one or more references; and

75 performing a function on the Downloadable and all components fetched to
76 generate a Downloadable ID.

77

ABSTRACT OF THE DISCLOSURE

A system protects a computer from suspicious Downloadables. The system comprises a security policy, an interface for receiving a Downloadable, and a comparator, 5 coupled to the interface, for applying the security policy to the Downloadable to determine if the security policy has been violated. The Downloadable may include a Java™ applet, an ActiveX™ control, a JavaScript™ script, or a Visual Basic script. The security policy may include a default security policy to be applied regardless of the client to whom the Downloadable is addressed, or a specific security policy to be applied based 10 on the client or the group to which the client belongs. The system uses an ID generator to compute a Downloadable ID identifying the Downloadable, preferably, by fetching all components of the Downloadable and performing a hashing function on the Downloadable including the fetched components.

Further, the security policy may indicate several tests to perform, including (1) a 15 comparison with known hostile and non-hostile Downloadables; (2) a comparison with Downloadables to be blocked or allowed per administrative override; (3) a comparison of the Downloadable security profile data against access control lists; (4) a comparison of a certificate embodied in the Downloadable against trusted certificates; and (5) a comparison of the URL from which the Downloadable originated against trusted and 20 untrusted URLs. Based on these tests, a logical engine can determine whether to allow or block the Downloadable.

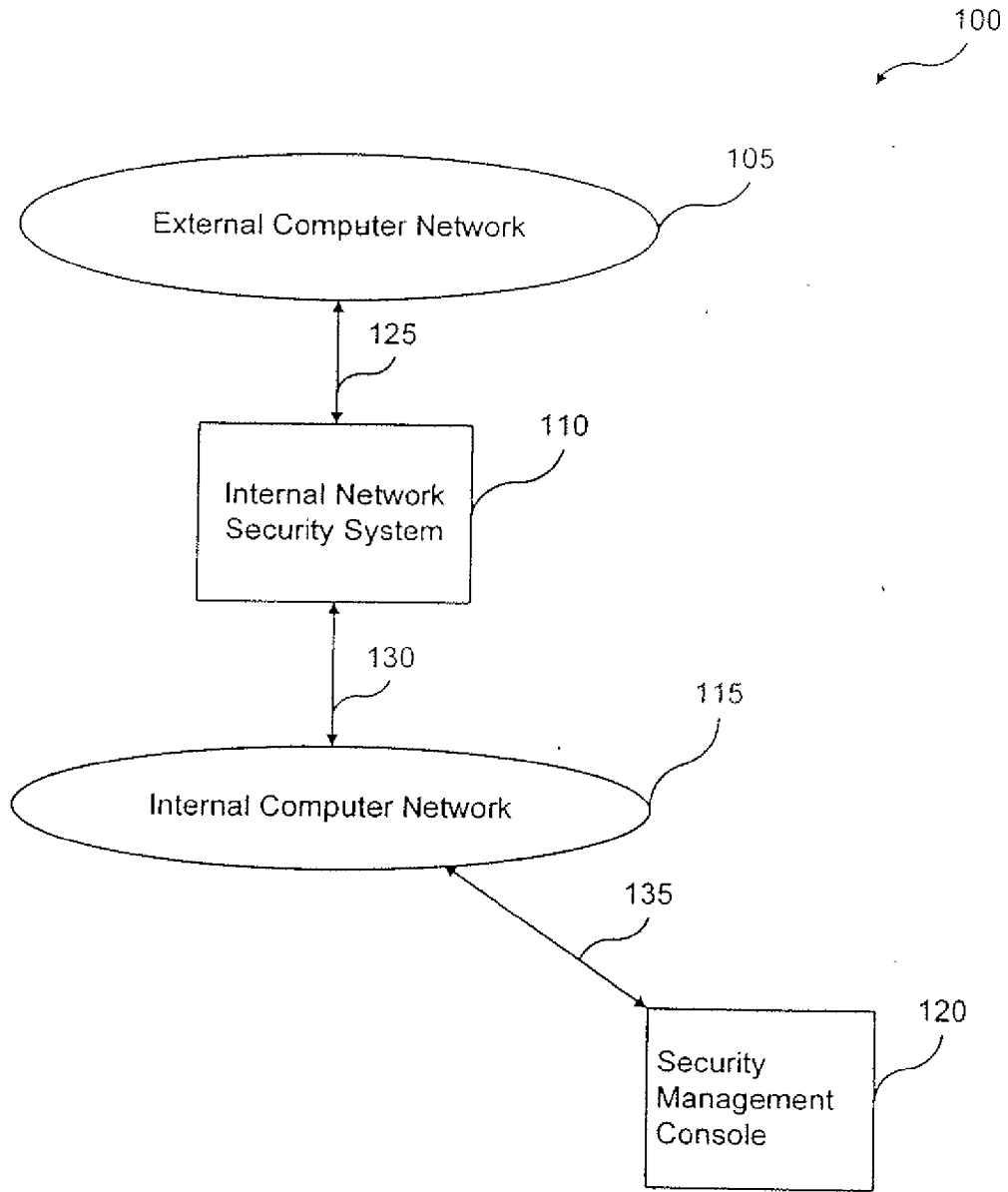


FIG. 1

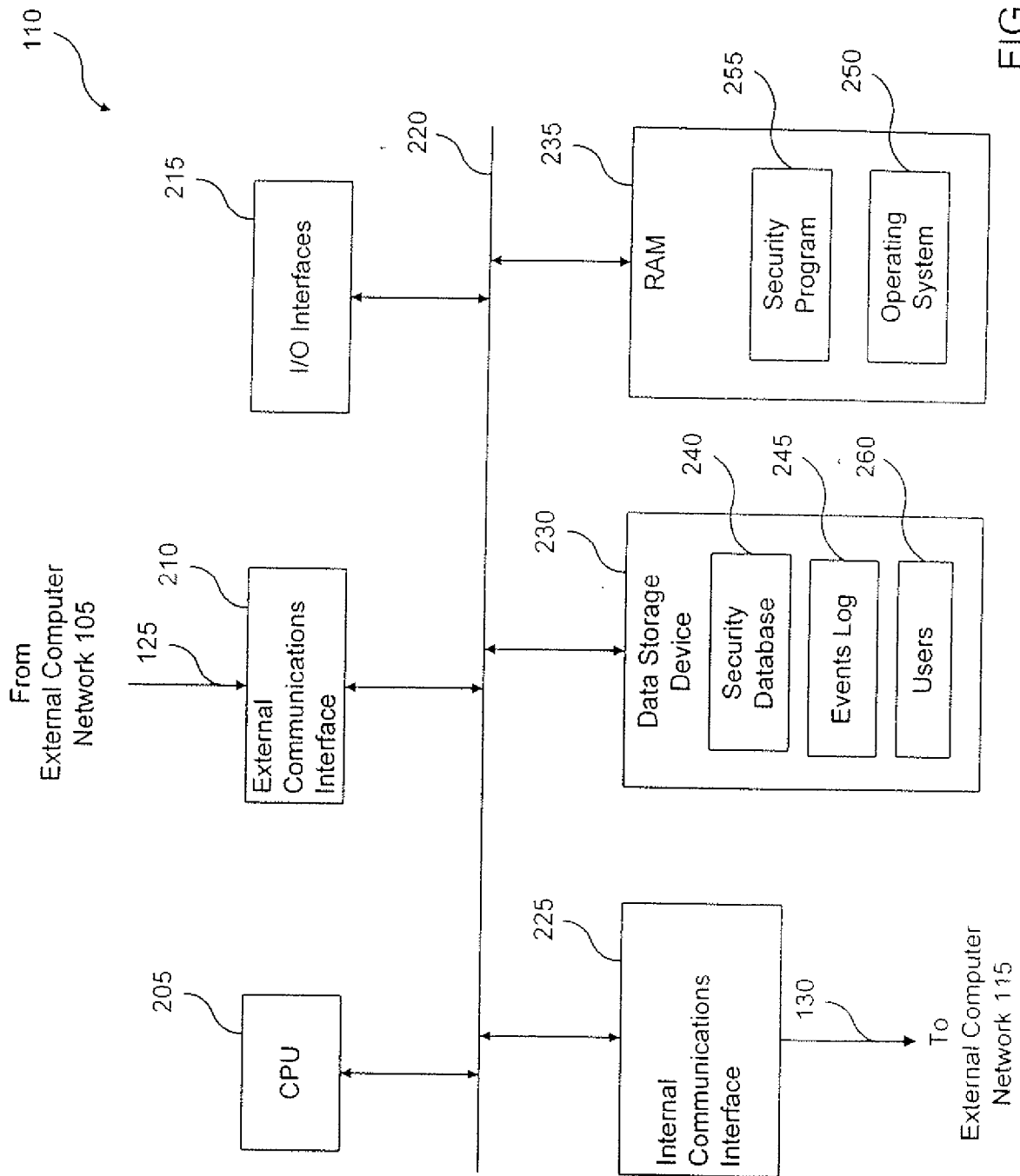


FIG. 2

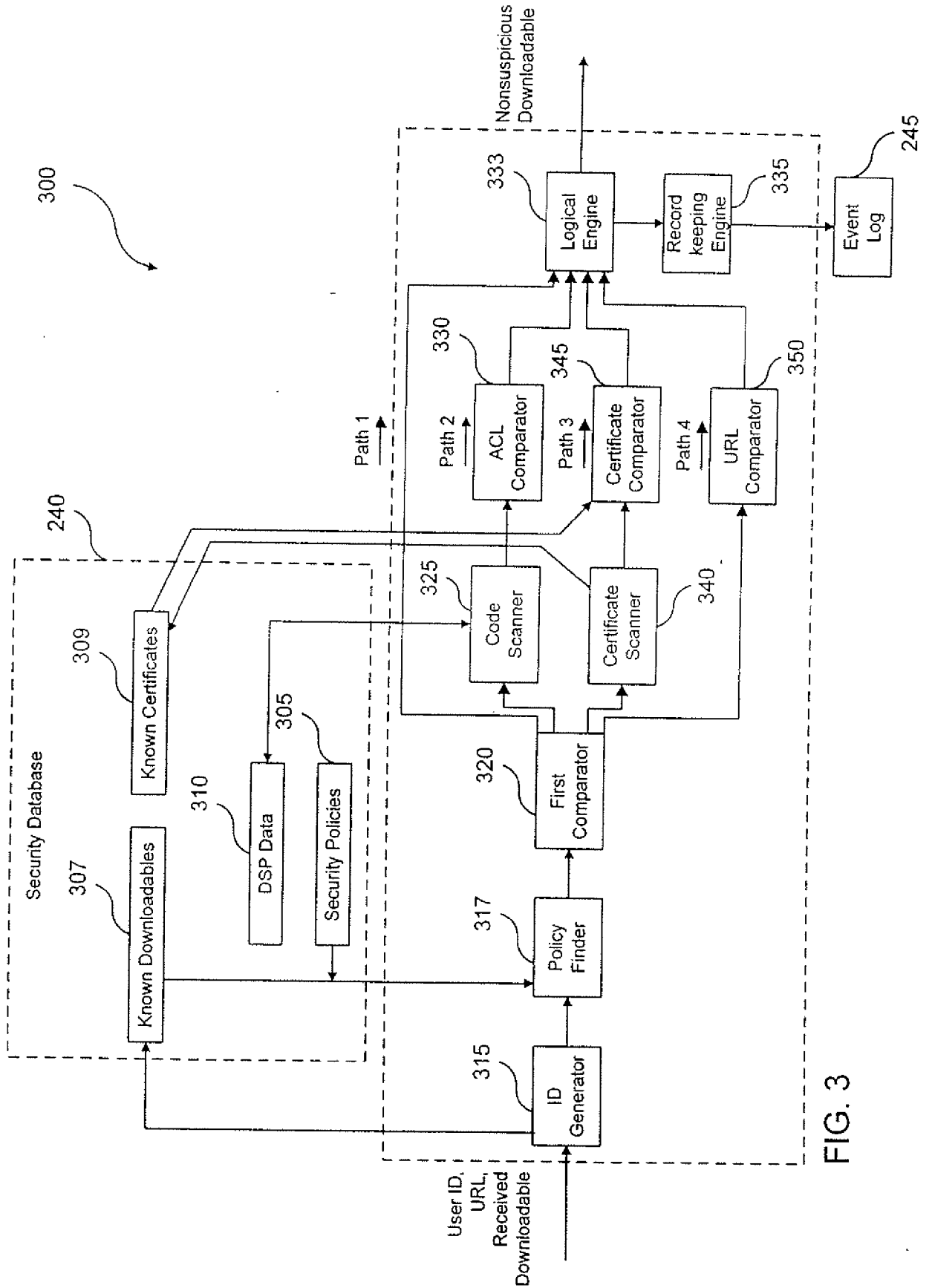


FIG. 3

Security Policies

305

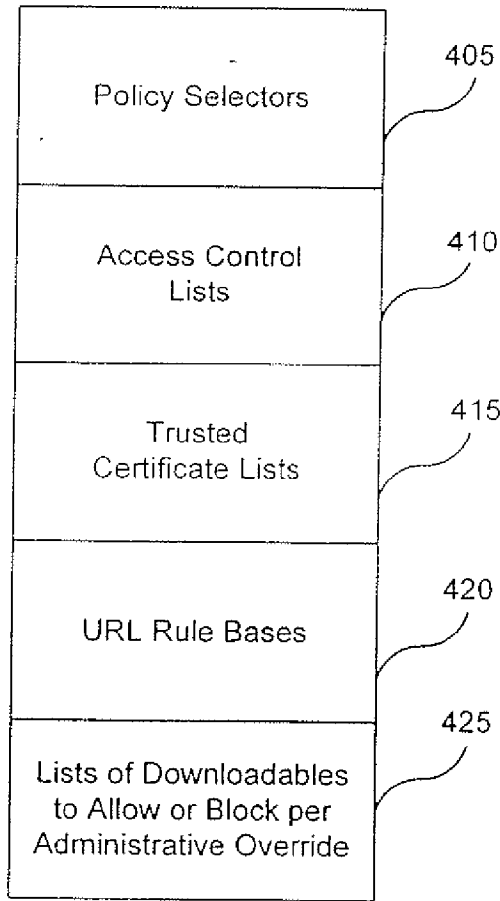


FIG. 4

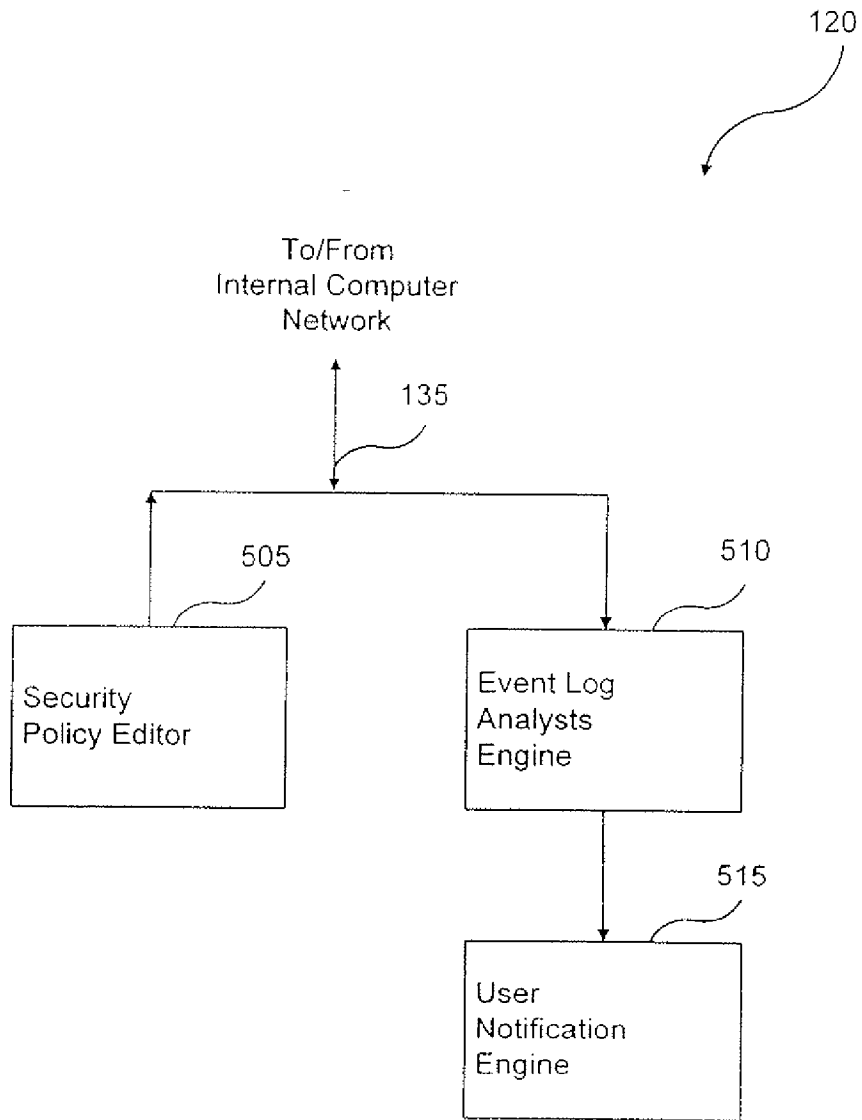


FIG. 5

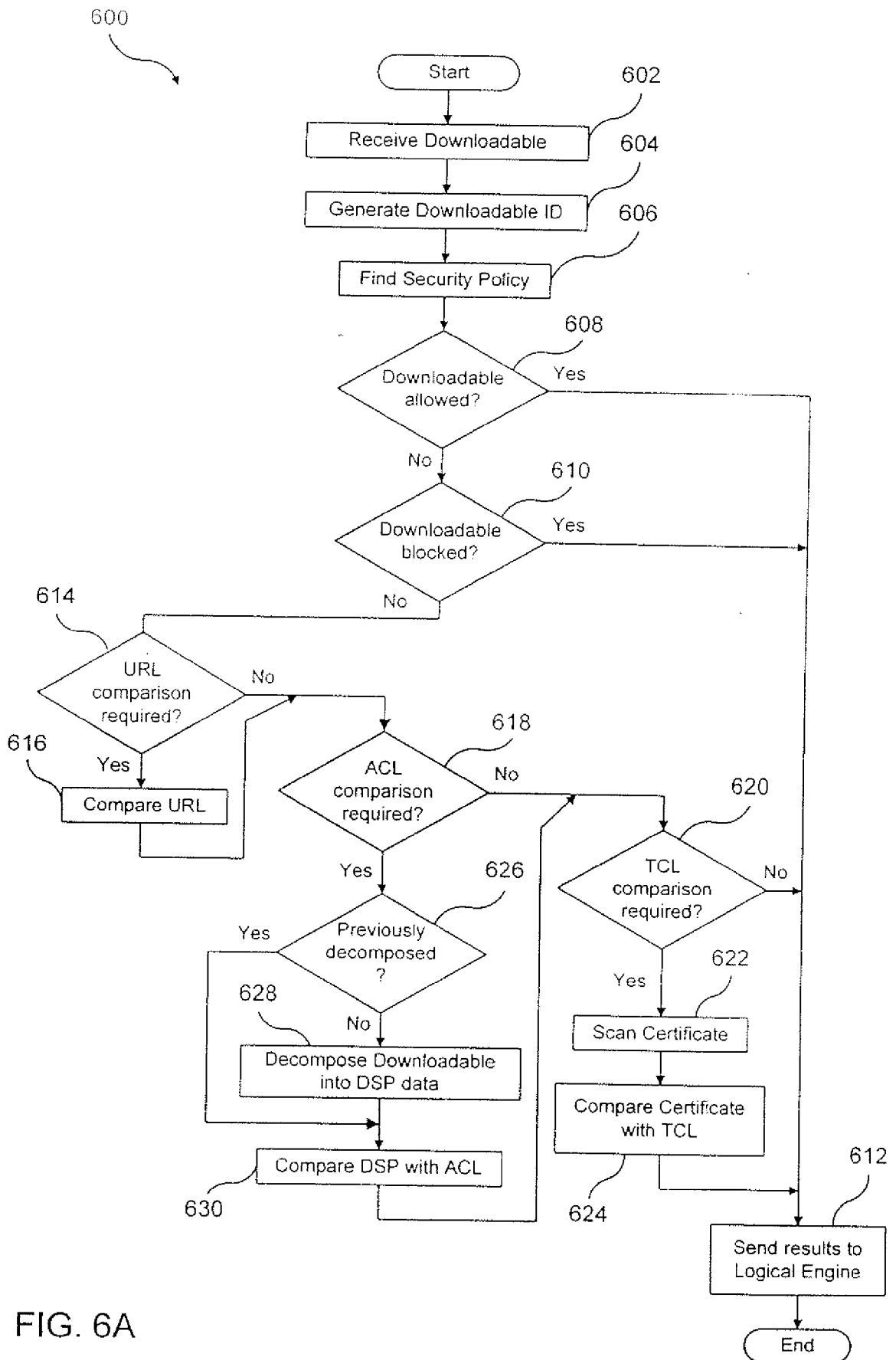


FIG. 6A

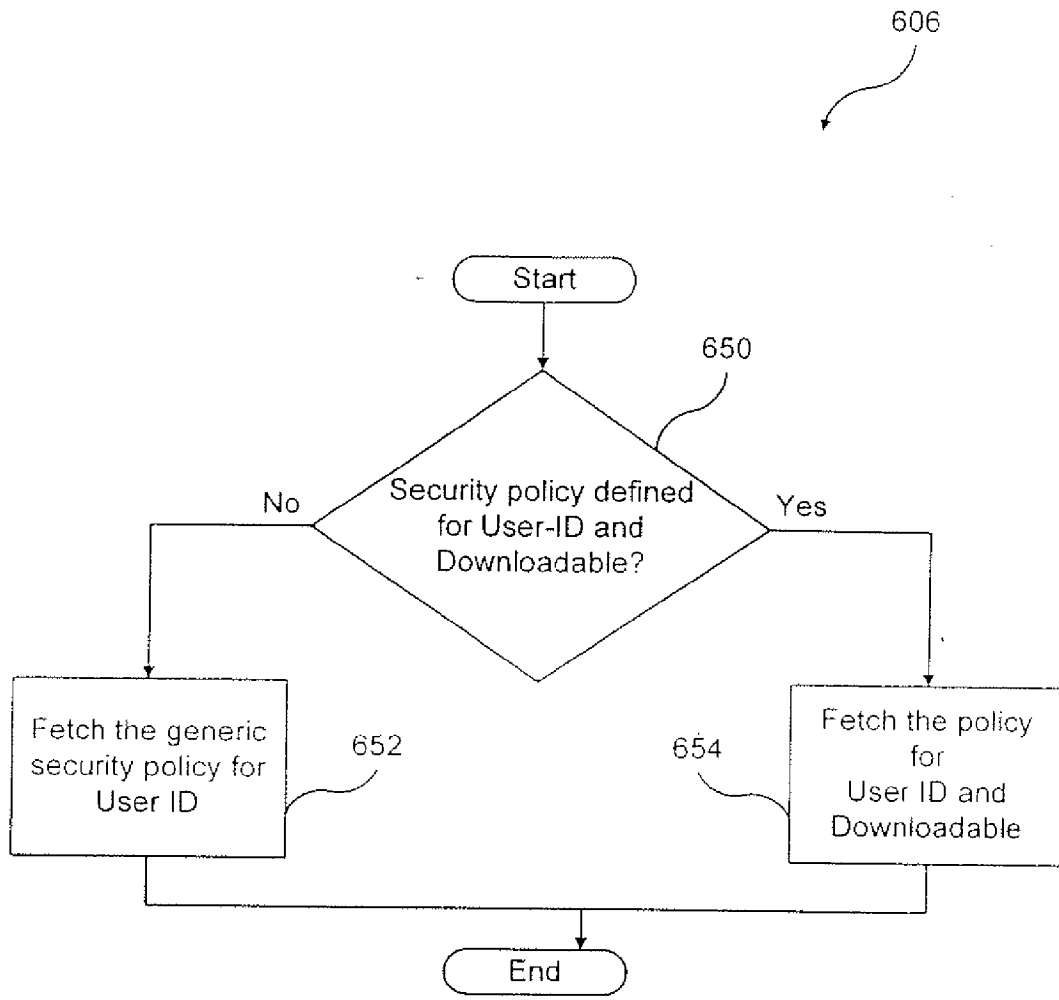


FIG. 6B

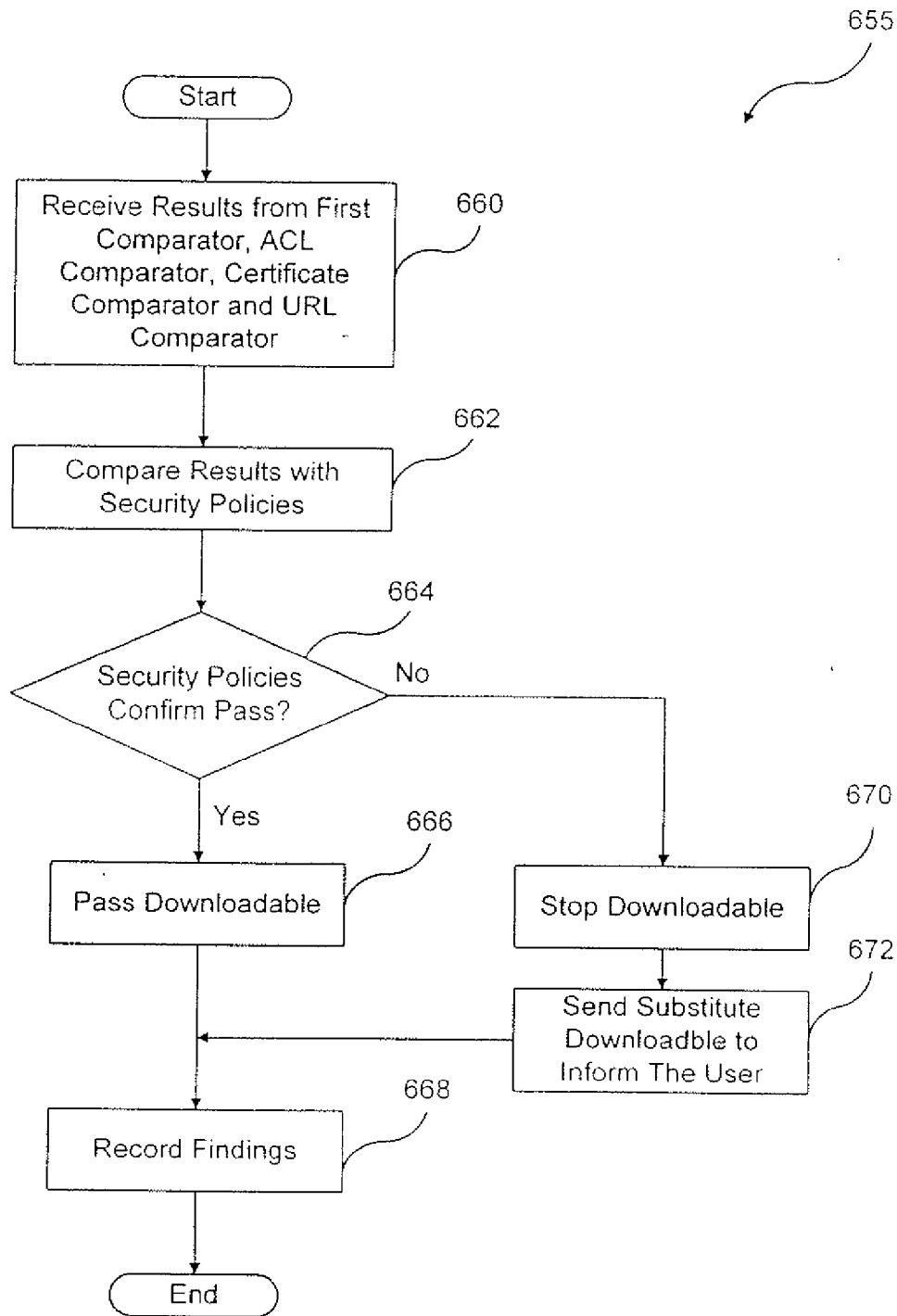


FIG. 6C

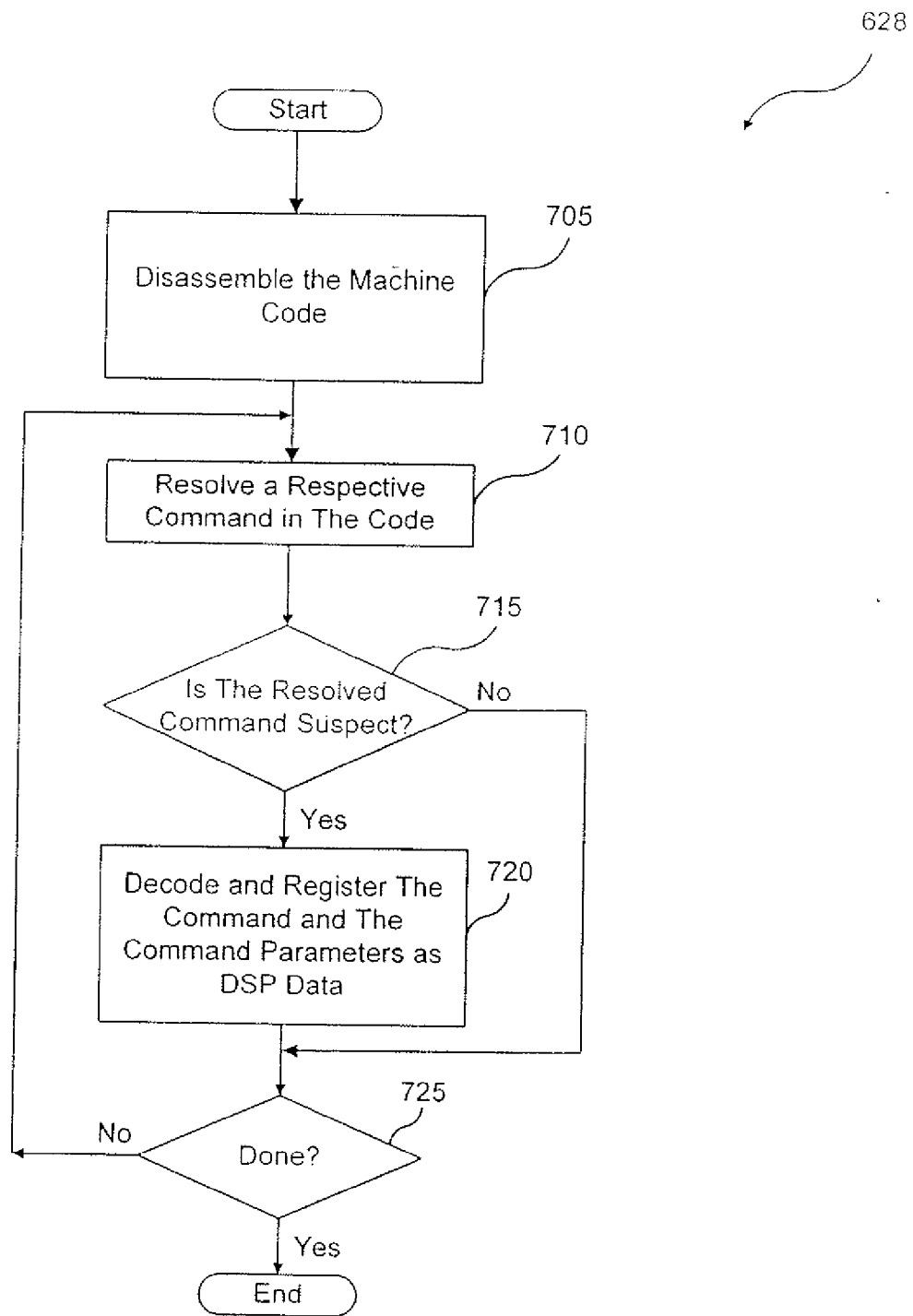


FIG. 7

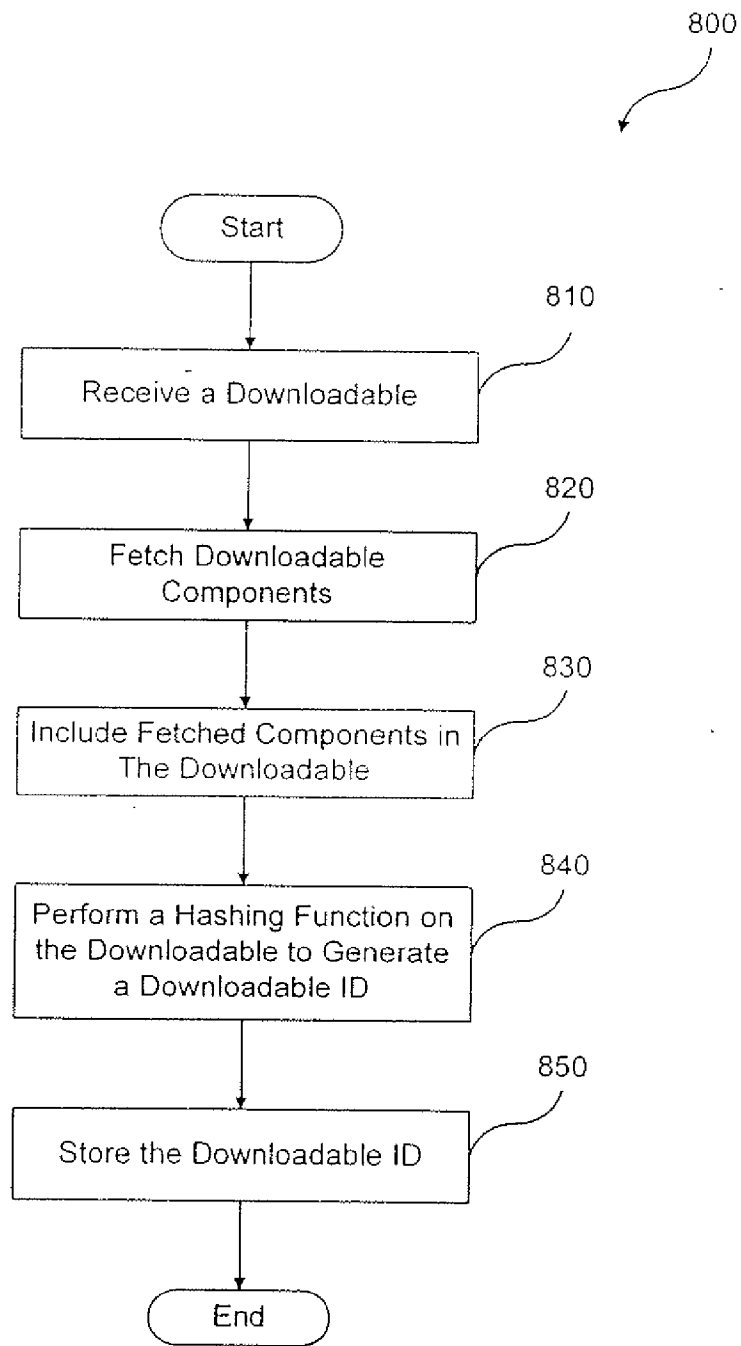


FIG. 8

Electronic Acknowledgement Receipt

EFS ID:	15718275
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Amanda Bayliss
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	21:49:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	15718284
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Mary Ellen Quigley
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-MAY-2013
Filing Date:	07-NOV-2011
Time Stamp:	21:52:56
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no
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1	Non Patent Literature	95001836_Part41.pdf	504801 <small>21bcef61a9b7794698f510a2496b9b199bf34b03</small>	no	9

Warnings:

Information:

2	Non Patent Literature	95001836_Part42.pdf	15409523	no	177
			0c46cc0517232752ff0865adf610520acc13ff8		
Warnings:					
Information:					
3	Non Patent Literature	95001836_Part43.pdf	3953406	no	46
			039edb1b820124af8f0fc4835830f5cfecba7a7c		
Warnings:					
Information:					
4	Non Patent Literature	95001836_Part44.pdf	10004868	no	242
			21a670c7a1037d3e5412385eaf05c79bee91ead9		
Warnings:					
Information:					
Total Files Size (in bytes):					29872598

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/290,708	Filing Date 11/07/2011	<input type="checkbox"/> To be Mailed
---	---	----------------------------------	---------------------------------------

APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	SMALL ENTITY <input type="checkbox"/>	OR			
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$ =		OR	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR			
AMENDMENT	05/07/2013	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus ** 20	= 0	X \$ =		OR	X \$80=	0
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus ***3	= 0	X \$ =		OR	X \$420=	0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus **	=	X \$ =		OR	X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus ***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/EVELYN NIMMONS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Ederly FIN0001-CON1-CIP1-CON4 4120

74877 7590 01/07/2013
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2431

NOTIFICATION DATE DELIVERY MODE

01/07/2013

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dbey@KSLaw.com
jpaolella-bald@kslaw.com

Office Action Summary

Application No. 13/290,708	Applicant(s) EDERY ET AL.
Examiner CHRISTOPHER REVAK	Art Unit 2431

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) Claim(s) 1-18 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) Claim(s) ____ is/are allowed.
- 7) Claim(s) 1-18 is/are rejected.
- 8) Claim(s) ____ is/are objected to.
- 9) Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) The specification is objected to by the Examiner.
- 11) The drawing(s) filed on 07 November 2011 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. ____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 3) Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 4) Other: ____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed have been fully considered but they are not persuasive since the Petition filed on October 31, 2012 for Correction of Unintentional Delayed Claim of Priority has been dismissed in the decision mailed on November 27, 2012.
2. The Examiner notes that claims 1-12 have been rejected as indicated on the PTO form 326 and in the rejection under 35 USC 102(e) as mailed on July 23, 2012, however claims 1-18 have been addressed in the actual rejection. The Examiner apologizes for the inadvertent error.

Terminal Disclaimer

3. The terminal disclaimer filed on October 23, 2012 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patents 8,079,086; 7,613,926; 7,418,731; 6,480,962; 6,167,520; 7,647,633; 6,804,780; 6,154,844; and 6,092,194 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2431

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent 5,983,348.

As per claim 1, it is taught of a computer-based method, comprising the steps of receiving an incoming Downloadable; deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

As per claims 2 and 11, it is disclosed of further comprising storing a date & time when the Downloadable security profile data was derived, in the database (col. 3, lines 32-44).

As per claims 3 and 12, it is taught wherein the Downloadable includes an applet (col. 3, lines 17-31).

As per claims 4 and 13, it is disclosed wherein the Downloadable includes an active control (col. 3, lines 17-31).

As per claims 5 and 14, it is taught wherein the Downloadable includes program script (col. 3, lines 17-31).

As per claims 6 and 15, it is disclosed wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory (col. 3, lines 17-31).

As per claims 7 and 16, it is taught wherein the Downloadable security profile data includes a URL from where the Downloadable originated (col. 4, lines 55-65).

As per claims 8 and 17, it is disclosed wherein the Downloadable security profile data includes a digital certificate (col. 8, lines 6-15).

As per claims 9 and 18, it is taught wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable (col. 7, lines 13-33).

As per claim 10, it is disclosed of a system for managing Downloadables, comprising a receiver for receiving an incoming Downloadable; a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory

Art Unit: 2431

period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER REVAK whose telephone number is (571)272-3794. The examiner can normally be reached on Monday-Thursday, 9:00am-5:00pm.

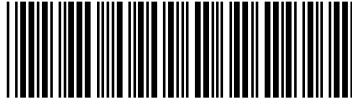
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 517-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 13/290,708
Art Unit: 2431

Page 6

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

Index of Claims 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	07/14/2012	01/02/2013						
	1	✓	✓						
	2	✓	✓						
	3	✓	✓						
	4	✓	✓						
	5	✓	✓						
	6	✓	✓						
	7	✓	✓						
	8	✓	✓						
	9	✓	✓						
	10	✓	✓						
	11	✓	✓						
	12	✓	✓						
	13	✓	✓						
	14	✓	✓						
	15	✓	✓						
	16	✓	✓						
	17	✓	✓						
	18	✓	✓						



King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington DC 20006

MAILED
NOV 27 2012
OFFICE OF PETITIONS

In re Application of :
Edery et al. :
Application No. 13/290,708 : **DECISION DISMISSING PETITIONS**
Filed: November 7, 2011 : **UNDER 37 CFR 1.78(a)(3) AND (a)(6)**
Attorney Docket No. FIN0001-CON1-CIP1- :
CON4 :

This is a decision on the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6), filed October 23, 2012 and supplemented on October 31, 2012, to accept an unintentionally delayed claim under 35 U.S.C. §§ 120 and 119(e) for the benefit of priority to the prior-filed nonprovisional and provisional applications set forth in the concurrently filed amendment.

The petition is **DISMISSED**

A petition for acceptance of a claim for late priority under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii). In addition, the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) must be accompanied by:

- (1) the reference required by 35 U.S.C. §§ 120 and 119(e) and 37 CFR §§ 1.78(a)(2)(i) and 1.78(a)(5)(i) of the prior-filed application, unless previously submitted;
- (2) the surcharge set forth in § 1.17(t); and
- (3) a statement that the entire delay between the date the claim was due under 37 CFR §§ 1.78(a)(2)(ii) and 1.78(a)(5)(ii) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not comply with item (1).

The amendment is not acceptable as drafted because Application No. 09/551,302, filed April 18, 2000, does not properly claim benefit of Application No. 60/030,639, filed November 8, 1996. It

cannot because the non-provisional application was filed more than 12 months after the filing date of the provisional application. It appears Application No. 08/790,097, filed January 29, 1997, claims benefit of Application No. 60/030,639, filed November 8, 1996. Please submit another amendment that corrects the priority chain.

37 CFR § 1.78(a)(6) requires a statement that the entire delay between the date the claim was due under 37 CFR § 1.78(a)(5)(ii) and the date the claim was filed was unintentional. Since the statement appearing in the petition varies from the required language, the statement is being construed as the statement required by 37 CFR § 1.78(a)(6). If this is not a correct reading of the statement appearing in the petition, petitioner should promptly notify the Office.

Before the petition under 37 CFR §§ 1.78(a)(3) and 1.78(a)(6) can be granted, a renewed petition and either an Application Data Sheet or a substitute amendment (complying with the provisions of 37 CFR 1.121 and 37 CFR 1.76(b)(5)) to correct the above matters are required.

Further correspondence with respect to this matter should be addressed as follows:


By mail: Mail Stop PETITIONS
 Commissioner for Patents
 Post Office Box 1450
 Alexandria, VA 22313-1450

By hand: Customer Service Window
 Mail Stop Petitions
 Randolph Building
 401 Dulany Street
 Alexandria, VA 22314

By fax: (571) 273-8300
 ATTN: Office of Petitions

By internet: EFS-Web
 www.uspto.gov/ebs/efs_help.html
 (for help using EFS-Web call the
 Patent Electronic Business Center
 at (866) 217-9197)

Any questions concerning this matter may be directed to the undersigned at (571) 272-3230.


Shirene Willis Brantley
Senior Petitions Attorney
Office of Petitions.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

CORRECTED PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF PRIORITY UNDER 35 U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-FILED APPLICATION FILED UNDER 37 CFR § 1.78(a)(3)

Mail Stop Petition

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

Sir:

Applicant respectfully submits this corrected petition to the petition filed October 23, 2012 for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application. In conjunction with this Petition, Applicant submits an Amendment to the Specification, and payment of the required fees.

Applicant understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Applicant understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted; (2) the surcharge set forth in 37 CFR §1.17(t); and (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application, filed November 7, 2011, to include a reference to prior-filed U.S. Patent Application Nos. 09/539,667, filed March 30, 2000, now U.S. Patent No. 6,804,780 and 60/030,639, filed November 8, 1996, is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

In accordance with 35 U.S.C. §119(e), §120, and 37 CFR §1.78(a)(2)(i), an amendment to the specification of the present application which adds a reference to prior-filed U.S. Patent Application Nos. 09/539,667 and 60/030,639 is submitted in conjunction with this Petition. This amendment has been submitted separately as an Amendment to the Specification and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Applicant submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

No additional fees are believed to be necessary since this document corrects the Petition originally filed on October 23, 2012, and the payment of the \$1,410 fee as required under 37 CFR §1.17(t) was electronically filed via EFS-Web with that submission. The Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Applicant respectfully submits that this request and the amendment to the specification are diligently made. Granting of this petition is requested.

Respectfully submitted,

Date: October 30, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

King & Spalding LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 626-8978 (Office)
(202) 626-3737 (Fax)

Electronic Acknowledgement Receipt

EFS ID:	14113207
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	31-OCT-2012
Filing Date:	07-NOV-2011
Time Stamp:	13:44:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions.	fin0001con1cip1con4_correctedpet.pdf	99486 <small>1ebd05a39658adfb969e1da604bab078387681f9</small>	no	2

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111


If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Number 	Application/Control No. 13/290,708	Applicant(s)/Patent under Reexamination EDERY ET AL.	

Document Code - DISQ	Internal Document – DO NOT MAIL
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TERMINAL DISCLAIMER	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED
Date Filed : October 23, 2012	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

Henry D. Jefferson
 9 td's are approved

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

**PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM OF PRIORITY
UNDER 35 U.S.C. §119(e) AND §120 FOR THE BENEFIT OF A PRIOR-FILED
APPLICATION FILED UNDER 37 CFR § 1.78(a)(3)**

Mail Stop Petition

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully petitions for the acceptance of an unintentionally delayed claim of priority under 35 U.S.C. § 119(e) and §120 for the benefit of prior-filed applications in the above-referenced patent application. In conjunction with this Petition, Applicant submits an Amendment to the Specification, and payment of the required fees.

Applicant understands that a petition for acceptance of a claim for late priority under 37 CFR §1.78(a)(3) is only applicable to those applications filed on or after November 29, 2000 and after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii). Applicant understands that the petition under 37 CFR §1.78(a)(3) must be accompanied by (1) the reference required by 35 U.S.C. §119(e), §120 and 37 CFR §1.78(a)(2)(i) of the prior-filed application, unless previously submitted; (2) the surcharge set forth in 37 CFR §1.17(t); and (3) a statement that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

The correction of the priority claim of the present application, filed November 7, 2011, to include a reference to prior-filed U.S. Patent Application Nos. 09/539,667, filed March 30, 2000, now U.S. Patent No. 6,804,780, 08/964,388, filed November 6, 1997, now U.S. Patent No. 6,092,194, and 60/030,639, filed November 8, 1996, is made after the expiration of the period specified in 37 CFR §1.78(a)(2)(ii).

In accordance with 35 U.S.C. §119(e), §120, and 37 CFR §1.78(a)(2)(i), an amendment to the specification of the present application which adds a reference to prior-filed U.S. Patent Application Nos. 09/539,667, 08/964,388, and 60/030,639 is submitted in conjunction with this Petition. This amendment has been submitted separately as an Amendment to the Specification and includes no new matter. In accordance with 37 CFR §1.78(a)(2)(i), the amendment identifies the prior filed application by application number and indicates the relationship of the applications.

Applicant submits that the entire delay between the date the claim was due under 37 CFR §1.78(a)(2)(ii) and the date the claim was filed was unintentional.

Payment of the \$1,410 fee as required under 37 CFR §1.17(t) is provided electronically via EFS-Web. The Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Applicant respectfully submits that this request and the amendment to the specification are diligently made. Granting of this petition is requested.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

King & Spalding LLP
1700 Pennsylvania Avenue, N.W.
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Washington, DC 20006
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FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: Christopher A. Revak

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND
METHOFDS

AMENDMENT TO THE SPECIFICATION

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

In conjunction with a Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. §119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3), entry of the amendments and consideration of the remarks submitted herein is respectfully requested.

Amendments to the Specification begin on page 2 of this paper

Remarks begin on page 4 of this paper

Amendments to the Specification

Please replace Paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which

claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables," and is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled "System and Method For Protecting a Client From Hostile Downloadables."

Remarks

Applicant respectfully requests entry of the amendment to the specification of U.S. Patent Application No. 13/290,708 in conjunction with the Petition to Accept Unintentionally Delayed Claim of Priority Under 35 U.S.C. § 119(e) and § 120 for the Benefit of a Prior-Filed Application Filed Under 37 C.F.R. § 1.78(a)(3) filed herewith. The amendment introduces no new matter and corrects the priority claim of the application. Applicant notes that U.S. Patent Application Nos. 09/539,667, 08/964,388, and 60/030,639 and the present invention share the inventor Shlomo Touboul.

Applicant respectfully notes that this submission is part of the procedural requirements involved in petitioning to correct an unintentionally delayed priority claim and is not to be construed as Applicant's response to the Non-Final Office Action mailed July 23, 2012.

No fees are believed due with this submission. However, in the event fees are due, the Commissioner is authorized to charge any underpayment of fees, or to credit any overpayment, to Deposit Account No. 50-4402.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Reg. No. 44,442

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(202) 626-3737 (Fax)

15157/105034
Doc. No. 19720357

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)
)
 Yigal Mordechai Edery)
 Nimrod Itzhak Vered)
 David R. Kroll)
 Shlomo Touboul)
)
Application No: 13/290,708)
)
Filed: November 7, 2011)
)
For: METHOD AND SYSTEM FOR)
 PROTECTING A COMPUTER)
 AND A NETWORK FROM)
 HOSTILE DOWNLOADABLES)
)

Mail Stop AMENDMENT
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO OFFICE ACTION
UNDER 37 C.F.R. §1.111

In response to the Office Action dated July 23, 2012 and pursuant to 37 C.F.R. §1.111 (the "Office Action"), applicants respectfully request that the above-identified application be amended as follows.

IN THE CLAIMS:

Please substitute the following claims for the pending claims with the same number:

- 1. (original)** A computer-based method, comprising the steps of:
 receiving an incoming Downloadable;
 deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
 storing the Downloadable security profile data in a database.
- 2. (original)** The computer-based method of claim **1** further comprising storing a date & time when the Downloadable security profile data was derived, in the database.
- 3. (original)** The computer-based method of claim **1** wherein the Downloadable includes an applet.
- 4. (original)** The computer-based method of claim **1** wherein the Downloadable includes an active control.
- 5. (original)** The computer-based method of claim **1** wherein the Downloadable includes program script.
- 6. (original)** The computer-based method of claim **1** wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

7. (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.

8. (original) The computer-based method of claim **1** wherein the Downloadable security profile data includes a digital certificate.

9. (original) The computer-based method of claim **1** wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable.

10. (original) A system for managing Downloadables, comprising:
a receiver for receiving an incoming Downloadable;
a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.

11. (original) The system of claim **86** wherein said database manager also stores a date & time when the Downloadable security profile data was derived by said Downloadable scanner, in the database.

12. (original) The system of claim **86** wherein the Downloadable includes an applet.

13. (original) The system of claim **86** wherein the Downloadable includes an active control.

14. (original) The system of claim **86** wherein the Downloadable includes program script.

15. (original) The system of claim **86** wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

16. (original) The system of claim **86** wherein the Downloadable security profile data includes a URL from where the Downloadable originated.

17. (original) The system of claim **86** wherein the Downloadable security profile data includes a digital certificate.

18. (original) The system of claim **86** wherein said Downloadable scanner comprises a disassembler for disassembling the incoming Downloadable.

REMARKS

Applicants' representative has carefully studied the outstanding Office Action. The present amendment is intended to place the application in condition for allowance and is believed to overcome all of the objections and rejections made by the Office Action. Favorable reconsideration and allowance of the application are respectfully requested.

Specification

At paragraph 2, the Office Action has objected to the specification because of a formality. The specification has been requested to be amended in accordance with co-filed Petition to Accept Unintentionally Delayed Claim of Priority and Amendment:

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 8,079,086, entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods," all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-Time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables," filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference, which application claims the benefit of provisional U.S. application serial no. 60/030,639, filed November 8, 1996 by inventors Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables." U.S. Serial No. 09/861,229, now U.S. Patent No. 7,058,822, is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables," filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference, which

claims the benefit of U.S. provisional application no. 60/030,639, filed on November 8, 1996 by inventor Shlomo Touboul, entitled "System and Method For Protecting a Computer From Hostile Downloadables," and is a continuation of U.S. application serial no. 08/790,097, filed January 29, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,167,520, entitled "System and Method For Protecting a Client From Hostile Downloadables."

Double Patenting

At paragraphs 3 – 12, the Office Action has rejected the claims on the ground of non-statutory obviousness-type double patenting in view of nine patents.

Applicants do not admit that the claims of the subject application are obvious over all of the nine patents. However, in order to expedite prosecution, applicants are submitting nine respective terminal disclaimers.

Claim Rejections – 35 USC §102

At paragraphs 13 and 14, the Office Action has rejected claims **1 – 18** under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent No. 5,983,348 ("Ji").

On October 23, 2012, applicants filed a Petition for Delayed Claim of Priority to, *inter alia*, U.S. Provisional Application No. 60/030,639.

Ji is not prior art because Ji has a priority date of September 10, 1997, whereas the claimed invention is supported in the priority document U.S. Provisional Application No. 60/030,639 of November 8, 1996, which pre-dates Ji. Moreover, Ji itself references the claimed invention at col. 1, line 64 – col. 2, line 42.

In Paragraph 2 of the June 2011 Office Action for the parent application, U.S. Serial No. 12/471,942, the Examiner requested a specific showing of support for the claimed invention in the priority document, U.S. Provisional Serial No. 60/030,639 filed on November 8,

1996, in order to overcome the prior art of Ji. Applicants provided arguments establishing support in the Preliminary Amendment filed for the subject application on November 7, 2011. Applicants' arguments are reproduced here for ease of reference.

Support for the Claimed Invention in Touboul, U.S. Provisional Patent Application No. 60/030,639 ("Touboul")

Claim **1** is supported in Touboul at least by page 8, lines 14 – 19: "*Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion*"; by page 15, lines 2 and 3: "*... code scanner 325, which in step 650 decomposes the received Downloadable into DSP data ...*"

Claim **3** is supported in Touboul at least by page 2, line 4: "*Examples of Downloadables include applets designed for use in the Java™ distributing environment produced by Sun Microsystems ...*"

Claim **4** is supported in Touboul at least by page 2, lines 4 – 7: "*Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation.*"

Claim **6** is supported in Touboul at least by page 9, lines 9 – 13: "*DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;*" and by page 16, lines 3 – 8: "*Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class.*"

Claim **9** is supported in Touboul at least by page 15, line 15 – page 16, line 4: *"FIG. 7 is a flowchart illustrating details of method 650 for decomposing a Downloadable. Method 650 begins in step 705 with code scanner 325 disassembling the machine code of the Downloadable. Code scanner 325 in step 710 resolves a respective command in the machine code. Code scanner 325 in step 715 determines whether the resolved command is a suspect command ... code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data ..."*

Claim **10** is supported in Touboul at least by page 8, lines 14 – 19: *"Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion"*; by page 10, lines 16 – 19: *"Code scanner 325 receives unknown Downloadables from first comparator 320 and uses conventional parsing techniques to decompose the byte code of the unknown Downloadable into DSP data;"* and by page 11, lines 13 – 16: *"... if second comparator 330 received the non-hostile Downloadable from code scanner 325, then ... its corresponding DSP data is stored in DSP data 310."*

Claim **12** is supported in Touboul at least by page 2, line 4: *"Examples of Downloadables include applets designed for use in the Java™ distributing environment produced by Sun Microsystems ..."*

Claim **13** is supported in Touboul at least by page 2, lines 4 – 7: *"Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation."*

Claim **15** is supported in Touboul at least by page 9, lines 9 – 13: *"DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory*

management operations and CPU allocation operations;" and by page 16, lines 3 – 8: "Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class."

Claim **18** is supported in Touboul at least by page 15, line 15, lines 2 and 3: *"... code scanner 325 ... decomposes the received Downloadable into DSP data ..."*

For the foregoing reasons, applicants respectfully submit that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

Respectfully submitted,

Date: October 23, 2012

By: /Dawn-Marie Bey - 44,442/

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**TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8,079,086 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**TERMINAL DISCLAIMER TO OBIVATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)

FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,480,962 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/

Signature

10/23/2012

Date

DAWN-MARIE BEY

Typed or printed name

202.626.8978

Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT

Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

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Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,167,520 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. The undersigned is an attorney or agent of record. Reg. No. 44,442

 /DAWN-MARIE BEY/
 Signature

 10/23/2012
 Date

 DAWN-MARIE BEY
 Typed or printed name

 202.626.8978
 Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) included.

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,804,780 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- is found invalid by a court of competent jurisdiction;
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- has all claims canceled by a reexamination certificate;
- is reissued; or
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/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,092,194 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- has all claims canceled by a reexamination certificate;
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/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	13290708
Filing Date:	07-Nov-2011
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Filer:	Dawn-Marie Bey./Julie Clements
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Priority accept. unintent. delayed claim	1454	1	1410	1410

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Blue Coat Systems - Exhibit 1004

00846

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Statutory or terminal disclaimer	1814	9	160	1440
Total in USD (\$)				2850

Electronic Acknowledgement Receipt

EFS ID:	14053299
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Julie Clements
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	23-OCT-2012
Filing Date:	07-NOV-2011
Time Stamp:	14:29:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2850
RAM confirmation Number	817
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part Exhibit	Pages (if any)

1		13290708_Response-to-NFOA_Petition_Amendment_Terminal-Disclaimers_2012-10-23.pdf	1117910 <small>7aa54a968f70e87cf25814f78e5d022523061133</small>	yes	25
Multipart Description/PDF files in .zip description					
Document Description		Start		End	
Transmittal Letter		1		1	
Petition for review by the Office of Petitions.		2		3	
Specification		4		7	
Amendment/Req. Reconsideration-After Non-Final Reject		8		8	
Claims		9		11	
Applicant Arguments/Remarks Made in an Amendment		12		16	
Terminal Disclaimer Filed		17		17	
Terminal Disclaimer Filed		18		18	
Terminal Disclaimer Filed		19		19	
Terminal Disclaimer Filed		20		20	
Terminal Disclaimer Filed		21		21	
Terminal Disclaimer Filed		22		22	
Terminal Disclaimer Filed		23		23	
Terminal Disclaimer Filed		24		24	
Terminal Disclaimer Filed		25		25	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32087 <small>2f209593bed2616fc1d3e3d9d1b51f0a1c285858</small>	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1149997		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office


If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	13/290,708
	Filing Date	11/07/2011
	First Named Inventor	YIGAL MORDECHAI EDERY et al.
	Art Unit	2431
	Examiner Name	CHRISTOPHER A. REVAK
Total Number of Pages in This Submission	25	Attorney Docket Number FIN0001-CON1-CIP1-CON4

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input checked="" type="checkbox"/> Amendment/Reply	<input checked="" type="checkbox"/> Petition (Unintentionally delayed claim of priority)	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input checked="" type="checkbox"/> Terminal Disclaimer (9 total)	<input type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Request for Refund	
<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	
	<input type="checkbox"/> Landscape Table on CD	
<input type="checkbox"/> Certified Copy of Priority Document(s)	Remarks	
<input type="checkbox"/> Reply to Missing Parts/ Incomplete Application	1. THE ABOVE-MENTIONED DOCUMENTS ARE BEING ELECTRONICALLY FILED VIA EFS-WEB ON OCTOBER 23, 2012.	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	2. ANY FEE(S) WHICH MAY BE DUE AT THE TIME OF FILING WILL BE PAID BY CREDIT CARD VIA EFS-WEB.	

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	KING & SPALDING LLP		
Signature	/DAWN-MARIE BEY/		
Printed name	DAWN-MARIE BEY		
Date	10/23/2012	Reg. No.	44,442

CERTIFICATE OF TRANSMISSION/MAILING via EFS-Web			
I hereby certify that this correspondence is being electronically transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:			
Signature			
Typed or printed name	JULIE CLEMENTS	Date	10/23/2012

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**TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 6,154,844 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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/DAWN-MARIE BEY/

Signature

10/23/2012

Date

DAWN-MARIE BEY

Typed or printed name

202.626.8978

Telephone Number

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FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,647,633 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

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REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,613,926 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

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REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
FIN0001-CON1-CIP1-CON4

In re Application of: YIGAL MORDECHAI EDERY

Application No.: 13/290,708

Filed: 11/07/2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

The owner*, FINJAN, INC., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7,418,731 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. The undersigned is an attorney or agent of record. Reg. No. 44,442

/DAWN-MARIE BEY/
Signature

10/23/2012
Date

DAWN-MARIE BEY
Typed or printed name

202.626.8978
Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/290,708	Filing Date 11/07/2011	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
(Column 1)		(Column 2)	SMALL ENTITY <input type="checkbox"/>		OR	SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		OR	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$ =			X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY					
(Column 1)		(Column 2)	(Column 3)		SMALL ENTITY		OR	SMALL ENTITY		
AMENDMENT	10/23/2012	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus	** 20	= 0	X \$ =		OR	X \$62=	0
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus	***3	= 0	X \$ =		OR	X \$250=	0
<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								OR		
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								OR		
					TOTAL ADD'L FEE			OR	TOTAL ADD'L FEE	0

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY					
(Column 1)		(Column 2)	(Column 3)		SMALL ENTITY		OR	SMALL ENTITY		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =		OR	X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =		OR	X \$ =	
<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								OR		
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								OR		
					TOTAL ADD'L FEE			OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
 /TRACIE HARGROVE/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/290,708 11/07/2011 Yigal Mordechai Ederly FIN0001-CON1-CIP1-CON4 4120

74877 7590 07/23/2012
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

EXAMINER

REVAK, CHRISTOPHER A

ART UNIT PAPER NUMBER

2431

NOTIFICATION DATE DELIVERY MODE

07/23/2012

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dbey@KSLaw.com
jpaolella-bald@kslaw.com

Office Action Summary	Application No. 13/290,708	Applicant(s) EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 07 November 2011.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
- 4) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) Claim(s) 1-12 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) Claim(s) _____ is/are allowed.
- 7) Claim(s) 1-12 is/are rejected.
- 8) Claim(s) _____ is/are objected to.
- 9) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 10) The specification is objected to by the Examiner.
- 11) The drawing(s) filed on 11/7/11 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/7/11; 2/16/12</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

2. The disclosure is objected to because of the following informalities:

On page 1 of the Applicant's Specification, reference is made to U.S. Patent Application No. 12/471,942 which is now U.S. Patent No. 8,079,086.

Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

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F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-18 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-42 of U.S. Patent No. 8,079,086.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by the patented claims in that the claims of the patent contain all of the limitations of the instant application. Claims 1-18 of the instant application therefore are not patentably distinct from the earlier patented claims, and as such is unpatentable for obvious-type double patenting.

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5. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 7,613,926.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patented claims 1-30 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

6. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 7,418,731.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patented claims 1-22 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

7. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-35 of U.S. Patent No. 6,480,962.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-35 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

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8. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,167,520.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-8 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

9. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-41 of U.S. Patent No. 7,647,633.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-41 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

10. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. 6,804,780.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-18 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

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11. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-44 of U.S. Patent No. 6,154,844.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-44 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

12. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-68 of U.S. Patent No. 6,092,194.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are anticipated by patent claims 1-68 in that the claims of the patent contain all of the limitations of the instant application. Claims 1-12 therefore are not patentably distinct from the earlier patented claims, and as such, is unpatentable for obvious-type double patenting.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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14. Claims 1-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Ji, U.S. Patent 5,983,348.

As per claim 1, it is taught of a computer-based method, comprising the steps of receiving an incoming Downloadable; deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

As per claims 2 and 11, it is disclosed of further comprising storing a date & time when the Downloadable security profile data was derived, in the database (col. 3, lines 32-44).

As per claims 3 and 12, it is taught wherein the Downloadable includes an applet (col. 3, lines 17-31).

As per claims 4 and 13, it is disclosed wherein the Downloadable includes an active control (col. 3, lines 17-31).

As per claims 5 and 14, it is taught wherein the Downloadable includes program script (col. 3, lines 17-31).

As per claims 6 and 15, it is disclosed wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory (col. 3, lines 17-31).

As per claims 7 and 16, it is taught wherein the Downloadable security profile data includes a URL from where the Downloadable originated (col. 4, lines 55-65).

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As per claims 8 and 17, it is disclosed wherein the Downloadable security profile data includes a digital certificate (col. 8, lines 6-15).

As per claims 9 and 18, it is taught wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable (col. 7, lines 13-33).

As per claim 10, it is disclosed of a system for managing Downloadables, comprising a receiver for receiving an incoming Downloadable; a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database (col. 3, lines 32-56 and col. 6, lines 38-51).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER REVAK whose telephone number is (571)272-3794. The examiner can normally be reached on Monday-Thursday, 9:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 517-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher A. Revak/
Primary Examiner, Art Unit 2431

Notice of References Cited	Application/Control No. 13/290,708	Applicant(s)/Patent Under Reexamination EDERY ET AL.	
	Examiner CHRISTOPHER REVAK	Art Unit 2431	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-8,079,086	12-2011	Edery et al.	726/24
	B US-			
	C US-			
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	V				
	W				
	X				

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claims renumbered in the same order as presented by applicant
 CPA
 T.D.
 R.1.47

CLAIM		DATE							
Final	Original	07/14/2012							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
	6	✓							
	7	✓							
	8	✓							
	9	✓							
	10	✓							
	11	✓							
	12	✓							

Search Notes 	Application/Control No. 13290708	Applicant(s)/Patent Under Reexamination EDERY ET AL.
	Examiner CHRISTOPHER REVAK	Art Unit 2431

SEARCHED			
Class	Subclass	Date	Examiner
none	none	7/13/12	CR

SEARCH NOTES		
Search Notes	Date	Examiner
PALM Inventor Name Search	7/14/12	CR
BRS Text Search: USPAT, US PGPUB, USOCR, DERWENT, FPRS, IBM TDB, EPO, JPO (see attached search strategy)	7/14/12	CR
BRS Subclass Text Search: USPAT, US PGPUB (see attached search strategy)	7/14/12	CR

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. FIN0001-CON1-CIP1- CON4		Serial No. To Be Assigned	
INFORMATION DISCLOSURE STATEMENT							
<i>(Use several sheets if necessary)</i>				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date Herewith		Group To Be Assigned	
U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
		2010/0195909	8/5/10	Wasson, et al.	382	176	1/19/10
		7,647,633	1/12/10	Edery, et al.	726	22	6/22/05
		7,613,926	11/3/09	Edery, et al.	713	181	3/7/06
		7,418,731	8/26/08	Touboul	726	22	5/3/04
		2008/0066160	3/13/08	Becker, et al.	726	4	9/11/06
		7,343,604	3/11/08	Grabarnik, et al.	719	313	7/25/03
		7,308,648	12/11/07	Buchthal, et al.	715	234	11/27/02
		7,210,041	4/24/07	Gryaznov, et al.	713	188	4/30/01
		7,143,444	11/28/06	Porras, te al.	726	30	11/28/01
		7,058,822	6/6/06	Edery, et al.	726	22	5/17/01
		2006/0048224	3/2/06	Duncan, et al.	726	22	8/30/04
		2006/0031207	2/9/06	Bjarnestam, et al.	707	3	6/8/05
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CONFIRMATION NO. 4120

SERIAL NUMBER 13/290,708	FILING or 371(c) DATE 11/07/2011 RULE	CLASS 726	GROUP ART UNIT 2431	ATTORNEY DOCKET NO. FIN0001-CON1-CIP1-CON4		
APPLICANTS Yigal Mordechai Edery, Pardesia, ISRAEL; Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL; David R. Kroil, San Jose, CA; Shlomo Touboul, Kefar-Haim, ISRAEL;						
<p>** CONTINUING DATA ***** This application is a CON of 12/471,942 05/26/2009 PAT 8,079,086 which is a CON of 11/370,114 03/07/2006 PAT 7,613,926 which is a CON of 09/861,229 05/17/2001 PAT 7,058,822 which claims benefit of 60/205,591 05/17/2000 and is a CIP of 09/539,667 03/30/2000 PAT 6,804,780 which is a CON of 08/964,388 11/06/1997 PAT 6,092,194 and said 09/861,229 05/17/2001 is a CIP of 09/551,302 04/18/2000 PAT 6,480,962</p>						
** FOREIGN APPLICATIONS *****						
** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 11/17/2011						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Met after Allowance /CR/	STATE OR COUNTRY ISRAEL	SHEETS DRAWINGS 10	TOTAL CLAIMS 18	INDEPENDENT CLAIMS 2
Verified and /CHRISTOPHER A REVAK/	Acknowledged _____ Examiner's Signature	Initials _____				
ADDRESS King and Spalding LLP 1700 Pennsylvania Ave, NW Suite 200 Washington, DC 20006 UNITED STATES						
TITLE Malicious Mobile Code Runtime Monitoring System and Methods						
FILING FEE RECEIVED 1250	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

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INFORMATION DISCLOSURE STATEMENT							
<i>(Use several sheets if necessary)</i>				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date November 7, 2011		Group 2431	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	446086	(code or executable or download\$5 or applet or java or javascript or script or activex)with(determin\$5 or ascertain\$3 or monitor\$3 or analy\$4 or inspect\$3 or examin\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:52
L2	668163	(code or executable or download\$5 or applet or java or javascript or script or activex)with(append\$3 or attach\$4 or indicat\$3 or profile or character\$5 or identif\$7 or report\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:52
L3	124404	1 with 2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:53
L4	2049592	(append\$3 or attach\$4 or indicat\$3 or profile or character\$5 or identif\$7 or report\$3)with(malicious or suspicious or attack\$3 or malware or virus or viral or trojan or worm or detail\$3 or list\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:54
L5	9718	3 same 4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:55
L6	227896	4 with(deriv\$5 or comput\$3 or process\$3 or creat\$3 or generat\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:55
L7	4426	5 same 6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:55
L8	28257	6 with(send\$3 or forward\$3 or communicat\$3 or transmi\$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:57
L9	871	7 same 8	US-PGPUB; USPAT;	OR	ON	2012/07/14 10:57

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L10	26016	3 with(database or repository or storage or memory)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:58
L11	245	9 same 10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:59
L12	18340	(726/22-25 or 713/168,175,176,179-181).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:59
L13	102	9 and 12	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/14 10:59

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Table with 4 columns: APPLICATION NUMBER (13/290,708), FILING OR 371(C) DATE (11/07/2011), FIRST NAMED APPLICANT (Yigal Mordechai Edery), ATTY. DOCKET NO./TITLE (FIN0001-CON1-CIP1-CON4)

CONFIRMATION NO. 4120

PUBLICATION NOTICE



74877
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

Title: Malicious Mobile Code Runtime Monitoring System and Methods

Publication No. US-2012-0117651-A1
Publication Date: 05/10/2012

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INFORMATION DISCLOSURE STATEMENT							
<i>(Use several sheets if necessary)</i>				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date November 7, 2011		Group 2431	
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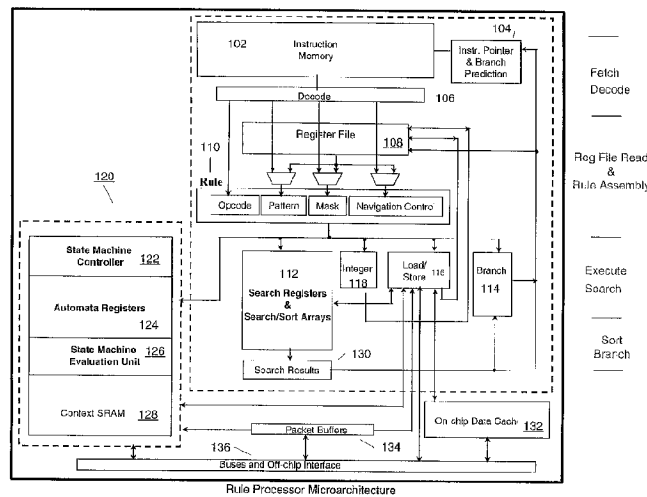
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(54) Title: A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO SUPPORT RAPID APPLICATION OF RULESETS TO DATA



(57) Abstract: A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

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**A PROGRAMMABLE PROCESSOR APPARATUS INTEGRATING
DEDICATED SEARCH REGISTERS AND DEDICATED STATE MACHINE
REGISTERS WITH ASSOCIATED EXECUTION HARDWARE TO
SUPPORT RAPID APPLICATION OF RULESETS TO DATA**

[0001] This application is a non-provisional application of U.S. Provisional Patent Application Serial No. 60/438,847, filed January 9, 2003, which is incorporated herein by reference.

RELATED APPLICATIONS

[0002] The present application is related to U.S. Patent Application No. 10/650,363 entitled "Programmable Rule Processing Apparatus for Conducting High Speed Contextual Searches and Characterizations of Patterns in Data," filed on August, 27, 2003; U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____ entitled "_____" concurrently filed with this application, the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0003] The present invention relates to the field of information processing, specifically the field of content analytics and processing.

BACKGROUND OF THE INVENTION

[0004] Significant trends in computing and communications are leading to the emergence of environments that abound in content analytics and processing. These environments require high performance as well as programmability on a certain class of functions, namely searching, parsing, analysis, interpretation, and transformation of content in messages, documents, or packets. Notable fields that stress such rich content analytics and processing include content-aware networking, content-based security systems, surveillance, distributed computing, wireless communication, human interfaces to computers, information storage and retrieval systems, content search on the semantic web, bio-informatics, and others.

[0005] The field of content-aware networking requires searching and inspection of the content inside packets or messages in order to determine where to route or forward such packages and messages. Such inspection has to be performed on in-flight messages at “wire-speed”, which is the data-rate of the network connection. Given that wire rates in contemporary networks range from 100Mbits/second all the way to 40Gbits/second, there is tremendous pressure on the speed at which the content inspection function needs to be performed.

[0006] Content-based security systems and surveillance and monitoring systems are required to analyze the content of messages or packets and apply a set of rules to determine whether there is a security breach or the possibility of an intrusion. Typically, on modern network intrusion detection systems (NIDS), a large number of patterns, rules, and expressions have to be applied to the input payload at wire speed to ensure that all potential system vulnerabilities are uncovered. Given that the network and computing infrastructure is continuously evolving, fresh vulnerabilities continue to arise. Moreover, increasingly sophisticated attacks are employed by intruders in order to evade detection. Intrusion detection systems need to be able to detect all known attacks on the system, and also be intelligent enough to detect unusual and suspicious behavior that is indicative of new attacks. All these factors lead to a requirement for both programmability as well as extremely high performance on content analysis and processing.

[0007] With the advent of distributed and clustered computing, tasks are now distributed to multiple computers or servers that collaborate and communicate with one another to complete the composite job. This distribution leads to a rapid increase in computer communication, requiring high performance on such message processing. With the emergence of XML (Extensible Markup Language) as the new standard for universal data interchange, applications communicate with one another using XML as the “application layer data transport”. Messages and documents are now embedded in XML markup. All message processing first requires that the XML document be parsed and the relevant content extracted and interpreted, followed by any required transformation and filtering. Since these functions need to be performed at a high message rate, they become computationally very demanding.

[0008] With the growth of untethered communication and wireless networks, there is an increase in the access of information from the wireless device. Given the light form factor of the client device, it is important that data delivered to this device be filtered and the payload be kept small. Environments of the future will filter and transform XML content from the wireline infrastructure into lightweight content (using the Wireless Markup Language or WML) on the wireless infrastructure. With the increasing use of wireless networks, this content transformation function will be so common that an efficient solution for it's handling will be needed.

[0009] Another important emerging need is the ability to communicate and interact with computers using human interfaces such as speech. Speech processing and natural language processing is extremely intensive in content searching, lexical analysis, content parsing, and grammar processing. Once a voice stream has been transduced into text, speech systems need to apply large vocabularies as well as syntactic and semantic rules on the incoming text stream to understand the speech.

[0010] The emergence and growth of the worldwide web has placed tremendous computational load on information retrieval (IR) systems. Information continues to be added to the web at a high rate. This information typically gets fully indexed against an exhaustive vocabulary of words and is added to databases of search engines and IR systems. Since information is continuously being created and added, indexers need to be "always-on". In order to provide efficient real-time contextual search, it is necessary that there be a high performance pattern-matching system for the indexing function.

[0011] Another field that stresses rich content analytics and processing is the field of bio-informatics. Gene analytics and proteomics entail the application of complex search and analysis algorithms on gene sequences and structures. Once again, such computation requires high performance search, analysis, and interpretation capability.

[0012] Thus, emerging computer and communications environments of the future will stress rich analysis and processing of content. Such environments will need efficient and programmable solutions for the following functions - searching, lexical analysis, parsing, characterization, interpretation, filtering and transformation of content in documents, messages, or packets.

[0013] Central to these rich content processing functions are (1) operations to perform contextual and content-based search, lookup, navigation, and rich associative lookup, and (2) the capability to efficiently evaluate state machines against an input data stream.

[0014] In the prior art, search and lookup processing has typically has been performed in one of two ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions using a combination of content addressable memories (CAMs), comparator hardware and dedicated logic. For example, search rules are stored in a content-addressable memory, and the data is streamed across the structure, shifting it 1 byte or 1 word at a time. Alternatively, specific comparators are arranged at fixed locations to recognize specific values in the incoming data. Incidences of matches are recorded and consumed by the dedicated logic as per the requirements of the target application. Although the fixed ASIC approach can increase performance, it lacks easy programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0015] Second, traditional general-purpose microprocessors with general-purpose execution datapaths have been used to handle rich search and lookup functions and associated content processing. Microprocessors are fully programmable devices and are able to address the evolving needs of problems – by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the performance level it can offer to rich content analytics and processing.

[0016] The limitation in performance on content analytics is inherent in the design and evolution of the microprocessor architecture. The microprocessor originated as a computing unit, performing arithmetic operations on 1,2,4,8 byte words. Subsequently, as the field of computing evolved, more functionality was progressively added to the microprocessor to address emerging fields. As a result, the general purpose microprocessor is functional across a very wide range of applications, but not very well tuned for any one in particular. Fundamentally, as it applies to the needs of content analytics, the microprocessor architecture has two key limitations – (1) it lacks the capability to simultaneously perform massively parallel and fine-grain

pattern-matching and comparison operations on large datasets, and (2) it lacks the capability to make rapid and multiple state transitions and efficient multi-directional control flow changes based on input data.

[0017] A number of search and pattern matching algorithms have evolved to make best use of the microprocessor. The Boyer-Moore algorithm is widely regarded as one of the best-known techniques employed on a microprocessor to find occurrences of patterns in a given data set. The algorithm processes only one pattern at a time and must be repeatedly invoked if more than one pattern is to be searched in a data set. For each pattern to be searched, it advances sequentially through the data set making selective comparisons based on observations obtained from pre-characterizing the pattern. This algorithm provides superior performance relative to other pattern matching algorithms by reducing the total number of comparisons within a given data set. However, due to the sequential nature of the algorithm, the performance is limited by fundamental constraints of microprocessor architecture, namely the scalar instruction set and the penalty incurred on branching.

[0018] Owing to the aforementioned architectural limitations of the microprocessor, the efficiency and capability of conventional microprocessors are severely challenged by the emerging computing and communications environments described earlier. Several data points can be provided to support these arguments. For example, in a Network Intrusion Detection System (NIDS) such as Snort, it is already desirable to apply signature detection of hundreds of strings on incoming packets. Performing this workload with signatures of 8-byte patterns on a 3GHz Pentium IV processor in a commercial microprocessor-based system that employs an improved version of the Boyer-Moore pattern matching algorithm limits the packet rate to less than 50Mbps. Likewise, parsing of XML documents on such a platform is limited to the 10MB/s range, and speech processing is limited to 1 real-time stream on restricted grammars and vocabularies. These data points indicate that the conventional microprocessor of 2003 or 2004 will be able to deliver rich content analytics and processing at rates around the 100Mbps range. However, by that timeframe, data rates of between 1Gbps to 10Gbps will not be uncommon in enterprise networks and environments. Clearly, there is a severe mismatch of one to two orders of magnitude between the performance that can be delivered by the conventional microprocessor and that which

is demanded by the environment. While it is possible to employ multiple parallel microprocessor systems to execute some of the desired functions at the target rate, this greatly increases the cost of the system. There is clearly a need for a more efficient solution for these target functions.

[0019] A similar parallel exists in the case of state machine evaluation. The history of state machines dates back to early computer science. In their simplest formulation, state machines are formal models that consist of states, transitions amongst states, and an input representation. Starting with Turing's model of algorithmic computation (1936), state machines have been central to the theory of computation. In the 1950s, the regular expression was developed by Kleene as a formal notation to describe and characterize sets of strings. The finite state automaton was developed as a state machine model that was found to be equivalent to the regular expression. Non-deterministic automata were subsequently developed and proven to be equivalent to deterministic automata. Subsequent work by Thompson and others led to a body of construction algorithms for constructing finite state automata to evaluate regular expressions. A large number of references are available for descriptions of Regular Expressions and Finite State Automata. For a reference text on the material, see "Speech and Language Processing" (by Daniel Jurafsky and James H. Martin, Prentice-Hall Inc, 2000).

[0020] Using techniques available in the prior art, state machine and finite state automata processing can be performed in one of three ways. First, such processing has been performed using fixed application specific integrated circuits (ASIC) solutions that directly implement a fixed and chosen state machine that is known a priori. Although the fixed ASIC approach can increase performance, it lacks programmability, and hence its application is severely restricted. Furthermore, the expense associated with designing and tailoring specific chips for each targeted solution is prohibitive.

[0021] Second, Field Programmable Gate Arrays (FPGA) can be used to realize state machines in a programmable manner. Essentially, the FPGA architecture provides generalized programmable logic that can be configured for a broad range of applications, rather than being specially optimized for the implementation of state machines. Using this approach, one can only accommodate a small number of state

machines on a chip, and furthermore the rate at which evaluation can progress is limited. The density and performance characteristics of the implementations make this choice of solution inadequate for the broad range of emerging applications.

[0022] Third, traditional general-purpose microprocessors have been used to implement a variety of state machines. Microprocessors are fully programmable devices and are able to address the evolving needs of problems – by simply reprogramming the software the new functionality can be redeployed. However, the traditional microprocessor is limited in the efficiency with which it can implement and evaluate state machines.

[0023] There is a need for a new solution for a programmable processing apparatus that is more suitable for content analytics and processing, and that is efficient on a set of functions that include state machine evaluation as well as the execution of operations for contextual search, lexical analysis, parsing, interpretation, and transformation of content on messages, packets, or documents.

SUMMARY OF THE INVENTION

[0024] A rule processor and method for using the same are disclosed. In one embodiment, the rule processor comprises a general purpose register file, an instruction sequencer to provide instructions, a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer, and a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

[0026] **Figure 1** is a block diagram of a rule processor.

[0027] **Figure 2** is an example of the use of one embodiment of a rule processor.

- [0028] **Figure 3** illustrates interfaces of one embodiment of a rule processor.
- [0029] **Figure 4** is a block diagram of one embodiment of a line card with a look-aside configuration.
- [0030] **Figure 5** is a block diagram of one embodiment of a line card with a flow-through configuration.
- [0031] **Figure 6** is a block diagram of one embodiment of a server co-processor configuration.
- [0032] **Figure 7** is a block diagram of one embodiment of a rule processor with a search apparatus.
- [0033] **Figure 8A** is a block diagram of one embodiment of a search register and the search execution hardware.
- [0034] **Figure 8B** is a block diagram of one embodiment of a search array.
- [0035] **Figure 9A** is a block diagram of one embodiment of a sorter.
- [0036] **Figure 9B** is a block diagram of one embodiment of a range select mechanism in a sorter.
- [0037] **Figure 10** is a circuit schematic of one embodiment of a search array.
- [0038] **Figure 11** illustrates an exemplary micro-architecture of a rule processor comprising of four processing stages.
- [0039] **Figure 12** illustrates an example pseudo-code of a complex pattern matching rule-set and the corresponding micro-code for an exemplary rule-processor.
- [0040] **Figure 13** illustrates the clock-by-clock pipelined execution of the micro-code shown in Figure 12.
- [0041] **Figure 14** illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention.
- [0042] **Figure 15** illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention.
- [0043] **Figure 16** illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention.
- [0044] **Figure 17** illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0045] A programmable rule processor apparatus integrating dedicated search registers and dedicated state machine registers with execution hardware to support rapid application of rulesets and grammars to data is described. Such a processor may be used for content analysis and searches. In one embodiment, the programmable rule processor includes portions or apparatus typically found in a general purpose processor along with search registers coupled with a search/parse execution array and also state machine registers coupled with state machine evaluation units. The portions of a general purpose processor may include the use of an instruction (or rule) memory, instruction pointer and instruction sequencer, as well as a decoder and general purpose register file. Other portions may be used and will be described in more detail below.

[0046] In one embodiment, the search registers store data or content in an array and the general purpose processor front end presents rules to the array for executing searches. The content may be a packet, stream, message or a document. The search registers and search/parse execution array allow for parallel and recursive sequencing of rules against the content payload, as well as parallel pattern matching capability and the capability of making multiple rapid content-based state transitions. Operations such as, for example, pattern matching, lexical analysis, parsing and interpretation functions, may be performed.

[0047] In contrast, in one embodiment, the state machine registers and state machine evaluation engines operate in an inverse fashion by storing rules programmed into the state machine registers and by streaming data through them. Note that for the discussion herein the terms state machine registers, automata registers and expression registers may be used interchangeably.

[0048] The coupling of the search registers and the search/parse array with the state machine registers and evaluation logic using a generalized sequencer and an instruction set format provide for a powerful programmable rule processor that accelerates rule-processing functions through dedicated and tailored hardware, and that allows a rich mix of operations to be performed in a single integrated processor apparatus. By integrating dedicated search registers and associated search/parse execution hardware with the general purpose processor apparatus, the associative

search and lookup functionality can be accelerated efficiently, and yet a rich mix of general purpose operations can be simultaneously performed. Likewise, by integrating state machine registers and associated state machine execution hardware with the general purpose processor apparatus, the state machine evaluation functionality can be accelerated, and simultaneously, a rich mix of general purpose functions can be performed on the data. The integration of all three pieces of apparatus – search registers and search execution hardware, state machine registers and state machine evaluation hardware, and general purpose processor hardware, yields a powerful programmable rule processor solution. Data can be fed into the rule processor and a mix of search functions, state machine evaluation functions as well as general purpose programming functions can be simultaneously performed. The state machine hardware and the search hardware can be viewed as another dedicated resource in the rule processor. A variety of operations can be performed on the data, which can be both analyzed and transformed progressively. In one embodiment, the various functional operations that can be performed in this rule processor can be performed in any sequence or order, and also in parallel, leading to accelerated content analysis and transformation capability.

[0049] Some portions of the detailed descriptions that follow are presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[0050] It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussion, it is appreciated that throughout the description,

discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

[0051] The present invention also relates to apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus.

[0052] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these systems will appear from the description below. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the invention as described herein.

[0053] A machine-readable medium includes any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). For example, a machine-readable medium includes read only memory ("ROM"); random access memory ("RAM"); magnetic disk storage media; optical storage media; flash memory devices; electrical, optical, acoustical or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.); etc.

Overview

[0054] A programmable rule processor is disclosed that comprises a general purpose processor portion having general purpose registers, a general purpose execution data path attached thereto, and an instruction sequencer. The general purpose processor portion is a tightly coupled with search registers with search execution units and state machine registers with state machine execution units. Together the search registers with search execution units and together the state machine recognition units the state machine execution units may each be considered processor execution units much like a floating point unit and an integer unit are execution units in a general purpose processor. Based on the type of instruction (e.g., opcode), a decoder in the general purpose processor portion is able to direct instructions to either of these execution blocks.

[0055] The general purpose processor portion feeds data and rules to the search registers and the state machine registers and is able to receive results from either one and supply them to the other or to both. That is, the general purpose processor portion is integrated with the search registers and the state machine registers such that the general purpose processor portion can access all the data in the search registers and the state machine registers, as well as move data between the search registers, and the state machine register, and the general purpose registers.

[0056] The general purpose processor portion also includes a (rule) instruction memory to store instructions, a instruction sequencer, including an instruction pointer, to sequence through a set of instructions stored in the instruction memory, a decoder to decode each instruction. The decoder is able to examine the instructions fed to it and to obtain search parameters and operands or retrieve indexes to locations in a general purpose register file that store such parameters and operands. Thus, the decoder decodes the instructions and then assembles the operands and parameters and prepares the rules that will be presented to the various rule processing execution units.

[0057] Figure 1 is a block diagram of one embodiment of a programmable rule processor. The programmable rule processor integrates traditional microprocessor capability with grammar processing, expression processing and string matching capabilities. Simple string matching is provided by search registers and a search/parse array that search for a set of bytes. The expression processing is

provided by state machine hardware that detects and processes combinations of multiple strings and operators. The grammar processing is achieved by the combined use of these two pieces of specialized hardware along with the general purpose processor to perform contextual and progressive parsing by applying a tree of rules and expressions, resulting in a contextual search with complex control flow.

[0058] Thus, the programmable processor of the present invention integrates parallel pattern matching, contextual search, navigation and progressive rule analysis, state machine hardware and elements of a conventional processor (e.g., integer, load/store, associative lookup, branching).

[0059] Referring to Figure 1, the instructions are stored in an instruction memory 102. Instructions are selected by flow control using an instruction fetch pointer and branch prediction unit 104. The instruction pointer points to locations in instruction memory 102 from which instructions are to be fetched. This occurs during the fetch stage of the hardware pipeline. Instruction fetch pointer and branch prediction unit 104 operate in a manner well known in the art to sequence instructions to decoder 106.

[0060] Decoder 106 reads and decodes instructions during a decoding stage. As far as decoded instructions for rule processing by the search registers and search hardware is concerned, the results from decoder 106 include an identification of the opcode, pattern, mask and navigation control (e.g., windows of where to begin and end searching) for each rule, such as instruction 110, or an indication of where in the general purpose register file 108 such information is stored. The instruction format is expanded to specify rules for searching and analysis of data. Note that other instruction formats may be used. After reading from register file 108, the values can be used to incorporate or write specific values into various fields of a rule that is being assembled.

[0061] As far as decoded instructions for rule processing by the state machine apparatus is concerned, the results from the decoder include an identification of the opcode, the input data values or a pointer to where the data values reside (either in general purpose register 108, or in packet buffers 134, or in an external address), as well as a code or indication as to which of state machine registers 124 and state machine units need to be invoked.

[0062] Next, the parameters of each instruction are supplied by decoder 106 to state machine unit 120, search registers & search/sort arrays 112, integer (or other arithmetic logic unit (ALU)) unit 118, load/store unit 116, and branch unit 114. In another embodiment, this is done with an instruction sequencer unit, which acts both as an instruction sequencer and a decoder.

[0063] Load /store unit 16 loads values into or stores values from the search registers as well as state machine registers 124 as well as streams data into the state machine unit 120.

[0064] The instructions may specify rules for searching and analysis of data. In such a case, the rule is presented to the search registers of search registers & search/sort arrays 112. The search execution hardware finds the specified pattern in the search registers, if it exists. Sort array sorts and delivers the desired match location and match results and completes execution of the search(es). Results of the searching are sent to search results storage 130.

[0065] More specifically, search registers & search/sort arrays 112 comprises search register and a sorter. These will be described in more detail below. The search register stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of the search register may be arbitrary, and in one embodiment is organized within a larger array, called a search array having multiple rows of a predetermined number of bytes each. Data from search register is stored in a replicated manner inside the search array. Irrespective of the manner in which the searchable data is organized throughout the search array, the search array receives a pattern and mask from rule 110. The pattern is compared against entries in the search array. The mask provides an indication of those bytes in the pattern that are not part of the pattern being searched. In one embodiment, the search array has an output line for each of the rows in the search array indicating whether the pattern being searched matched that content data stored in that particular row. The output lines of the search array are coupled to inputs of the sorter.

[0066] The sorter receives offsets that indicate a starting and ending point, respectively, of a range in the search register that is to be searched. Based on the match indication lines from the search array and the start and end range as specified

by the offsets, the sorter processes the results of the search array. Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by the opcode in search instruction 110. The sorter may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from the search array. In this manner, the sorter may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations. Thus, after processing, the sorter generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in the search register where the first match occurs or where the last match occurs with respect to the top of the search register. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[0067] Following the computation of the outputs, namely, the match indication and the index, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 102) dependent on the match indication or other similar techniques. For example, the search results in search results storage 130 can be made available for branching via branch unit 114, which causes branching based on those results, or to instruction pointer & branch prediction unit 104 for changing values of the instruction pointer and determining a new set of rules that are to be executed by the rule processor. Note that the branch unit 114 may branch based on a value specified in a rule or opcode field, which branch unit 114 receives after decoding. Branch unit 114 operates in a manner well-known in the art and is described in greater detail below.

[0068] Additionally, the sorter may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of the

sorter may also be coupled to the rule processor instruction sequencer 104 to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[0069] Alternatively, the instructions may specify rules for expression processing or state machine evaluation. Such an instruction may indicate that the state machine unit is to be invoked, what state machines are to be tested and what data is to be streamed or input to those state machines. In such a case, state machine unit 120 performs the expression processing in response to the instructions. State machine controller 122 controls state machine registers 124 based on state machine configuration information. State machine configuration information may be received by state machine unit 120 via load/store unit 116, packet buffers 134 or the buses 136, and state machine controller 122 loads this information in state machine registers 124. The state machine configuration information is used to program state machine behavior into state machine registers 124. Once programmed, data may be streamed across the state machines and the state machines may be evaluated. State machine evaluation unit 126 comprises hardware that evaluates one or more state machines programmed into the state machine registers 124 in view of the data being presented to state machine unit 120. In one embodiment, state machine evaluation unit 126 evaluates a large number of state machines in parallel. One embodiment of state machine unit 120 is described in more detail below.

[0070] Multiple state machines may be evaluated in parallel. Each state machine's behavior is specified in a set of state machine registers. For each state machine register set, a state machine evaluation unit executes the state machine specified in the register set against input data. Multiple state machines are specified via multiple sets of state machine registers. Multiple state machines can be evaluated in parallel, by providing an execution unit for each state machine register set. Each state machine could be fed independent data so that multiple state machines could be evaluated in parallel on multiple distinct data streams.

[0071] Context static random access memory (SRAM) 128 is used to store context information for multiple sets of data being evaluated (e.g., data from multiple different streams). If a packet is from a different stream or connection, then the front-end of the programmable rule processor issues an indication to state machine controller 122 that indicates a new stream (or connection) and not part of the same

stream as the previous bytes being processed. This indication can be issued on either a dedicated instruction or issued on a field of the instruction that invokes the state machine operation. In response, state machine controller 122 causes the accumulated state machine evaluation information that exists in state machine registers 124 and state machine evaluation unit 126 to be stored away as context in context SRAM 128. More specifically, once a new rule provides this indication (e.g., via opcode), state machine controller 122 first stores all temporary status of the execution thus far in context SRAM 128 and loads in the context for the stream corresponding to the new rule. If it is a new stream, there is no context accumulated as yet and it starts with the register context initialized. Note that in this case after the end of the first packet of a fresh stream, fresh context is created. Note that in one embodiment, load/store unit 116 has access to context SRAM 128.

[0072] Note that the state machine unit 120 and search registers and search/sort array 116 act as distinct execution units that may operate in parallel. They may be processing the same or different data, or process the same data at different times.

[0073] In one embodiment, load/store unit 116 stores values into search registers 112 or remove values from search registers 112. Load/store unit 116 could load values into general purpose registers file 108 in a manner well-known in the art. Load/store unit 116 communicates with an on-chip data memory or data cache 132 and external memory (through bus and off-chip interface 136).

[0074] Load/ store unit 116 also reads from and writes from a message buffer or packet buffer (temporary storage) 134. Packets flow into the message buffer or data buffer or packet buffer 134. Load/ store unit 116 may move those into search registers 112 to enable an entire packet or message or document to be stored in search registers 112 via packet buffer 134. This allows the programmable rule processor to receive packet, message, document or stream data and load it into search registers 112 and, using the rule processor, do a series of finds or navigated windowed searches to locate specific portions of the data, characterize the packet, or delineate various zones in the packet or regions of interest in the packet wherein more pattern matching or state machine evaluation has to be performed. Rulesets stored in instruction memory specify the high level control flow of the program that includes the overall control flow graph specifying the graph or tree of rules that needs to be applied or performed.

A variety of rich sequences or rulesets or grammars could thus be applied to the data. For example, initially, based on a context search to be performed, search registers 112 are loaded to find a zone of interest. Once the zone of interest in the data has been found, load/store unit 116 transfers that region to state machine unit 120 for application of a certain number of rules or regular expressions to that zone or portion of data. After transfer, a new rule is presented to state machine controller 122 that indicates which state machines to evaluate against this zone of data.

[0075] Load/store unit 116 can access state machine unit 120. For example, load/store unit 116 can send values to program state machine registers 124 with state machine behavior. Load/store unit 116 may provide data from a number of sources for evaluation. Load/store unit 116 may provide data from packet buffers 134 and can be streamed or fed to state machine unit 120. Load/store unit 116 can provide data or from buses via off-chip interface 136. Load/store unit 116 may send program or data values. State machine unit 120 then evaluates such data by having state machine controller 122 take the data and feed it to state machine registers 124 and state machine evaluation unit 126 for evaluation.

[0076] Note that although not shown, in one embodiment, state machine unit 120 and the search registers and search/sort arrays 112 may be coupled together using dedicated buses or shared buses to transfer data and/or results between each other.

[0077] Integer unit 118 performs general purpose integer functions. In one embodiment, integer unit 118 computes indexes or addresses, or transforms data that may be then fed back to the search registers or state machine registers.

[0078] Thus, one embodiment of the programmable rule processor includes three sets of registers. These include general purpose registers and two other sets of registers, namely search registers and state machine registers. An execution unit is coupled to each of the search registers and the state machine registers. For the state machine registers, the execution unit is the state machine evaluation unit, while for the search registers, the execution unit is the search and sort array. Thus, the rule processor takes a conventional microprocessor front-end and adds search registers and a search and sort execution hardware and state machine registers and state machine evaluation unit to evaluate state machines.

[0079] Figure 2 is an example illustrating the capability of one embodiment of the rule processor executing a rich rule tree comprising a sequence of operations that include a protocol decode function followed by the use of regular expression processing to find patterns of interest in specific portions of the input data. Referring to Figure 2, the rule tree is shown with two phases or levels.. The first phase involves a protocol decode operation in which packets going through a network are examined and decoded to understand what protocol is in effect. This requires pattern matching on potentially all the bytes in each packet. In this case, the search registers and search/parse array are used to perform a series of find operations. In this example, various routines of FindForward and FindNotForward operations, which are discussed in more detail below are used to determine if the protocol being used is HTTP and to determine if a GET command or a POST command is being used. More specifically, FindNotForward and FindForward operations locate where the commands begin and end as well as locating arguments for any universal resource indicator (URI). Note that each of a series of such location operations may be executed in a single iteration of a cycle.

[0080] After determining that the packet is some type of HTTP packet, determining if a get command or a post command exists, and after locating the arguments, the last sequence shown in the program, the FINDRE sequence or function, is used to determine if a set of patterns exists. To that end, the start and end locations that were found by the search register and search/parse execution hardware identify where the relevant bytes are in the search registers that may be extracted by the load/store unit and sent to the state machine unit for processing thereby. The instruction sequencer provides a command to point to a group of state machines for evaluation and the state machine controller decodes the group and invokes them against the data. In the end, results are available that indicate whether any of the URIs were found in that zone (i.e., whether there was a match). The result information can be passed back to the remainder of the rule processor, which may, for example, use the branch unit to branch to some other location based on those results (maybe due to some pattern identified in the payload of the packet).

[0081] Thus, one embodiment of the programmable rule processor performs stateful inspection, pattern matching, analysis, and state machine evaluation on high speed data streams.

[0082] Embodiments of the rule processor described herein include one or more advantageous features. For example, one embodiment of the rule processor may utilize a non-procedural high-level language to describe data and data patterns. The use of high level descriptions reduces coding effort. Embodiments of the present invention also provide support for complex protocols and data layouts, such as, for example, variable size, string terminated, conditional, overlaid, or arbitrarily ordered data, as well as arbitrary data layouts.

Exemplary Card Configurations

[0083] Figure 3 illustrates interfaces of one embodiment of a rule processor. Referring to Figure 3, rule processor 300 includes a host interface 301, a streaming interface 302, a memory interface 303, and a look-aside interface 304. Host interface 301 may comprise, for example, a PCI-X interface. Streaming interface 302 may comprise, for example, a SPI 4.2 interface or a HT & Cascade interface. Memory interface 303 may comprise, for example, a DDRII interface. Look-aside interface 304 may comprise, for example, a LA-1 interface. Note that in other embodiments, the rule processor may have additional interfaces or a subset of the interfaces shown in Figure 3.

[0084] A rule processor, such as rule processor 300, may be included in a number of card configurations. Figures 4-6 illustrate a number of exemplary card configurations. Figure 4 is a block diagram of a line card look-aside configuration. Figure 5 is a block diagram of a line card flow-thru configuration. The in-line codes operate on a stand-alone basis. Therefore, in such a configuration, the rule processor does not send results back to a host processor. The rule processor receives packets on one interface, unravels the packets and determines the protocol to detect packets. The rule processor creates results and may modify the data to be sent. Subsequently, the rule processor sends the data to its next destination. Note that rule processor performs, storing, routing, delivery and other network functions.

[0085] Figure 6 is a block diagram of a server co-processor card configuration. In this configuration, the host processor receives a message, because the host processor handles all of the network functions. The host processor sends a message (packet or buffer) and some instructions indicating what type of rule processing is to be applied to the rule processor. In response, the rule processor applies a rule processing sequence or program and then sends the results to the host processor. The host is then able to take any action, if necessary.

[0086] Referring to Figure 4, the line card configuration comprises a rule processor 401 having a memory 402 coupled to its memory interface and a network processor 403 coupled to a streaming interface of rule processor 401. Rule processor 401 has a host interface for coupling to a host or other control plane.

[0087] Network processor 403 is coupled to a memory 404 and includes an interface 407 for coupling to a host or other control plane. Network processor 403 has an input 405A and an output 405B. Input 405A is coupled to receive network traffic, which network processor 403 forwards to rule processor 401 for processing (e.g., attack detection using patterns, rules, expressions and grammar). The network traffic is forwarded from network processor 403 via output 406.

[0088] Referring to Figure 5, the line card flow-thru configuration comprises a rule processor 501 having a memory 502 coupled to its memory interface, an output 505B of a network processor 503A coupled to its streaming interface, and an input 506A of a network processor 503B coupled to its look-aside interface. Rule processor 501 has a host interface for coupling to a host or other control plane.

[0089] Network processor 503A is coupled to a memory 504A and includes an interface 507A for coupling to a host or other control plane. Network processor 503A has an input 505A and an output 505B. Input 505A is coupled to receive network traffic, which network processor 503A forwards to rule processor 501, via output 505B, for processing (e.g., attack detection using patterns, rules, expressions and grammar). After processing, rule processor 501 forwards the network traffic to network processor 503B via input 506A. Network processor 503B is coupled to a memory 504B and includes an interface 507B for coupling to a host or other control plane. Network processor 506B outputs network traffic via output 506B.

[0090] Referring to Figure 6, the co-processor card resembles a standard PCI-X card that includes a host processor 606 coupled to a chipset 604 via a host interface.

Chipset 604 includes a memory interface coupled to host memory 605. Chipset 604 also includes two PCI-X interfaces, one coupled to a network interface card (NIC) 603 and the other coupled to a host interface of rule processor 601. Rule processor 601 also includes a memory interface coupled to memory 602.

[0091] In the arrangement in Figure 6, content is received via NIC 603 and is sent via chipset 604 to host memory 605. Processor 606 receives an indication (e.g., interrupt) indicating that content has been received and is stored in host memory 605. In response, host processor 606 signals rule processor 601 to handle the content processing. Once completed, rule processor 601 signals host processor 606, which signals NIC 603 indicating to NIC 603 that the data in host memory 605 is ready for transfer. Finally, NIC 603 access the network traffic from host memory 605 via chipset 604 and sends the network traffic out to the network

An Exemplary Embodiment of Search Register and Search/Sort Array Hardware

[0092] One embodiment of the search register and search/sort array hardware is given below. Note that alternative embodiments of search register and search/sort array hardware may be used.

[0093] Figure 7 is a block diagram of a portion of one embodiment of a rule processor comprising search registers 701 and search execution hardware 702. Such a portion may be part of the rule processor of Figure 1. Search instruction 703 is presented to search registers 701 and search execution hardware 702. As described above, the processor further comprises of an instruction store referred to as rule/instruction memory 704 and an apparatus to control the flow of instructions that includes, in one embodiment, instruction sequencer 705 and instruction pointer 706.

[0094] A typical search entails presentation of an instruction or rule to the search registers. The rule specifies a pattern along with one or more additional search parameters. In one embodiment, the search function returns a number of results. These include an indication of whether or not a match was found between the pattern and the content in the search registers, and also a match location indicating where in the payload search registers the match occurred.

[0095] Additional search control parameters are provided by the rule processor to search execution hardware 702. Search instructions might provide a mask vector along with a set of bytes comprising the target search pattern. The mask vector might be comprised of bits that correspond to the target pattern byte or bytes. In one embodiment, specific bytes in the target pattern to be ignored during the search operation are selected by setting the corresponding bits in the mask vector to a pre-determined logic level of 0 or 1. Thus, the target pattern used in the search may be reduced in size. Additionally, the rule processing instructions may specify starting and ending locations that constitute a search window or a range of bytes in search registers 701 within which the search is constrained.

[0096] Additional parameters to search instructions may include a branch address to be utilized by the rule processor in the event of an unsuccessful search.

[0097] An example of a search instruction is a windowed-find-first-forward instruction. In one embodiment, in a windowed-find-first-forward search, given an 8-byte pattern specified in or by a rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content data (e.g., document data) in search registers 701, and an ending location offset address pointing to an ending byte in the content data (e.g., document data) in search registers 701, the search returns the starting address in search registers 701 of the first string after the specified starting location address that matches the masked pattern, providing this address starts before the ending location offset address. In another example, a windowed-find-first-reverse search may be performed. In one embodiment, in a windowed-find-first-reverse search, given an 8-byte pattern in the rule, an 8-bit mask, a starting location offset address pointing to a starting byte in the content in search registers 701, and an ending location address pointing to an ending byte in the content in search registers 701, the search returns the starting address of the last string before the specified ending location address that matches the masked pattern, providing this address starts after the starting location offset address.

[0098] The rule processor also provides a control store or rule memory 704 that contains rules or rule sets to be applied to the payload data. In one embodiment, the memory 704 holds rule sets or sequences of instructions or code that describe patterns, rules, expressions or grammars that need to be applied and detected in search

registers 701. The rule vocabulary may specify a range of operations, including, but not limited to, global or local (windowed) searches with either exact matches or partial matches, with individual and multiple match information delivered to some registers, primitives to generate offsets and addresses in the output payload of the rule processor, as well as logical and computational operators to be applied to the search results. Such rules may be composed of multiple fields that specify the various parameters described above. Each parameter may be directly specified within the rule or, alternatively, indirectly specified through the use of a pointer to a register or memory location containing the value to be used. In embodiments where both direct and indirect specifications are permissible, each such field may contain an additional sub-field that indicates whether direct or indirect specification is being utilized.

[0099] In one embodiment, the rule processor performs sequences of prioritized and directed searches of anchored or unanchored patterns and windowed and ranged searches for an arbitrary long pattern starting at any arbitrary location in a document, stream, message, or packet. The patterns as well as the range control and program control flow (e.g., branch addresses) can be specified statically in rules contained in the program store or dynamically selected indirectly from a register file using a pointer or index set forth in a rule. This enables powerful dynamic and contextual pattern matching.

[00100] The rule processor presents one or more rules of a search to a search register structure. In one embodiment, the search register is a 2KB register file with each entry being one byte wide. Data to be searched is loaded in the search register file. Each rule may specify a pattern that is presented to the search register file to determine if the pattern is present in the data stored therein. A mask may also be provided to further configure the pattern and/or to reduce the size of the pattern being used in the search.

[00101] Referring to Figure 7, search registers 701 and search execution hardware 702 is collectively presented with a search instruction 703. Search instruction 703 is further illustrated in Figure 8A. Referring to Figure 8A, search instruction 801 comprises an opcode 801a that describes the type of search operation, a search pattern 801b, a mask 801c that specifies the bytes in the pattern that are relevant to the current search instruction and two offsets 801d and 801e that specify

the starting and ending bounds, respectively, of the locations in the search register that are relevant to the current search instruction. Search execution unit 802 outputs a result 803 that, in one embodiment, comprises an indication of the success of the search operation and additionally includes one or more parameters such as, but not limited to, an index that indicates the location within the search register that met the search instruction of the search operation.

[00102] Search execution hardware 802 comprises search register 802a and a sorter 802b as shown in Figure 8A. Search register 802a stores searchable data, which may be content from a document, message, packet, or any other well-known source of data that can undergo searching. The size of search register 802a may be arbitrary, M bytes, and in one embodiment is organized within a larger array, called a search array 802c, of M rows of N bytes each. Data from search register 802a is stored in a replicated manner inside the search array

[00103] In one embodiment, data to be searched is stored in search register 802a by use of a data generator 813, based on addresses generated from address generator 811, which are decoded by address decoder 812. The process of storing also entails recording the size of the searchable data in search register 802a. For data sets that are smaller in size than the capacity of search register 802a, search register 802a provides a mechanism to restrict the search operation to the appropriate data. In one embodiment, data generator 813 may store a pattern that is established a priori to be data that will be ignored for search operations in the remaining locations of search array 802c or in an alternate embodiment search register 802a disables the appropriate locations of search array 802c from participating in search operations.

[00104] Irrespective of the manner in which the searchable data is organized throughout search array 802c, search array 802c receives a pattern 801b and mask 801c. Pattern 801b is compared against entries in search array 802c. In one embodiment, search array 802c has M rows of N bytes, where N is the same number of bytes as are in pattern 801b. Mask 801c provides an indication of those bytes in pattern 801b that are not part of the pattern being searched. In other words, if pattern 801b is a pattern that is less than N bytes, mask 801c specifies which bytes of pattern 801b search array 802c is to ignore. In one embodiment, search array 802c has an output line for each of the M rows in search array 802c indicating whether the pattern

being searched matched that content data stored in that particular row. In one embodiment, if the output is a 1, the pattern matched content data in the particular row. The M output lines of search array 802c are coupled to inputs of sorter 802b. [00105] Sorter 802b is also coupled to receive offsets 801d and 801e that indicate a starting and ending point, respectively, of a range in search register 802a that is to be searched. In one embodiment, these offsets are $\log_2 M$ -bit numbers. Based on the match indication lines from search array 802c and the start and end range as specified by offsets 801d and 801e, sorter 802b processes the results of search array 802c. Such processing may include performing one or more operations. These operations may be index resolution functions that output a specific match index pursuant to the type of operation. In one embodiment, the operations include Find_First_Forward, Find_First_Reverse and Find_Population_Count. The operations are specified by opcode 801a in search instruction 801. Sorter 802b may store intermediate or final results of previous operations that may be used in subsequent operations in conjunction with the match indication lines from search array 802c. In this manner, sorter 802b may be used to progressively navigate through the searchable data set by issuing a series of operations that utilize the results of previous operations. Additionally, sorter 802b may also be coupled to a register file for storage of results of previous operations for use in subsequent operations that may be executed after an arbitrary number of other operations have been executed. The results of sorter 802b may also be coupled to the rule processor instruction sequencer, such as instruction sequencer 705 of Figure 7, to generate or assist in the generation of rule program offsets (e.g., branch addresses).

[00106] After processing, sorter 802b generates outputs indicating whether there is a match, and an index associated with the match. The index may indicate the location (address) in search register 802a where the first match occurs or where the last match occurs with respect to the top of search register 802a. Alternatively, the index may indicate the number of matches that occurred within the range specified by offsets.

[00107] Note that the range specified by the offsets may be changed dynamically. For example, a first search instruction may be applied to search array 802c initially while a range that is specified by offset 801d and offset 801e comprises all rows of search array 802c. However, after the first search instruction and a match is

identified, the start and end ranges may be changed in a subsequent search instruction such that the searching begins from a location that includes the match lines found within the range specified by the previous search instruction. This capability is achieved by using the indirection functionality that allows fields of a rule or an instruction to reference values in a general purpose register file.

[00108] In Figure 8A, in one embodiment, search array 802c is comprised of 2K rows of 8 bytes each. Thus, search register 802a holds 2K bytes of data. Search array 802c holds replicated data. Each 8-byte string that begins with a distinct byte in search register 802a is stored as a distinct row of bytes in search array 802c. These strings are comprised of the distinct byte from search register 802a and additionally 7 consecutive bytes that follow that byte in search register 802a. Thus, each row of search array 802c holds the 7 most significant bytes of the previous row and additionally one immediately succeeding higher order byte, which is appended to the right of these 7 bytes.

[00109] Data is loaded into search array 802c by data generator 813, which, in one embodiment, supplies the appropriate 8 bytes of data for each row from the source data.

[00110] In one embodiment, an 8-byte search pattern is presented in each search instruction. The search pattern is aligned with search array 802c such that each of the 8 columns in the array is presented with a unique byte. This is shown in Figure 8B. Referring to Figure 8B, state bytes 1 through 8 are stored in the search array for each of rows 1 through 2K. For each byte that is stored as an element of the search array of 2K rows and 8 columns shown in Figure 8B, there exists a signal line 310. For example, byte 1 of row 1 generates signal line 310₁₁, byte 2 of row 1 generates signal line 310₁₂, byte 1 of row 2 generates signal line 310₂₁, and so forth. The signal for each byte is asserted during a search operation when the stored byte matches the byte of the search pattern that is presented to the same column that the element belongs to. In this embodiment, where each row contains 8 bytes, 8 signal lines, for example 310₁₁ through 310₁₈, are used to indicate each of the byte level matches in the row. The byte level matches for each row are ANDed together with the masks from masks 102c in row & mask resolver blocks 311. The result of the AND function is an indication of whether a match occurred in each row. In this embodiment, where the

search array includes 2K rows, 2K match lines are output to the sorter. The circuit structure of two of the byte elements 312 in this array is shown in Figure 10. The circuit operates in a manner that provides a fully parallel search operation by performing a simultaneous search within all its rows in one clock period. When a search operation is conducted, all byte level match lines 401 in a column simultaneously indicate matches with their respective stored bytes. A search operation is invoked on all columns simultaneously allowing the masked reduction block in each row to indicate a row level match. Thus, in this embodiment of the search array, in a single clock, a parallel search of all 2K strings in the search register that are comprised of 8 contiguous bytes is performed and the results are indicated on the 2K match lines.

[00111] Figure 9A is a block diagram of one embodiment of a sorter. Referring to Figure 9A, match lines 910 from the search array are coupled to and input to a range mask and select unit 901. In one embodiment, match lines 910 comprise match 1 to match 2048. Range mask and select unit 901 receives a pair of offsets specifying a range of rows of the M match lines from search array to perform further processing. In one embodiment, the offsets are 11 bit numbers that are converted into 2K mask bits that may be ANDed together with the match lines to provide an output. Such an example is shown in Figure 9B in which the offset for the start range is converted to one or more zeros with the remainder of the bits being a one bit, while the offset for the end of the range is converted to all zeros starting from the bottom up to a certain point after which all bits are ones. By ANDing these registers with the match lines, the matches that occur within the specified start and ending range are output without change, while other match lines outside the range are masked (e.g., changed to a predetermined logic level).

[00112] The output of range mask and the select unit 901 is coupled to the inputs of index resolution functions unit 902. In one embodiment, index resolution functions unit 902 includes one or more functions that are performed on the outputs of range mask and select unit 901. For example, as shown, the sorter includes an ascending priority encoder 902A to find the first occurrence (with respect to the top of the search array) of a match between the specified pattern of N bytes and the content data in the search array as indicated by the non-masked match lines. A descending priority

encoder 902B may also be included to find the last occurrence (with respect to the top of the search array) of a match between the N byte pattern and the content data in the search array as indicated by the non-masked match lines. A population counter 902C indicates the number of matches that occur between the N byte pattern and the data in the search array as indicated by the non-masked match lines. Other index selectors may also be used.

[00113] The outputs of index resolution functions unit 902 are input to an index combine and select unit 903, which is also coupled to receive opcode 102a. The opcode 102a is specified in the search instruction and selects one of the index resolution function outputs as the output of the sorter. Index combine and select unit 903 generates a match indicator 921 indicating that there was match along with an index 922 indicating that the location within the search array of the data that is either the first occurrence of a match if the output ascending priority encoder 902A is selected, the last occurrence of a match in case the output of descending priority indicator 902B is selected, indicates the number of matches in the non-masked match lines if the pop counter 902C is selected, etc. Following the computation of the outputs, namely, match indicator 921 and index 922, they may be utilized to control the execution of one or more search instructions that follow by storing the outputs in general-purpose registers and utilizing indirect specification in subsequent instructions, branching to a specified address in the instruction memory (e.g., instruction memory 704) dependent on the match indicator 921 or other similar techniques.

[00114] Figure 11 illustrates the micro architecture of a rule processor that includes search apparatus. Referring to Figure 11, the search instructions are stored in an instruction memory 1101. Instructions are selected by flow control using an instruction fetch pointer register 1102. Instructions are decoded by a decoder 1103. The individual subsets of each instruction are either taken from the instruction or fetched from general purpose register file 1104. Then the various subsets of each instruction are supplied to the separate units, namely, search array 1105, sorter 1106 comprising of a sort unit 1106a followed by a characterization unit 1106b, a conventional arithmetic logic unit (ALU) 1107, as set forth above. In one embodiment, the processing of each instruction follows a 4-stage pipeline consisting

of (i) instruction fetch stage 1108, (ii) an instruction assembly stage 1109, (iii) a search/execute stage 1110, and (iv) a sort and delivery of results and/or branch stage 1111.

[00115] In one embodiment, the rule engine instruction format comprises a number of bits are divided into subsets that contain various fields to issue directives to various hardware engines on the rule processor. In one embodiment, the search subset contains a search/sort opcode field, a pattern field (in one embodiment, this contains a value or a pointer to a location that provides a value along with an additional bit(s) that specifies whether the value in the instruction is a pointer or not), a byte level mask field, a start location address field (in one embodiment, this field, comprises a value or a pointer to a register that provides the value, and including an additional bit(s) to indicate whether the start location address contains the value or such a pointer), an end location address field (in one embodiment, this field, comprises a value, or a pointer to a register that provides the value, with an additional bit(s) to specify whether the end location address information is a pointer or not), a result register field that specifies where the results of the search operations are to be returned and a branch address field (in one embodiment, this field comprises a value or a pointer to a register that provides the value, with an additional bit(s) to specify whether the branch address information is a pointer or not)

[00116] Figure 12 illustrates an example pseudo-code 1201 of a rule-set that may be processed by one embodiment of the rule processor described above. The rule has multiple patterns with some specific constraints on the locations of where such patterns may exist in a message or document or packet. The constraints are expressed in the pseudo-code through the use of key words such as BEFORE and AND. For purposes of simplicity, the patterns in 1201 are used in this example without any additional delimiters between strings, which may be the case in practice. Also, in Figure 12 is a listing 1202 of the corresponding micro-code for the exemplary rule processor. The format of the instructions is as described earlier. Using the first instruction 1203 for illustration, it consists of the FIND_FIRST_FORWARD opcode where all 8 bytes of the Pattern "cp /bin/" are relevant for the search (through the use of 0xFF as Mask) with the start and end offsets expressed as constant values (through the use of Indirection Flags) to denote the start and end of the searchable payload held

in the search registers. For purposes of brevity, the derivation of the constant numbers has been skipped here. The result of this opcode is shown to be loaded into general purpose register A and lastly the branch address is specified as the constant value of 11 which is the instruction that would follow the micro-code snippet shown in Figure 12. This instruction will cause the search execution hardware to search for the occurrence of "cp /bin/" within byte locations 0x03D and 0x800 of the search registers 802a. All rows in the search array 802c that match will assert their respective match lines 910 by the end of the search execution stage 1110 of the micro-architectural pipeline. In the sort and branch stage 1111, the sorter 802b converts 0x03D and 0x800 into bit vectors as illustrated in Figure 9B. The bit vectors are used to perform the range mask and select function 901 to negate any matches that start outside of the location window from 0x03D to 0x800. Of the remaining matches that are now within the location window, the opcode of this instruction chooses the ascending priority encoder 902a from the index resolution functions 902 to convert the lowest numbered match into an 11-bit binary encoded location. If such a match was found, match 921 would be asserted and index 922 would hold the 11-bit location. If match 921 were to be not asserted because a match was not found, the instruction sequencer 705 would load the branch address 0xB into the instruction pointer 706. Index 922 would be loaded into general-purpose register A by the control circuitry of the register file 1104. The load into general-purpose register A and the load of the instruction pointer, if applicable, will be completed by the end of the sort and branch execution stage 1111. Second instruction 1204, `FIND_FORWARD_ANCHORED`, further illustrates the rich vocabulary of the exemplary rule engine. It is a variant of `FIND_FIRST_FORWARD` in that the match begins at the `start_offset` for the search to be successful.

[00117] Figure 13 illustrates the execution of the micro-code shown in Figure 12 within the micro-architecture of the exemplary rule processor shown in Figure 11. Table 701 shows the execution across multiple clock cycles. For purposes of simplicity, it is assumed that all the search instructions are successful in finding the specified patterns in the search registers. In one embodiment, the execution proceeds in a pipelined fashion through the 4 stages described in Figure 11. Through the use of indirect specification, the execution of a search instruction can use the offsets

calculated in the immediately preceding instruction. Therefore, instructions 1 through 8 are executed in consecutive cycles. Instruction 8 is a branch dependent on the result of the comparison of the contents of general purpose register A and general purpose register B which are computed in clock cycle 8 and clock cycle 9 respectively. The branch is taken in clock cycle 11 and the instruction execution completed in clock cycle 14. Thus, the complex pattern matching expression described using pseudo-code 1201 is executed in only 14 clock cycles using the rich instruction vocabulary of the exemplary rule processor. This example illustrates the capability and efficiency of the exemplary rule processor on execution of functions that include dynamic and contextual search and analysis of documents, messages or packets.

An Exemplary Embodiment of State Machine Unit Hardware

[00118] One embodiment of state machine unit hardware is described below. Note that other embodiments of state machine unit hardware may be used.

[00119] A state machine evaluation architecture is described that allows for efficient implementation and evaluation of state machines and finite state automata. In one embodiment, the apparatus employs a technique of building graphs using circuits in a way that enables, in a programmable manner, the physical realization of any arbitrary control flow graph in hardware. The apparatus provides a high performance and compact solution for implementation of multiple state machines as well as large and complex state machines. The apparatus can be used for efficient parsing and evaluation of data via the hierarchical application of thousands of regular expressions on the incoming data stream. Such an apparatus may be the central evaluation engine for a regular expression processor. Note that one embodiment of finite state machine units are described in U.S. Patent Application No. 10/650,364 entitled "Method and Apparatus for Efficient Implementation and Evaluation of State Machines and Programmable Finite State Automata," filed on August, 27, 2003; and U.S. Patent Application No. _____ entitled "_____" concurrently filed with this application, which are incorporated herein by reference.

[00120] Figure 14 illustrates a basic state machine evaluation building block or finite state automata building block (FSA building block) from a programming perspective in accordance with one embodiment of the invention. FSA building block 1400,

shown in Figure 14 includes a number of registers that allow the FSA building block to be fully programmable. Register 1401 contains node elements that specify the current state of the FSA. Register 1402 contains state transition evaluation symbols on which match a state will be transitioned. Register 1403 contains a state transition connectivity control matrix that specifies which states of the FSA are connected (i.e., the enabled state connections).

[00121] Initially, the nodes are in a certain state. With each evaluation cycle, an input (e.g., an input byte) 1405 is input to the state transition dynamic trigger computation 1410, which compares the input to the state transition evaluation symbols contained in register 1402. The comparison information is input to the state transition interconnections and next state evaluation logic 1415. Then, based on the nodal connections contained in register 1403, the next state is computed and latched and then becomes the current state. That is, the next states are calculated using triggers, connectivity controls, and current state bits. The architecture of the FSA building block allows a character of input data to be analyzed every clock cycle without the need for external memory.

[00122] Figure 15 illustrates a logic circuit for implementing an FSA building block in accordance with one embodiment of the invention. The logic circuit 1500, shown in Figure 15, may be used to implement a state machine architecture for realization of a non-deterministic finite state automata with R nodes, R symbols, and R^2 arcs. In Figure 15, R has been set to a variable M , and the hardware organization is designed and laid out to be scalable for any M . By fixing the value of M and providing the appropriate level of hardware, an FSA building block with specifically M instantiated nodes can be realized.

[00123] The node elements N_1-N_M are fully connected with interconnections 1501. Each node element has an arc or interconnection to itself, as well as to each of the other node elements. Hence, for $M=32$, there are 32×32 or 1024 interconnections 1501. Likewise, for $M=16$, there are 16×16 or 256 interconnections 1501.

[00124] For $M=32$, the state transition connectivity controls 1502 comprise 1024 bits organized as a matrix of 32 bits \times 32 bits. Likewise, for $M=16$, the state transition connectivity controls 1502 comprise 256 bits organized as a matrix of 16 bits \times 16 bits. A bit in row Y and column Z represents the control to enable or disable an

interconnection between node element N_Y and node element N_Z . The mechanism by which the interconnections 1501 between node elements N_1-N_M can be enabled or disabled by the state transition connectivity controls 1502 is embodied as a switch on the interconnection (e.g., wire) 1501, with the switch being gated by the relevant control bit for that interconnection. This could be implemented using AND gate logic as well.

[00125] In this embodiment, there are as many state transition evaluation symbols 1503 as there are states in the machine. For $M=32$, there are 32 symbols. For $M=16$, there are 16 symbols. Each symbol could comprise a single 8-bit character value and compare operator, so that input data is specified for comparison to the 8-bit character value to compute the state transition dynamic trigger 1504. In this embodiment, the logic for the state transition dynamic trigger 1504 computation is as follows. A fresh byte of input data is fed simultaneously to all M comparators. A set of M match lines act as state transition dynamic triggers 1504. Once again, M may be either 16 or 32.

[00126] The mechanism by which the state transition dynamic triggers 1504 govern the update and transfer of values between node elements N_1-N_M (over interconnections 1501 that have been enabled) is implemented in this embodiment as simple AND gate logic. That is, AND gates in cooperation with OR gates act to enable and/or disable interconnections 1501.

[00127] The data transfer unit 1505 dynamically configures and programs the state transition connectivity controls 1502 and the state transition evaluation symbols 1503. This enables dynamic realization of a range of control flow graph structures or configurations. In this embodiment, for $M=32$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 32 registers of 32 bits each. Likewise, for $M=16$, the bit matrix for the state transition connectivity controls 1502 can be implemented as 16 registers of 16 bits each. In this embodiment, for $M=32$, the storage for the state transition evaluation symbols 1503 can be implemented as 32 registers of 8 bits each. Likewise, for $M=16$, the storage for the state transition evaluation symbols 1503 can be implemented as 16 registers of 8 bits each.

[00128] The data transfer unit 1505 also provides access to read and write the node elements N_1-N_M . For $M=32$, the node elements could be viewed as a logical register of 32 bits. Likewise, for $M=16$, the node elements could be viewed as a logical

register of 16 bits. The data transfer unit 1505 executes load and store operations to read and write values from and into all these registers. This ability to read and write the node elements N_1-N_M can be used to enable the data transfer unit 1505 to communicate with an external interconnect fabric to connect the state machine building block to other such building blocks, in order to construct larger state machines or graphs. The data transfer unit 1505 outputs values from selected node elements on dedicated signal wires, which can be sent to, for example, other state machines (e.g., another FSA building block) or an external interconnect fabric.

Likewise, it receives values from the external interconnect fabric on dedicated signal wires. These values can be transferred into selected node elements.

[00129] A single reset signal 1507 is fed to various elements of the apparatus to clear values to zero.

[00130] Before the start of the state machine evaluation, the state transition connectivity controls 1502 and the state transition evaluation symbols 1503 should have been programmed with desired configuration values. Hence, the signal values in the storage assigned for these controls will be stable before the state machine evaluation begins.

[00131] In one embodiment, there is a mechanism to control the start of the state machine evaluation. In one embodiment, for $M=32$, the start state select controls 1509 consist of a register of 32 bits. In one embodiment, for $M=16$, the start state select controls 1509 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Upon initialization of the state machine, node elements that correspond to active bits in the start state select controls 1509 register will start as active states.

[00132] In one embodiment, the progress of the state machine evaluation is conditioned by a clock 1508 that determines an evaluation cycle. In one embodiment, every evaluation cycle, a fresh byte of input data is presented to the apparatus, and this byte is evaluated in parallel against all state transition evaluation symbols (in this embodiment, this is a comparison of the input byte versus the 8-bit character value), leading to an update of set of M match lines representing the state transition dynamic triggers 1504. These M triggers 1504, along with the M^2 bits corresponding to the state transition connectivity controls 1502, combine with the current state values in

the node elements N_1 - N_M to compute the next state value for each node element. The logic equation for the computation of the next state of each node element is as follows:

If the state transition dynamic triggers are T_1 to T_M

If node elements are N_1 to N_M

If state transition connectivity controls are a bit matrix $C_{I,J}$ with $I=1,M$, and $J=1,M$

Then, given previous state PS_K for node element N_K , the next state NS_K is as follows:

$$NS_K = \text{OR} ($$

$$\begin{aligned} & [PS_1 \text{ AND } T_1 \text{ AND } C_{1,K}], \\ & [PS_2 \text{ AND } T_2 \text{ AND } C_{2,K}], \\ & \dots\dots\dots \\ & \dots\dots\dots \\ & [PS_I \text{ AND } T_I \text{ AND } C_{I,K}], \\ & \dots\dots\dots \\ & \dots\dots\dots \\ & [PS_M \text{ AND } T_M \text{ AND } C_{M,K}] \end{aligned}$$

$$)$$

Effectively, for each node element, the next state computation is a large OR function of M terms. Each term is computed by ANDing together 3 values – the previous state value of a node element, the corresponding dynamic trigger, and the corresponding connectivity control bit that indicates whether that particular interconnection 1501 is enabled.

[00133] Once the next state computation is complete, the node elements are updated with the next state values, and the state machine completes a single evaluation cycle. As can be seen by the logic equations for the next state computation, the evaluation cycle time for the apparatus is three levels of logic evaluation. The first level comprises of AND gates to compute the triggers, the second level comprises of AND gates to factor in the connectivity controls, and finally an M-input OR gate. This

evaluation cycle time is considerably shorter than the cycle time that governs the operating frequency of commercial microprocessors.

[00134] Note that the sequence of steps described above represents the computation needed in a single logical evaluation cycle. Physically speaking, additional pipelining is possible, to further boost the frequency of operations. For example, the computation of the state transition dynamic triggers (given a fresh byte of input data) can be decoupled from the next state evaluation.

[00135] In one embodiment, there is a mechanism to control the halting of the state machine evaluation. For $M=32$, the accept state select controls 1510 consist of a register of 32 bits. For $M=16$, the accept state select controls 1510 consist of a register of 16 bits. Each bit in this register corresponds to a node element. Any number of bits in this register could be set to 1 (active). Once the state machine enters into any of these states (corresponding node element goes active), the state machine halts its evaluation.

[00136] The foregoing provided a description of the evaluation cycle for a single FSA building block. When such an FSA building block is coupled to other state machines (e.g., another FSA building block) via the external interconnect fabric, an additional synchronization handshake would be incurred to enable the respective evaluation cycles to be coordinated.

[00137] The basic FSA building block, as described above, may be implemented in various ways. The remainder of the detailed description will discuss specific embodiments that address a number of concerns.

[00138] As discussed above, embodiments of the invention provide a fixed-size FSA building block (i.e., an FSA building block having a fixed number of states) to facilitate efficient implementation. In alternative embodiments, FSA building blocks of various sizes may be implemented. However, a regular, repeatable structure of a fixed size FSA building block allows for efficient implementation of a large number (e.g., 1000) of FSA building blocks on a chip.

[00139] The fixed size FSA building block, while easier to implement, raises the issue of how to address REs having a number of states greater than the fixed size of the FSA building block. For one embodiment of the invention, a fixed size for the FSA building block is determined based upon the particular problem space, and two

or more FSA building blocks are connected (stitched) to accommodate REs having a greater number of states.

[00140] For one embodiment, the stitching of FSA building blocks to solve REs having an excessive number of states is accomplished as follows. The RE is converted into a syntax tree. The syntax tree is then split into a number of sub-trees, each having a number of characters that is no greater than the fixed size of the FSA building block. This division of the syntax tree may be effected using a number of well-known algorithms. Each sub-tree is then converted to an NFA having a number of states that can be accommodated by the fixed size FSA building blocks. The NFA for each sub-tree is then implemented on a separate FSA building block and each of the separate FSA building blocks are then stitched together to effect evaluation of the RE.

[00141] Depending upon the size of the REs in the problem space, a number of the FSA building blocks may be grouped together. For example, for a fixed size FSA building block of 16 states, grouping 16 FSA building blocks together would accommodate an RE having 256 states. For one embodiment of the invention, the approximately 1000 FSA building blocks on a chip are divided into groups of 16 FSA building blocks each. By interconnecting each FSA building block with all FSA building blocks within its group, clock penalties for cross-group transitions are avoided.

[00142] For one embodiment, each group of FSA building blocks is not interconnected with every group, rather the groups are cascaded with some groups "triggering" one or more particular other groups. For one embodiment, where such architecture is unable to accommodate an excessively large RE, a controller is employed to read the state of the FSA building block(s) and explicitly write the transitions states.

[00143] As described above, an RE may be too large to be solved by a single FSA building block. By the same token, occasionally REs are smaller than the fixed size of the FSA building block. For one embodiment, two or more REs are solved using a single FSA building block as described below.

[00144] For one embodiment, the number of REs that can be solved is not limited by the number of REs instantiated within the FSA building blocks. For one embodiment,

REs can be loaded to the FSA building blocks from a rule memory (e.g., conventional memory), that can store many more RE's than are implemented in hardware.

Coupling the FSA building blocks to a rule memory allows REs to be stored in memory and used to dynamically program the FSA building blocks.

[00145] Occasionally, the input data to an FSA building block is fragmented, that is, a first portion of the input data is followed immediately by unrelated data, which is followed subsequently by the remaining portion of the input data. To address this situation, one embodiment of the invention provides the capability of storing a partial context to a context memory and accessing the partial context at the appropriate time.

[00146] For one embodiment of the invention, the FSA building blocks include counters, pointers, and status registers to provide additional information (e.g., beyond whether or not a pattern has been discerned). For example, a counter may be used to indicate the number of times a particular RE matched or to implement more complex REs; a pointer may be used to indicate the start and end locations of an RE match; and status bits may be used to indicate various occurrences during an RE search.

SYSTEM

[00147] Figure 16 illustrates an FSA building block in which a number of features have been implemented to provide additional functionality in accordance with one embodiment of the invention. FSA building block 1600 shown in Figure 16 is a 16-state FSA building block. FSA building block 1600 includes an enable signal 1615 that is driven by an externally programmed start offset/end offset register. That is, when receiving an input data stream, it is not necessary to commence evaluation at the beginning of the stream.

[00148] The starting and ending points of the evaluation can be determined and programmed to drive the enable signal 1615 of FSA building block 1600. A clock signal 1608 controls the evaluation process and a reset signal 1607 resets the FSA building block (i.e., sets all node elements 1616 to zero). A start state register 1609 is programmed via software to indicate which of the 16 states are initially active. When the initial clock signal 1608 is received, if the enable signal 1615 is high, the values contained in start state register 1609 are latched into node elements 1616. When an input byte 1606 is received, it is compared to the evaluation symbols of the symbol

evaluation unit (SEU) 1603. The determination, as to whether or not the input byte is a match, is forwarded to the state transition interconnection and next state evaluation logic (STINSEL) 1617. Then upon a match, and based upon the nodal connections as programmed into the state transition connectivity control (STCC) register 1602, the dynamic next state (DNS) 1625 is enabled and used by the next state determination logic (NSDL) 1618 to determine the next state. The NSDL 1618 then latches the next state to the node elements 1616 at the end of the clock cycle. The latched value then becomes the current state of the FSA building block, the next input data byte is received, and the evaluation continues.

SYMBOL EVALUATION UNIT

[00149] In accordance with one embodiment of the invention, the SEU 1603 contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs.

[00150] An RE may be defined to employ a range rather than a single character symbol. For example, the RE may reference a character in the range of a – z or 0 – 9. As shown in Figure 16, the SEU 1603 includes two range registers, namely rangelower register 1620 and rangeupper register 1621, to specify the lower range value and an upper range value, respectively, for multiple (e.g., up to four) ranges. The input byte 1606 and the upper and lower range values are provided to a range detection logic 1619 to determine if the input was within the specified range. This information, together with input byte 1606 and the programmed match symbol from symbol register 1622, is provided to the symbol match detection logic (SMDL) 1622 that evaluates the input byte 1606 against the symbol itself. This allows the software to program a state transition on a range, a character, or a combination thereof. This is accomplished by expanding the character definition (e.g., to include range information) and providing additional space for the character definition. For one embodiment, 16 symbol registers of 24 bits each are implemented, with 12 of the 24 bits used to define the extended character and 12 used for a bit-mask (discussed below). Of the 12 bits used for the extended character, 8 are used for the character itself, and four are used to specify whether the extended character has a range.

[00151] SEU 1603 includes a symbol mask register 1623 to indicate a particular bit or bits that is not to be compared. For some applications it may be more efficient to mask a bit of the input data (i.e., to program the evaluation logic such that a particular bit is not considered). For example, ASCII provides an 8-bit character to represent characters a-z (lower case) and A-Z (upper case), with the fifth bit specifying the case. If an RE employed a range of a-z and A-Z, it could be more efficiently implemented by ignoring the case (i.e., masking the fifth bit). That is, by masking the case bit (fifth bit) it would not be necessary to effect a comparison for lower case and a separate comparison for upper case, a single state can complete the comparison.

[00152] SEU 1603 includes a logical operation register 1624 that may be used to indicate state transition upon the occurrence of a matching symbol in conjunction with a logical operator. For example, an RE may be programmed such that transition occurs upon the negative polarity of the evaluation instead of the positive polarity of the evaluation (e.g., transition occurs on "NOT" match instead of match). For one such embodiment, the logical operation register provides 16 bits (i.e., one bit per state) to specify the logical operator "NOT".

ACCEPT STATE DETECTION UNIT

[00153] When the DNS 1625 is enabled, the next state is checked to determine if an accept state has been reached. Accept state detection unit 1610 includes accept state registers 1626 and accept state detection logic (ASDL) 1627. The accept state registers 1626 are programmed with accept states. The ASDL 1627 used the DNS 1625 to determine if the programmed accept state has reached, if so, a hit is recorded in hit register 1628a corresponding to the accept state register 1626. the hit register, then, records the number of hits, this information can be made available externally via register read/write bus 1628b. In accordance with one embodiment of the invention, the ASDU 1610 includes two accept state registers 1626 to facilitate the packing of two REs into a single FSA building block. As described above, two or more REs having a total number of states not greater than the fixed number of states of the FSA building block may be packed into a single FSA building block. Each RE may have unique accept states, and therefore an accept state register should be implemented on the FSA building block for each packed RE. Because each RE may reach accept

states separately, a corresponding hit register should be implemented for each accept state register. For the embodiment shown in Figure 16, two accept state registers 1626 are implemented along with corresponding hit registers 1628a and 1628b. To maintain flexibility, each register is a full 16-bit register, which allows packing REs of various sizes. For example, a 12-state RE may be packed with a 4-state RE, or in the extreme a 15-state RE could be packed with a 1-state RE. If the particular FSA building block is not being packed, the additional accept state register and corresponding hit register are not used.

MATCH LOCATION POINTER

[00154] For some applications, it is useful to determine the location at which a match begins and ends. To effect such determination, a start location register 1629 and an end location register 1630, as well as a byte count 1631, are implemented in the FSA building block in accordance with one embodiment. When the evaluation starts, a byte count 1631 is provided, when a transition of the next state occurs (e.g., a match is initiated), the value of the byte count at that point is latched to the start location register 1629. When, subsequently, the DNS 1625 is enabled, a determination is made as to whether an accept state is reached (e.g., a match is determined), the value of the byte count 1631 at that point is latched to the end location register 1630, thus providing start and end locations for the match.

STATE TRANSITION COUNTER UNIT

[00155] The FSA building block 1600 includes a state transition counter unit (STCU) 1632 that contains a number of registers and accompanying logic to allow for efficient evaluation of complex REs. For example, the counter allows an RE to be programmed that employs state transitions not just upon receipt of a specified symbol, but upon receipt of the specified symbol a specified number of times. So, for example, an RE may be programmed as a b {2, 4} c, which indicates a match when "a" is received followed by the occurrence of "b" from two to four times, followed by "c" (i.e., abbc, abbbc, and abbbbc). A counter trigger state (CTS) register 1633 can be programmed with a trigger state (e.g., state 1, the state corresponding to "b") for the counter 1634. For this example, the CTS register 1633 is programmed to state 1,

the counter lower value (CLV) register 1635 is programmed to 2 (i.e., the minimum number of occurrences for a match), and the counter upper value (CUV) register 1636 is programmed to 4 (i.e., the maximum number of occurrences for a match). The programmed values of the CTS 1633, the CLV 1635, and the CUV 1636, together with the value of the counter 1634, are input to the counter logic 1637. When the conditions of the RE are satisfied, the counter logic output 1638 will be activated. The transition from one state to the next is controlled by the counter logic output 1638, so no transition will occur until the counter logic output is high.

[00156] For one embodiment the CTS register 1633 can be programmed with multiple trigger states to effect more complex REs. For example, an RE programmed as a (b|c) {2, 4} would require programming the states corresponding to “b” and “c” (i.e., states 1 and 2) as trigger states.

[00157] For one embodiment, the trigger state of CTS 1633 can be programmed to an accept state of the RE to count the number of times the RE has hit.

[00158] To effect stitching, the FSA building block 1600 includes a stitch out control unit (SOCU) 1639 with two caller outgoing state (COS) registers 1640 and two corresponding caller’s target FSA (CTF) registers 1641. Each COS register is programmed with the states at which to stitch to another FSA building block. The corresponding CTF registers 1641 indicate which FSA building blocks to stitch to (i.e., the callee FSA building blocks). The stitch trigger computation logic (STCL) 1642 receives the stitch state information and the target FSA building block information from the COS registers 1640 and the corresponding CTF registers 1641, respectively, and uses the information to activate FSA startout 1643. FSA startout 1643 is connected to, and activates, the FSA startin 1644 of the callee FSA building blocks. At the callee FSA building blocks, the receiving states selector (RSS) 1645 is programmed to determine which of the callee receiving state (CRS) registers 1646 to access for the callee receiving states. The NSDL 1618 then uses the value in the selected CRS register 1646, the start state 1609, and the DNS 1625 to determine the next state for the callee FSA building block, which is then latched to the node elements 1616. For one embodiment the values in the selected CRS register(s) 1646, the start state 1609, and the DNS 1625 are OR’d to determine the next state.

[00159] Similarly, when the callee FSA building block reaches an accept state contained in an accept state register 1626, it determines which FSA building block to return to by reference to the accept's target FSA (ATF) register 1647. The ASDL 1627 uses the value in the accept state register 1626 and the value in the ATF register 1647 to determine when to activate stitch return out (SRO) 1648. SRO 1648 is connected to, and activates, the stitch return in (SRI) 1649 of the target FSA building blocks, and the evaluation continues at the target FSA building blocks.

[00160] FSA building blocks may be interconnected to provide FSA building block stitching in accordance with one embodiment of the invention. Each FSA building block may be connected to itself via an internal connection.

[00161] Figure 17 illustrates an on-chip state machine unit, referred to as a RE processor, in accordance with one embodiment of the invention. RE processor 1700, shown in Figure 17, includes a number of FSA building blocks 1705, that may be interconnected in groups as described above. For one embodiment, the number of FSA building blocks 1705 may be approximately 1000 – 2000. RE processor 1700 also includes an automata controller 1710 that provides input data to the FSA building blocks 1705. Automata controller 1710 couples the FSA building blocks 1705 to a rule memory 1715 and a context memory 1720, as well as to an on-chip bus and interface 1725, for communication with off-chip memory 1730 and with other system devices through an off-chip interface 1735.

CONTEXT MEMORY

[00162] As discussed above, if the input data is fragmented, then the state (context) of the FSA building block should be saved in order to resume appropriate evaluation when the input data resumes. The context of the FSA building block includes the node element values, the counter values, and potentially, the location registers. Upon resuming the input data, the saved context memory is loaded to the FSA building block so that the evaluation may continue. In accordance with one embodiment, upon interruption of the input data, the automata controller 1710, which is capable of reading from, and writing to, the FSA building block, reads the context from the appropriate registers of the FSA building block, and stores the context, on-chip, in context memory 1720. Upon resumption of the input data, the automata controller

1710 loads the context from context memory 1720 to the FSA building block. The amount of context data is small relative to the programmed registers of the FSA building block. Therefore, by implementing an on-chip context memory, it is possible to efficiently handle multiple concurrent fragmented RE evaluations.

RULES MEMORY

[00163] Initially, the FSA building blocks are programmed with rules that define the relevant REs. Without more, the FSA building blocks could evaluate only those particular REs. However, applications frequently contain more REs than can be practically implemented as FSA building blocks. Embodiments of the invention provide FSA building blocks that are fully programmable and reprogrammable. For one embodiment, additional rules are stored in rule memory 1715. The automata controller 1710 moves rules from the rule memory 1715 into the appropriate FSA building block and vice versa. That is, based upon an externally provided instruction, the automata controller 1710 reprograms particular FSA building blocks with rules stored in rule memory 1715. Storing the additional rules on-chip allows for the rapid reprogramming of the FSA building blocks. The amount of rules that can be practically stored on-chip is at least several times the amount of rules implemented in the on-chip FSA building blocks.

[00164] The interconnection of FSA building blocks in groups allows for the context and rule information to be written to, or read from, the FSA building blocks in parallel. Such interconnection also allows for increasing throughput by concurrently evaluating multiple data input streams. For example, if an application requires only a portion of the available FSA building blocks, then the relevant rules may be loaded repeatedly into the available FSA building blocks and the REs evaluated through multiple data input streams.

[00165] Whereas many alterations and modifications of the present invention will no doubt become apparent to a person of ordinary skill in the art after having read the foregoing description, it is to be understood that any particular embodiment shown and described by way of illustration is in no way intended to be considered limiting. Therefore, references to details of various embodiments are not intended to limit the

scope of the claims, which in themselves recite only those features regarded as essential to the invention.

CLAIMS

We claim:

1. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

2. The programmable rule processor defined in Claim 1 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.

3. A programmable rule processor comprising:
 - a general purpose register file;
 - an instruction sequencer to provide instructions;
 - a decoder coupled to the general purpose register file to decode a set of instructions specified by the instruction sequencer;
 - search registers and search execution hardware coupled to the plurality of search registers and coupled to receive search parameters from one or both of the decoder and the general purpose register file to perform one or more contextual searches on content in the search registers in response to executing one or more of the set of instructions; and
 - a state machine unit coupled to the decoder and having state machine registers to store one or more state machines and state machine execution hardware coupled to the state machine registers to evaluate the one or more state machines in response to

executing one or more of the set of instructions and based on information from one or both of the decoder and the general purpose register file.

4. The processor defined in Claim 3 wherein either results from performing one or more contextual searches by the search execution hardware are subsequently used by the state machine unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one contextual search.

5. The processor defined in Claim 3 wherein the search execution hardware performs at least one of the one or more contextual searches via parallel pattern matching in response to executing one or more search instructions specifying the one or more pattern searches and presenting one or more patterns to the content in the search registers.

6. The rule processor defined in Claim 5 wherein the search execution hardware comprises:

a search array coupled to the plurality of search registers, wherein content in the plurality of search registers is replicated and stored in the search array; and

a sorter coupled to the search array to perform the one or more operations in response to information specified by one or more search instructions.

7. The processor defined in Claim 3 wherein the state machine execution hardware comprises a state machine evaluation unit.

8. The rule processor defined in Claim 3 further comprising a memory to store the one or more search instructions to be applied to data in the search registers or to be applied to be evaluated by the state machine execution hardware.

9. The rule processor defined in Claim 3 further comprising an instruction sequencer for applying one or more search instructions to the search execution engine and the state machine execution hardware.
10. The rule processor defined in Claim 3 wherein at least one search instruction includes a field that specifies a parameter to use to control the search or a pointer into a memory that stores the parameter to control the search.
11. The rule processor defined in Claim 10 wherein the pointer points to a general purpose register.
12. The programmable rule processor defined in Claim 3 wherein state machines being evaluated are finite state automata to detect regular expressions on input data.
13. The rule processor defined in Claim 3 wherein at least one of the one or more search instructions specifies a pattern that is to be searched against the content in the plurality of search registers and zero or more search parameters.
14. The rule processor defined in Claim 13 wherein one parameter specifies a portion of the pattern to be masked to enable a subset of the pattern to be searched against the content in the search registers.
15. The rule processor defined in Claim 14 wherein the portion of the pattern to be masked is specified by a mask vector to mask off specific bytes in the pattern.
16. The rule processor defined in Claim 14 wherein the zero or more parameters specify starting and ending locations that constitute a range of the content within the search registers within which the search execution engine is to constrain a search.

17. The rule processor defined in Claim 3 wherein the one or more search instructions specify at least one pattern, range control, and program control flow.

18. A programmable rule processor comprising:

a general purpose register file;

a plurality of search registers;

a plurality of state machine registers;

a plurality of execution units;

an instruction sequencer to provide instructions;

a decoder coupled to the general purpose register file, the plurality of search registers, the plurality of state machine registers, and the plurality of execution units, to decode a set of instructions specified by the instruction sequencer and provide the decoded instructions to one or more execution units and one or more of the plurality of search registers and plurality of state machine registers for execution thereby based on an opcode in each instruction in the set of instructions.

19. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a state machine evaluation unit.

20. The programmable rule processor defined in Claim 18 wherein at least one of the execution units evaluates state machines represented by data in the state machine registers.

21. The programmable rule processor defined in Claim 20 wherein the state machines being evaluated are finite state automata to detect regular expressions on input data.

22. The processor defined in Claim 18 wherein one of the plurality of execution units comprises a sort array.

23. The processor defined in Claim 18 wherein two of the execution unit comprise a state machine evaluation unit and search execution hardware, and further wherein either results from processing data by the search execution hardware are subsequently used by the state machine evaluation unit in evaluating at least one state machine or results from evaluation of the one or more state machines are subsequently used the search execution hardware in performing at least one search.

24. The processor defined in Claim 18 further comprising a branch unit to branch to another set of one or more instructions based on results of data processing involving one or more of the state machine registers and the search registers.

25. A process for performing contextual searches using a rule processor, the process comprising:

fetching a first rule from a memory on the rule processor;

decoding the first rule to identify whether search parameters are located in the first rule or a general purpose register file in the rule processor;

executing one or more search operations on values in a plurality of search registers in the rule processor using the search parameters obtained from either or both of the first rule and the general purpose register file, the plurality of search registers storing content therein;

generating search results of executing the one or more search operations;

fetching a second rule from the memory;

evaluating one or more state machines with respect to data identified by the search results using state machine execution hardware in the rule processor according to parameters obtained from either or both of the first rule and the general purpose register file.

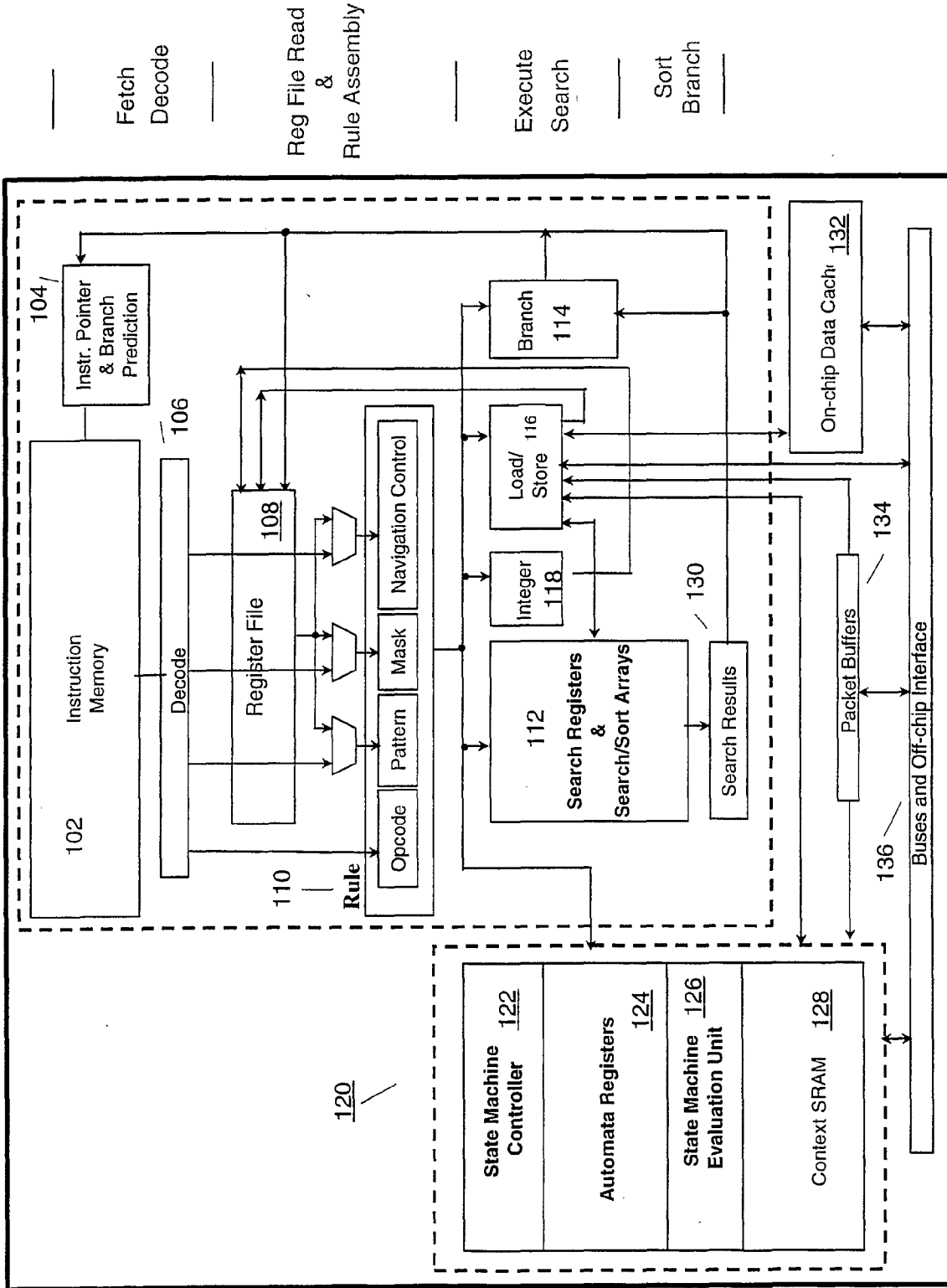


Figure 1: Rule Processor Microarchitecture

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Code Fragment for UriClass: Uses Search Register Apparatus

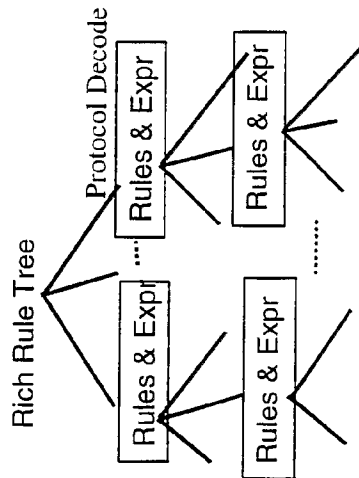
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// Parse the Request Line
methodStartLoc = ..... : (0, docSize, space)
methodEndLoc = ..... (0, docSize, space)
uriArgsStartLoc = ..... : (methodEndLoc, docSize, space)
uriArgsEndLoc = ..... (uriArgsStartLoc, docSize, space)
.....
methodIsGet = .....
..... (methodStartLoc, methodEndLoc, "GET")
methodIsPost = .....
..... (methodStartLoc, methodEndLoc, "POST")

If (methodIsGet > docSize) & (methodIsPost > docSize) return;
.....
..... (uriArgsStartLoc, uriEndLoc, UriGroup);
.....

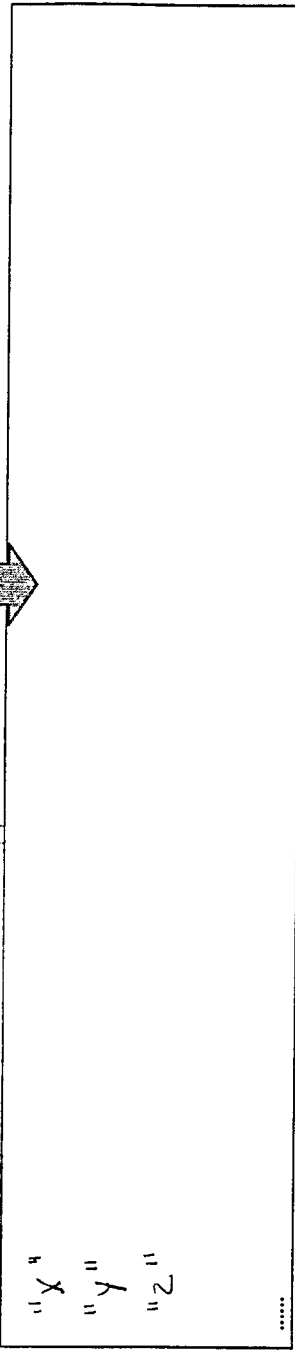
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Content Analysis

UriGroup REs: Uses Search Register Apparatus



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Figure 2

System Interfaces

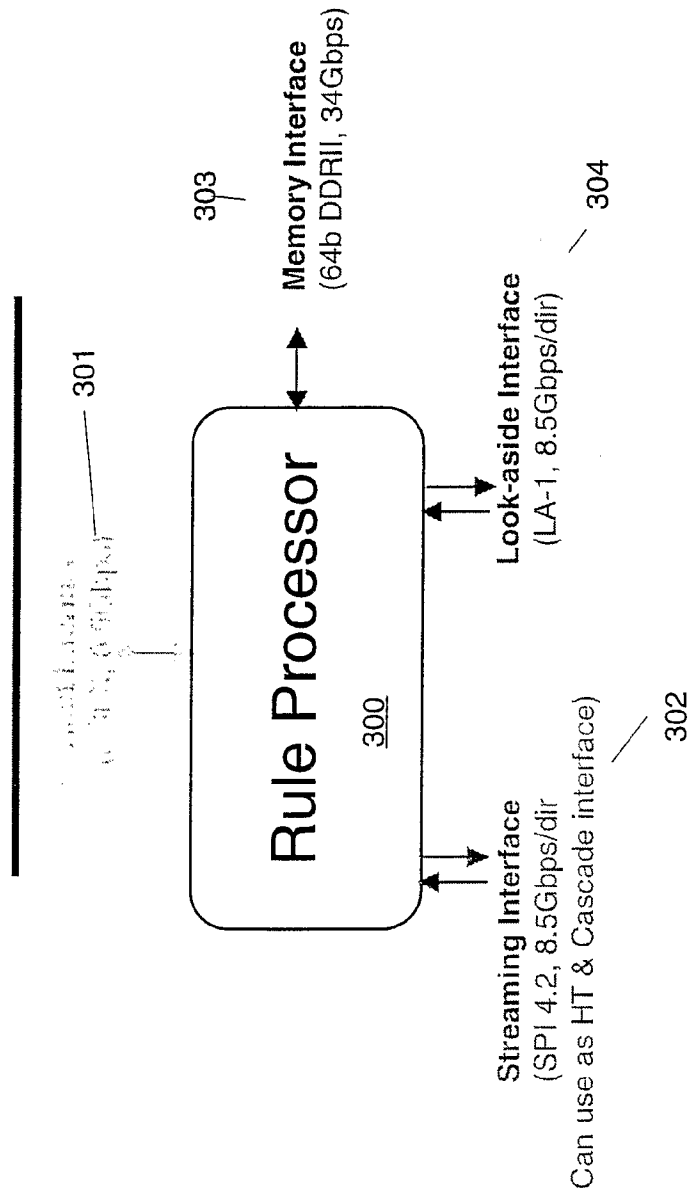


Figure 3

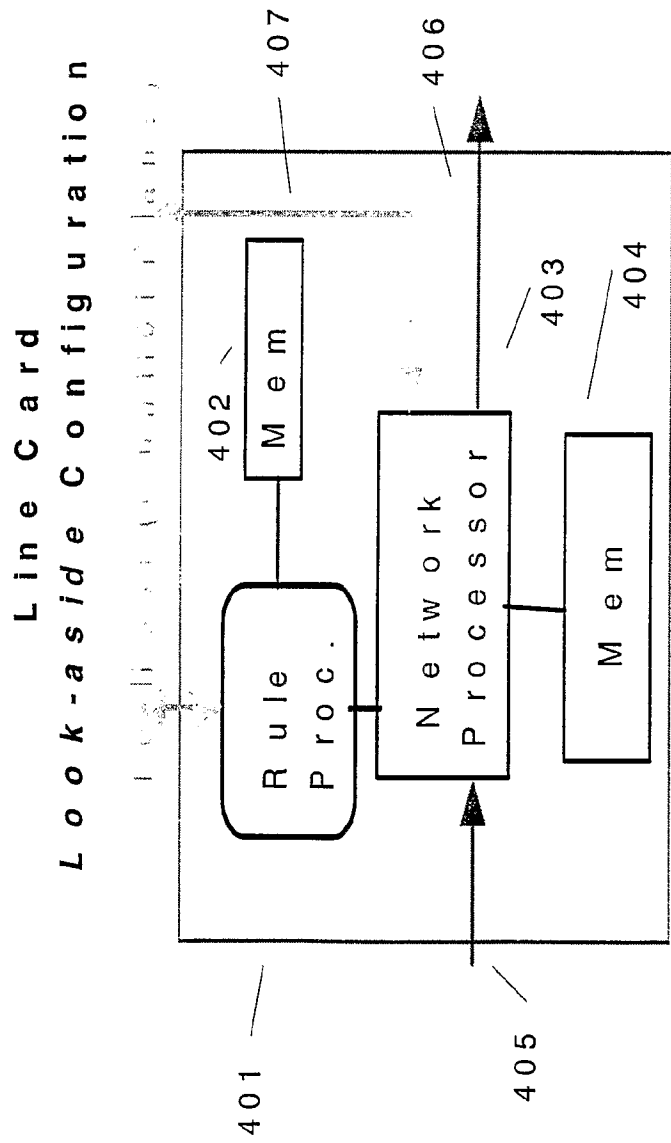


Figure 4

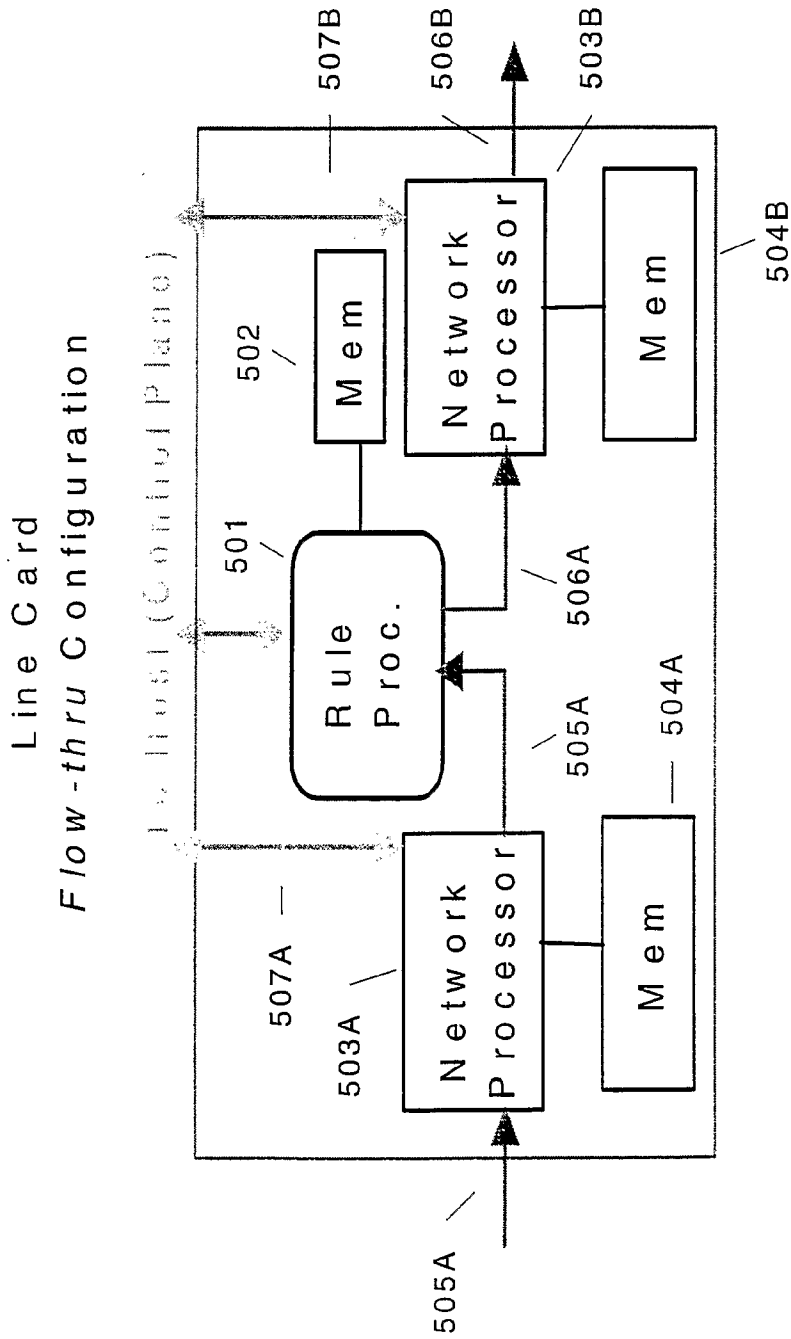


Figure 5

S e r v e r C o - P r o c e s s o r
C o n f i g u r a t i o n

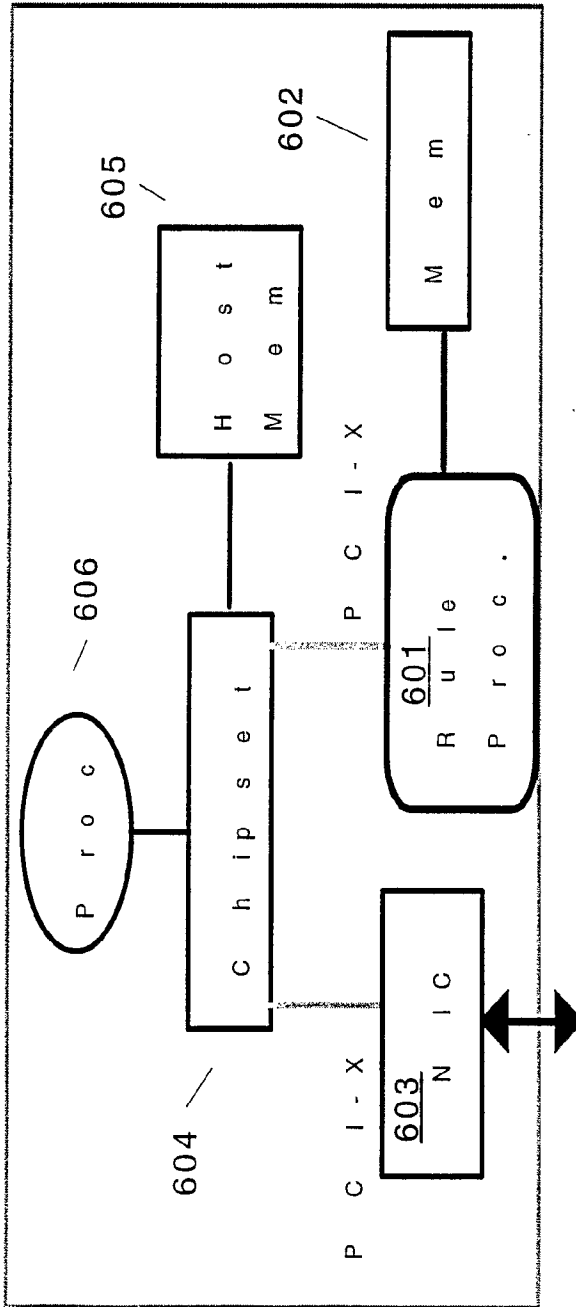


Figure 6

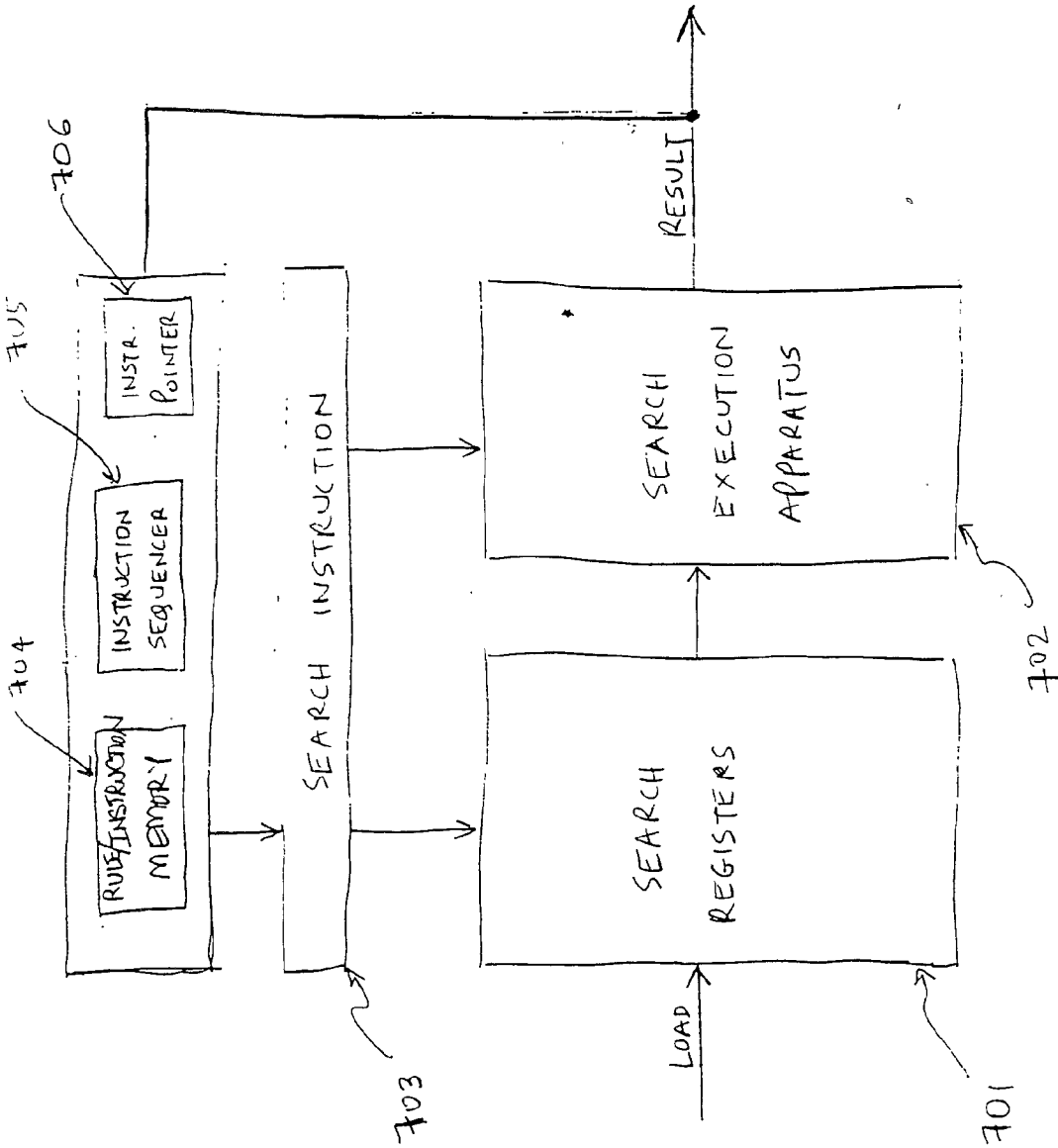


FIGURE 7

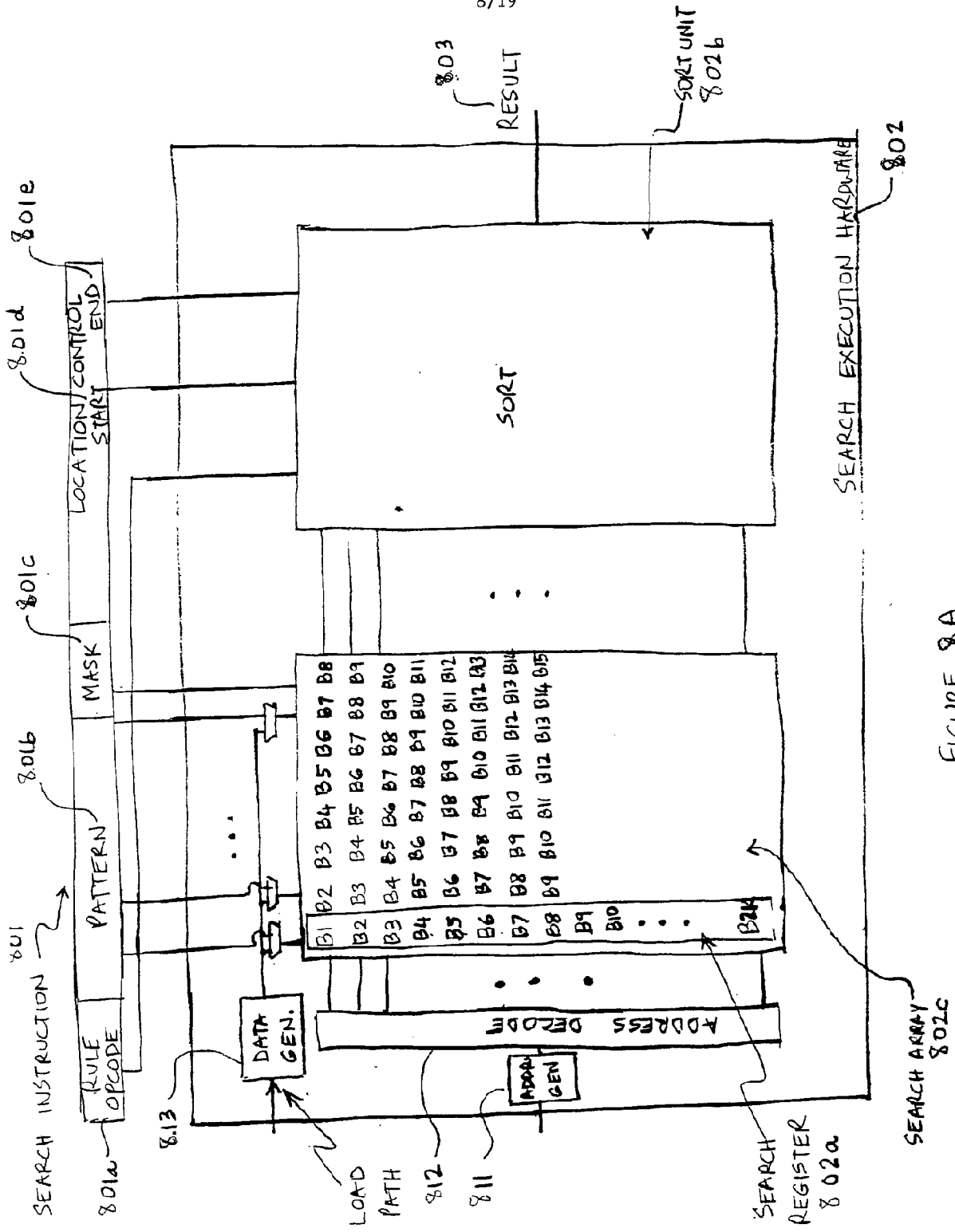


FIGURE 8A

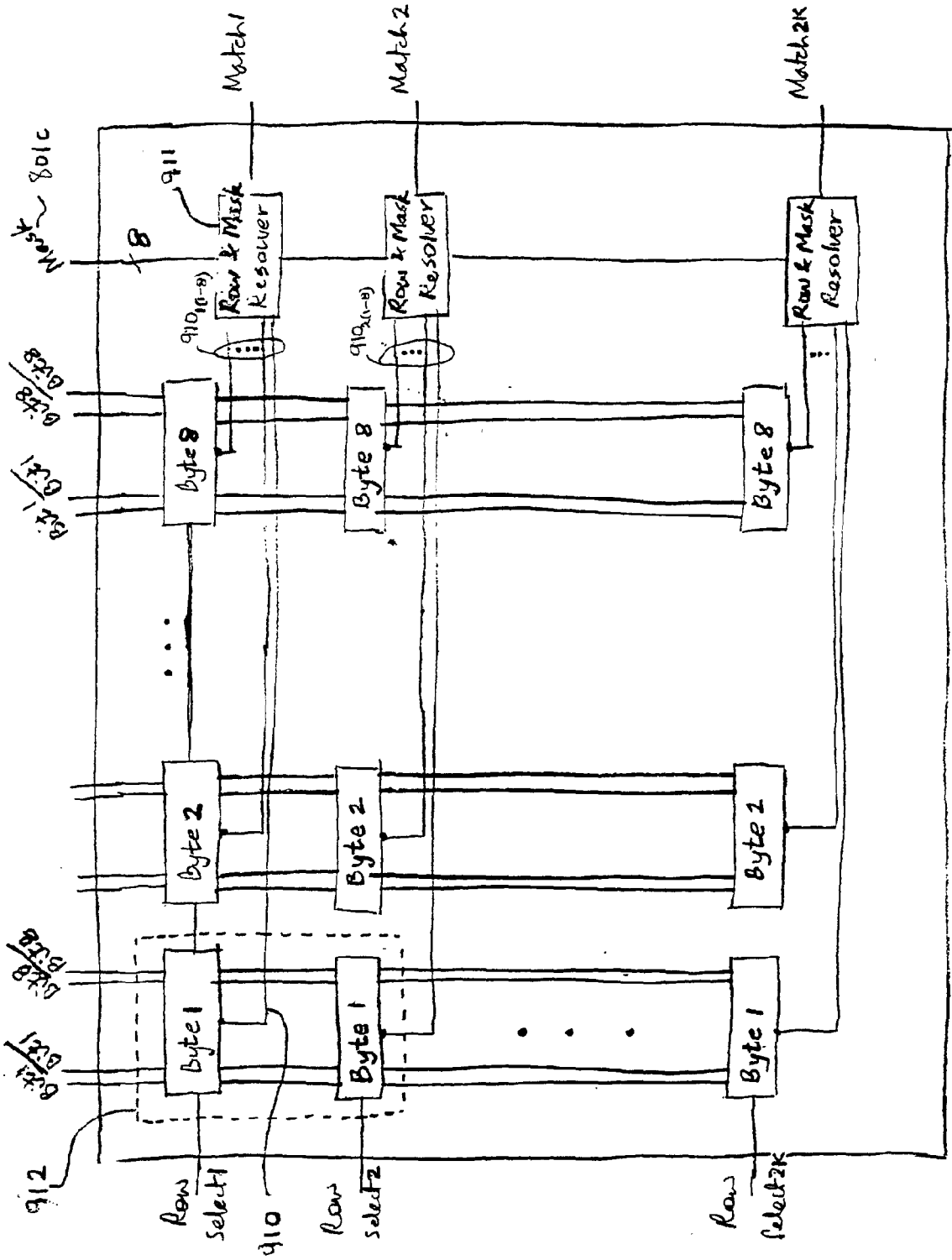
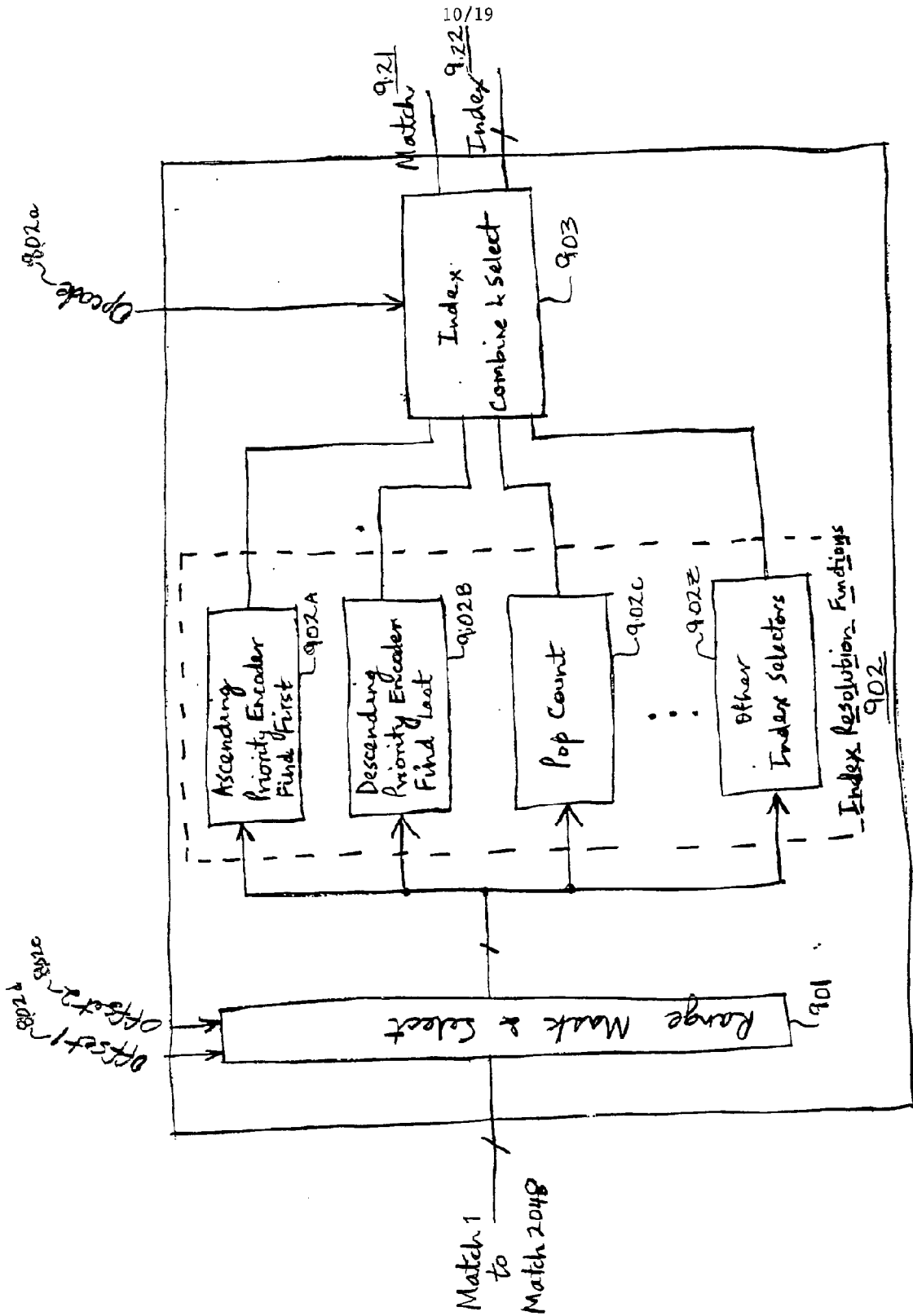


FIGURE 8B

FIGURE A



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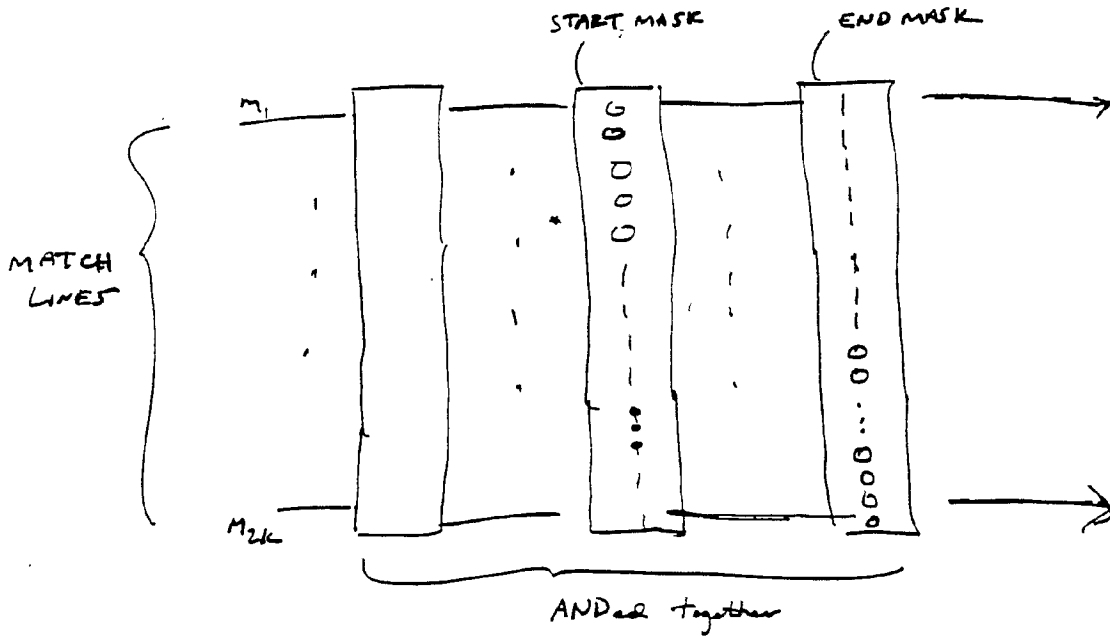


Figure 9B

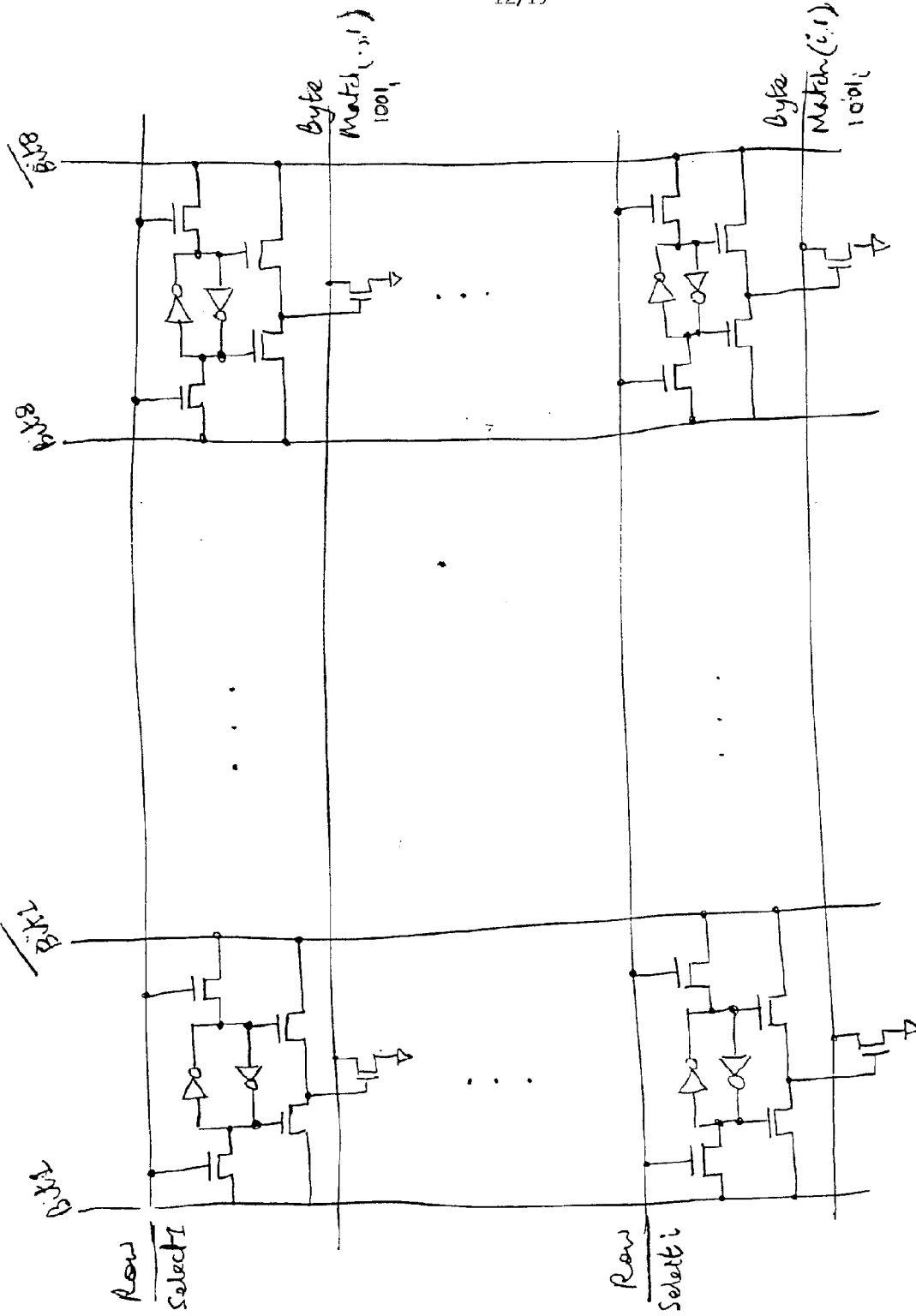
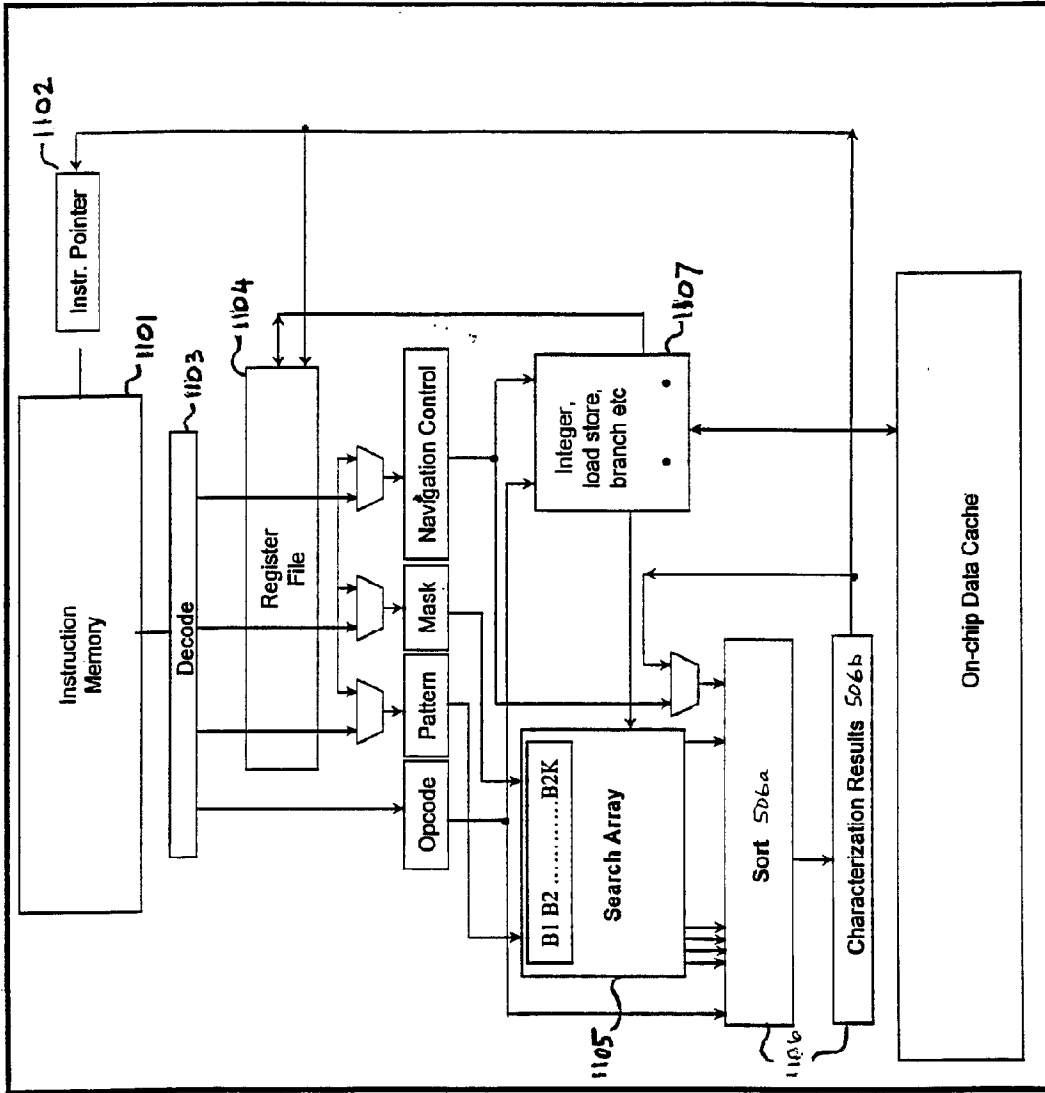


FIGURE 10

Microarchitecture Diagram



Fetch ~ 1108

Reg File Read & Rule Assembly ~ 1109

Execute/Search ~ 1110

Sort & Branch ~ 1111

822b-02

Figure 11

Example pseudo-code and Rule Engine micro-code

Pseudo-code

FIND ("cp /bin/sh /usr/spool/mail/root" BEFORE "chmod 4755 !\$") AND "touch" BEFORE "mail"

Micro-code for an exemplary Rule Engine

	Opcode	Pattern	Mask	Start Offset	Start Offset Indirect	End Offset	End Offset Indirect	Result Register	Branch Address
1	FIND_FIRST_FORWARD	"cp /bin/"	0xFF	0x03D	0	0x800	0	A	0xB
2	FIND_FORWARD_ANCHORED	"sh /usr/"	0xFF	<A + 8>	1	0x800	0	A	0xB
3	FIND_FORWARD_ANCHORED	"spool/ma"	0xFF	<A + 8>	1	0x800	0	A	0xB
4	FIND_FORWARD_ANCHORED	"il/root"	0xFE	<A + 8>	1	0x800	0	A	0xB
5	FIND_FIRST_FORWARD	"chmod 47"	0xFF	<A + 7>	1	0x800	0	A	0xB
6	FIND_FORWARD_ANCHORED	"55 !\$"	0xF8	<A + 8>	1	0x800	0	A	0xB
7	FIND_FIRST_FORWARD	"touch"	0xF8	0x03D	0	0x800	0	B	0xB
8	CMP(B+5, A+5)_BRANCH(10)	-	-	-	-	-	-	-	0xA
9	FIND_FIRST_FORWARD	"mail"	0xF0	<A + 5>	1	0x800	0	C	0xB
10	FIND_FIRST_FORWARD	"mail"	0xF0	<B + 5>	1	0x800	0	C	0xB

FIGURE 1a

Execution of example micro-code: pipeline diagram

	Clock 14	-	-	-	10
	Clock 13	-	-	10	-
	Clock 12	-	10	-	-
	Clock 11	10	-	-	-
	Clock 10	-	-	-	8
	Clock 9	-	-	8	7
	Clock 8	-	8	7	6
	Clock 7	8	7	6	5
	Clock 7	7	6	5	4
	Clock 6	6	5	4	3
	Clock 5	5	4	3	2
	Clock 4	4	3	2	1
	Clock 3	3	2	1	-
	Clock 2	2	1	-	-
	Clock 1	1	-	-	-
		Fetch	Assemble	Search/ Execute	Sort & Branch

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FIGURE 13

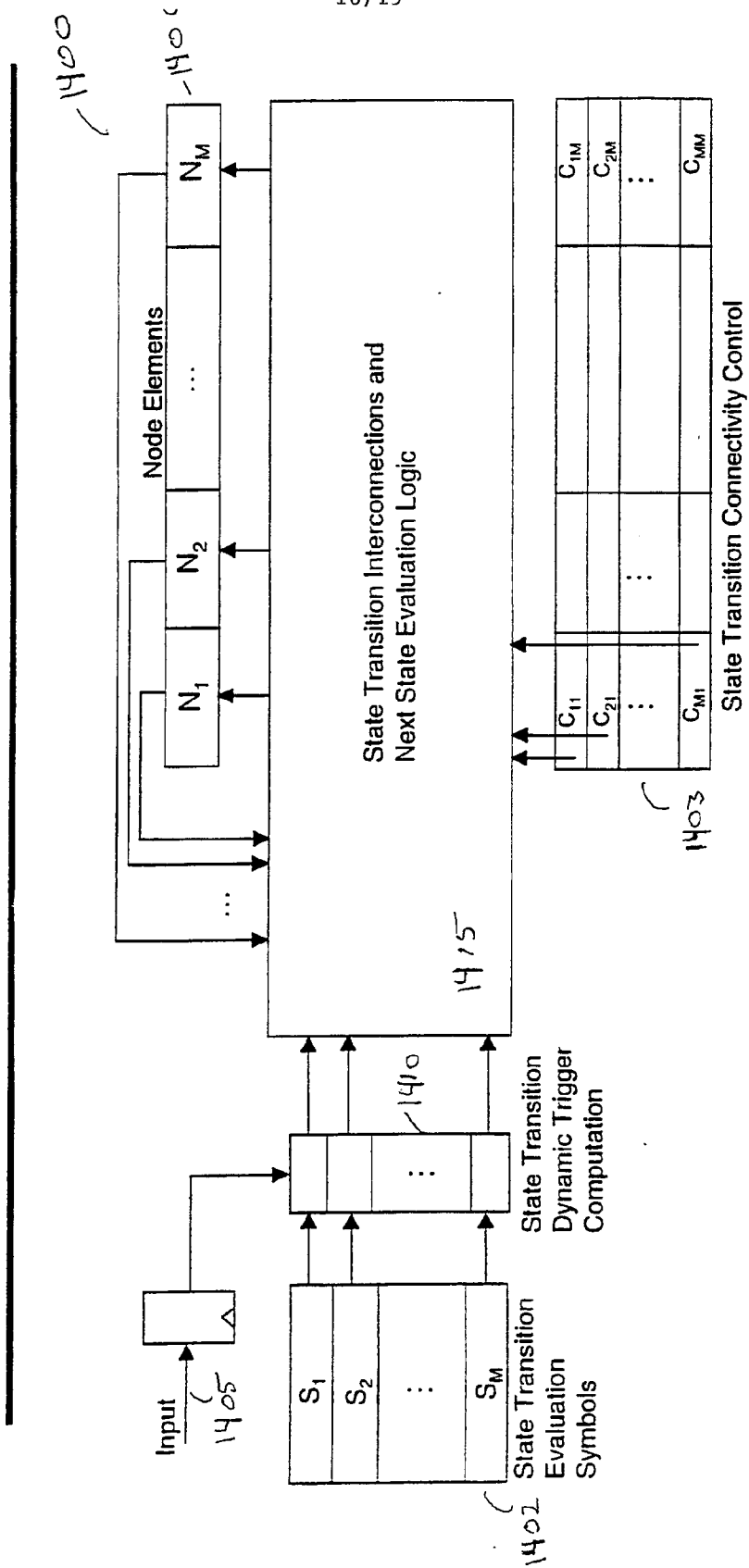
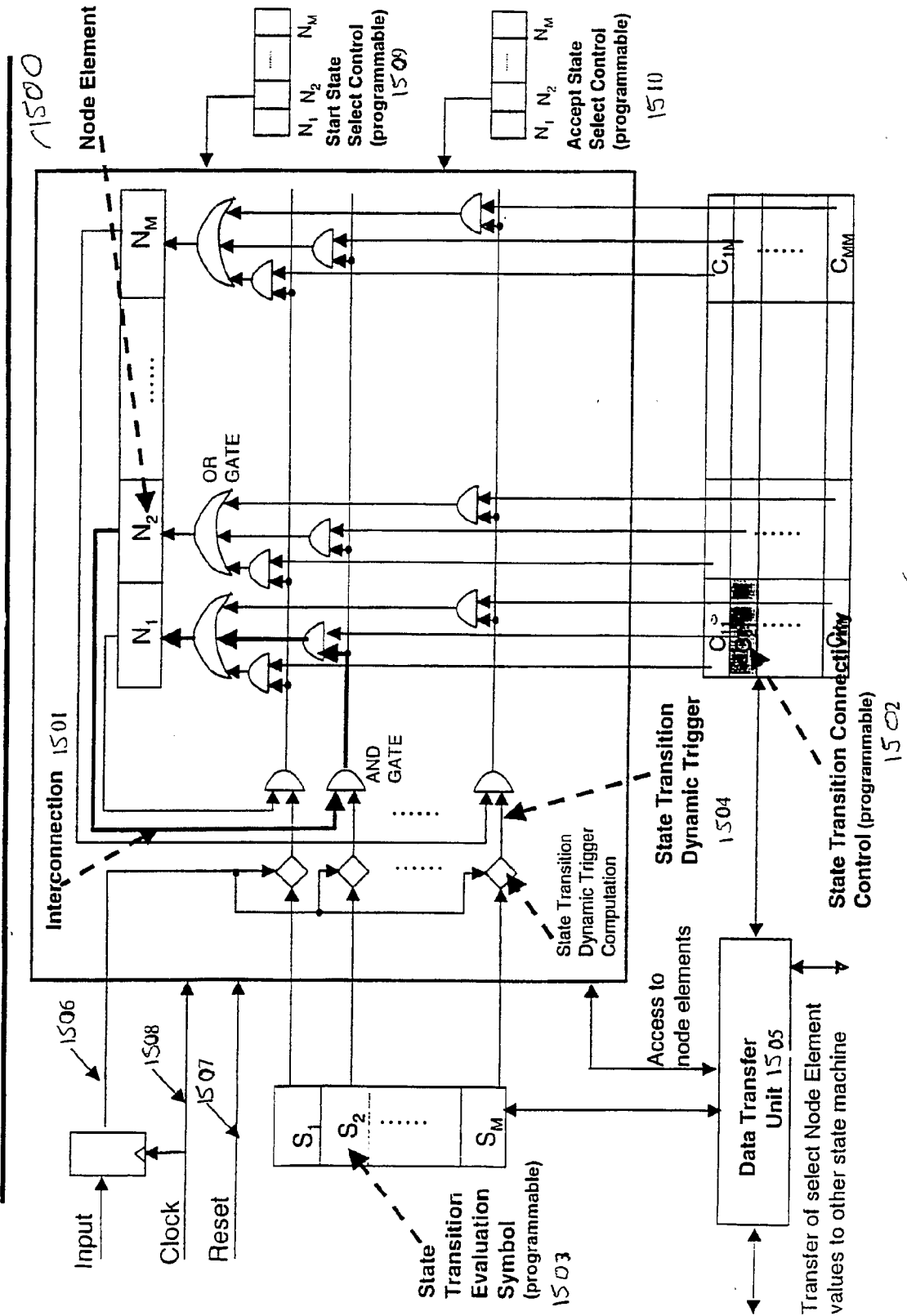


Fig. 14



FSA Building Block

1600

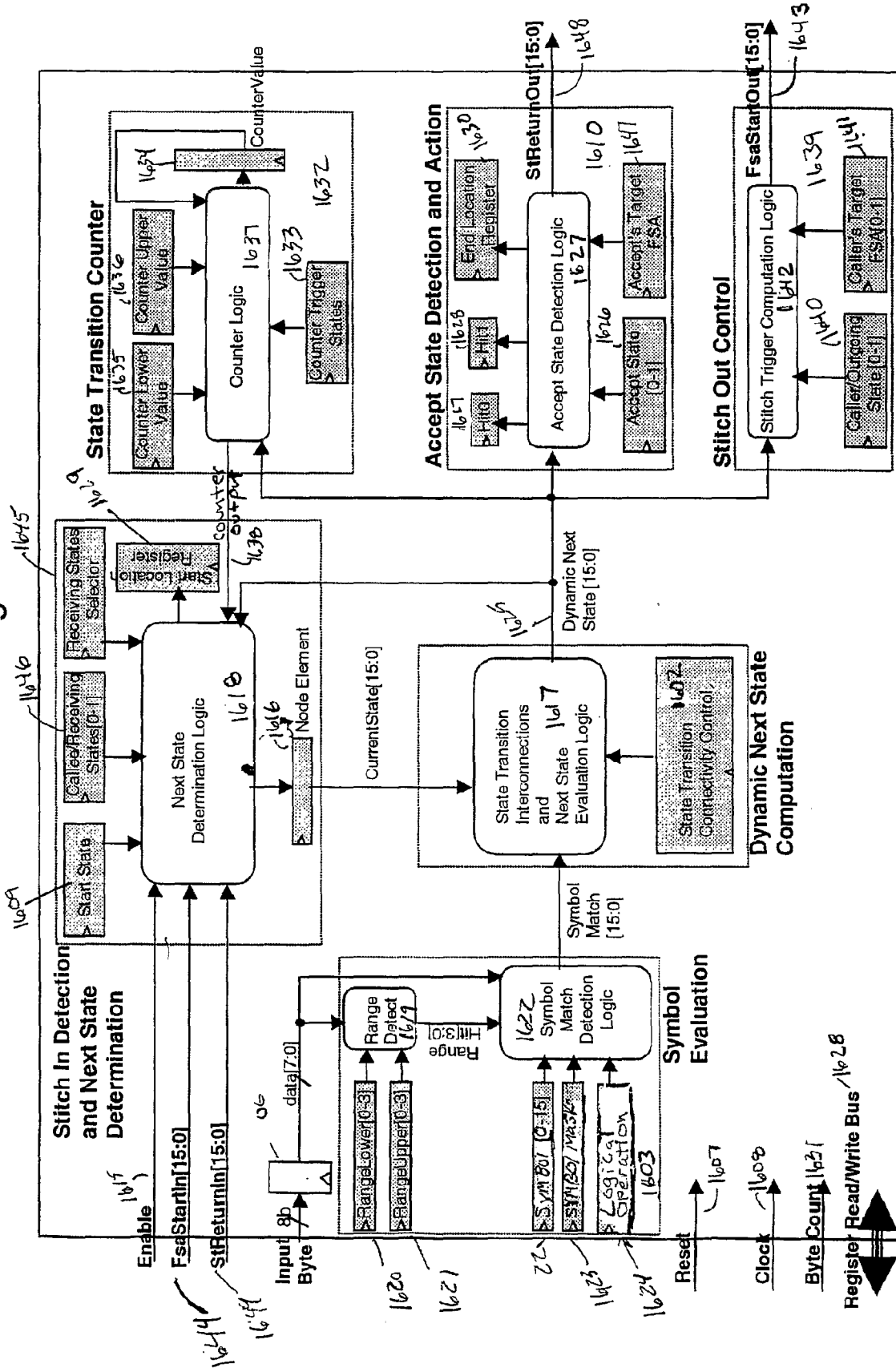


Fig. 16

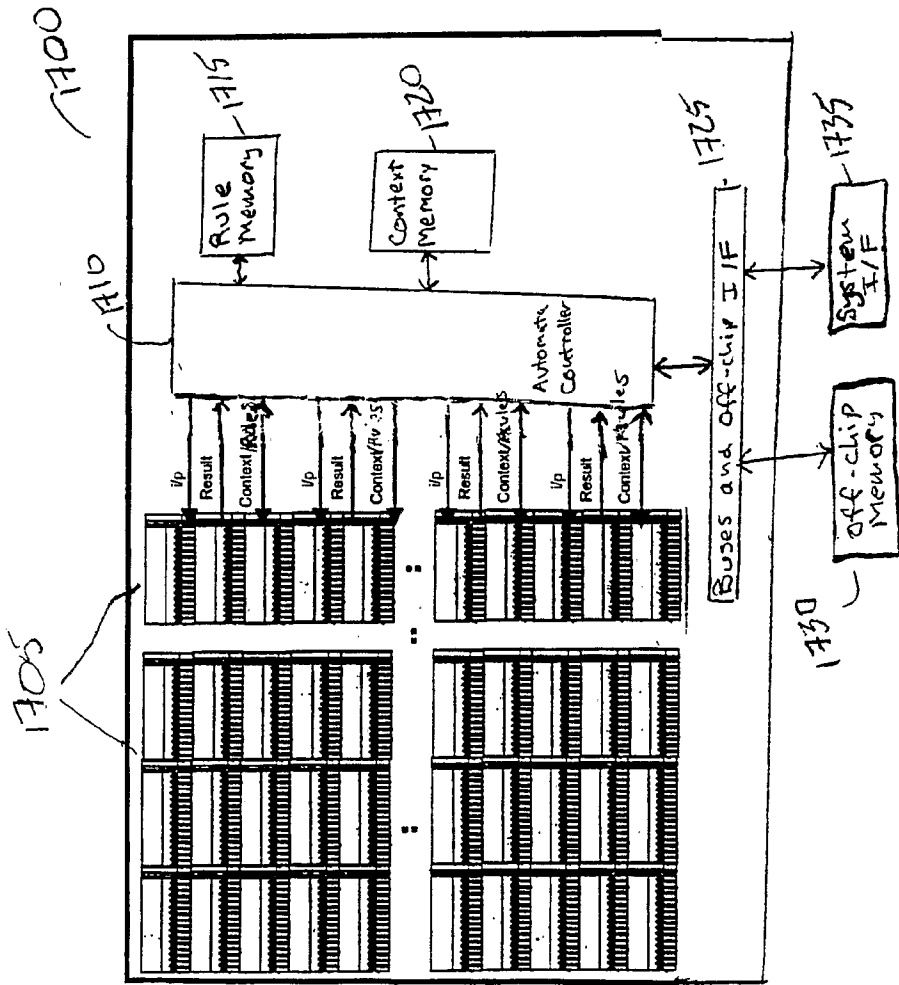


Fig. 17

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/000409

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G06F17/30		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 G06F G05B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, INSPEC, IBM-TDB		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A A A	US 6 212 625 B1 (RUSSELL RICHARD G) 3 April 2001 (2001-04-03) abstract column 2, line 55 - column 3, line 11 column 5, line 6 - column 5, line 25 column 6, line 57 - column 7, line 21 figures 1-6 ----- US 6 327 508 B1 (MERGARD JIM) 4 December 2001 (2001-12-04) abstract column 2, line 29 - column 2, line 50 column 4, line 46 - column 5, line 46 ----- EP 0 488 297 A (HITACHI LTD ; HITACHI MAXELL (JP)) 3 June 1992 (1992-06-03) the whole document ----- -/--	1,2 3-25 3-25 3-25
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
° Special categories of cited documents :		
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family	
Date of the actual completion of the international search <p style="text-align: center;">1 June 2004</p>	Date of mailing of the international search report <p style="text-align: center;">09/06/2004</p>	
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center;">Abbing, R</p>	

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/000409

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 101 376 A (NOGUCHI KOUKI ET AL) 31 March 1992 (1992-03-31) abstract column 1, line 31 - column 3, line 12 figures 1,10,12	3-5,18, 23,25
A	US 5 452 451 A (AKIZAWA MITSURU ET AL) 19 September 1995 (1995-09-19) the whole document	3-5,18, 23,25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/US2004/000409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6212625	B1	03-04-2001	NONE
US 6327508	B1	04-12-2001	NONE
EP 0488297	A	03-06-1992	JP 2960533 B2 06-10-1999 JP 4205174 A 27-07-1992 DE 69131954 D1 09-03-2000 DE 69131954 T2 05-10-2000 EP 0488297 A2 03-06-1992 US 5497488 A 05-03-1996
US 5101376	A	31-03-1992	JP 3130994 A 04-06-1991 KR 159941 B1 01-02-1999 US 5036486 A 30-07-1991
US 5452451	A	19-09-1995	JP 2825009 B2 18-11-1998 JP 3017780 A 25-01-1991 JP 2880199 B2 05-04-1999 JP 3131969 A 05-06-1991 US 5497488 A 05-03-1996

Electronic Acknowledgement Receipt

EFS ID:	12088621
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	16-FEB-2012
Filing Date:	07-NOV-2011
Time Stamp:	00:54:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	fin0001con1cip1con4_suppidst rans.pdf	102076 <small>a857f16449513cf1fa4a2f9bbc19e95c5d55 701</small>	no	2

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_1449frm.pdf	101076 fc918ee90cdb6737d1eb73b6db2c00cd3423e00	no	1
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Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	fin0001_ref.pdf	3494083 72f6d6e57d84613f7a3e8f04df2d150691f69890	no	75
Warnings:					
Information:					
4	Non Patent Literature	fin0001_ref2.pdf	1043428 f24e3400af85593b920d6c5ec0f0f428dfb1145d	no	14
Warnings:					
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Total Files Size (in bytes):				4740663	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Docket No. FIN0001-CON1-CIP1-CON4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Yigal Mordechai EDERY, et al.

Serial No.: **13/290,708**

Group Art Unit: **2431**

Filed: **November 7, 2011**

Examiner: **To Be Assigned**

For: **MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS**

**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 AND 1.98**

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria , VA 22314

Sir:

In accordance with the requirements of 37 C.F.R. §§ 1.56, 1.97-1.98 and MPEP § 609, the references noted on the attached Form PTO-1449 are hereby brought to the attention of the Examiner.

No fees are believed to be necessary since the references cited in this statement are being submitted before the First Office Action. However, the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 50-4402.

The above information is presented so that the United States Patent and Trademark Office may, in the first instance, determine any materiality thereof to the claimed invention. See

37 C.F.R. §§ 1.104(a) conferring the PTO duty to consider and use any such information. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the “References Cited” on any patent to issue therefrom.

Respectfully submitted,

Dated: February 14, 2012

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

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1700 Pennsylvania Avenue, N.W.
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Washington, DC 20006
(202) 737-0500

15157/105034
Doc. No. 18232654

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
13/290,708

APPLICATION AS FILED - PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(j))	18	minus 20 = *
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

* If the difference in column 1 is less than zero, enter "0" in column 2.

SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

OR OTHER THAN SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	380
N/A	620
N/A	250
x 60 =	0.00
x 250 =	0.00
	0.00
	0.00
TOTAL	1250

APPLICATION AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY,DOCKET,NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/290,708, 11/07/2011, 2431, 1250, FIN0001-CON1-CIP1-CON4, 18, 2

CONFIRMATION NO. 4120

UPDATED FILING RECEIPT



74877
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

Date Mailed: 02/02/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

Domestic Priority data as claimed by applicant

This application is a CON of 12/471,942 05/26/2009 PAT 8079086
which is a CON of 11/370,114 03/07/2006 PAT 7613926
which is a CON of 09/861,229 05/17/2001 PAT 7058822
which claims benefit of 60/205,591 05/17/2000
and is a CIP of 09/539,667 03/30/2000 PAT 6804780
which is a CON of 08/964,388 11/06/1997 PAT 6092194
and said 09/861,229 05/17/2001
is a CIP of 09/551,302 04/18/2000 PAT 6480962

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/290,708

Projected Publication Date: 05/10/2012

Non-Publication Request: No

Early Publication Request: No
Title

Malicious Mobile Code Runtime Monitoring System and Methods

Preliminary Class

726

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Yigal Mordechai EDERY, et al.

Group Art Unit: 2431

Serial No.: 13/290,708

Examiner: To Be Assigned

Filed: November 7, 2011

For: MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

United States Patent and Trademark Office
Customer Service Window, Mail Stop Missing Parts
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

Responsive to the Notice to File Corrected Application Papers, mailed November 21, 2011, the following items are submitted herewith to complete the formal filing requirements for the above-identified application:

- (1) Replacement Abstract (2 sheets). A replacement abstract is being presented which incorporate changes for compliance with 37 C.F.R. 1.72(b) and 37 C.F.R. 1.121. The changes can be explained as follows: The abstract was revised to meet the requirement for length of abstract not to exceed 150 words. A marked-up copy of the abstract is attached showing changes made to the original submission, together with a clean copy of the revised abstract.

If any additional fees are required in connection with the filing of this response, the Commissioner is hereby authorized to charge the same, or to credit any overpayment, to Deposit Account No. 50-4402.

Respectfully submitted,

Date: January 23, 2012
KING & SPALDING LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, DC 20006
(202) 626-8978

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey (Reg. No. 44,442)

15157/105034
Doc. No. 18099447

REPLACEMENT SHEET - REVISED VERSION

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers (“PCs”) and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other “Downloadables” or “mobile code” in whole or part. A protection engine embodiment provides, ~~within a server, firewall or other suitable “recommunicator,”~~ for monitoring information received ~~by the communicator,~~ determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information, ~~more suitably by forming a protection agent including the MPC, protection policies and a detected Downloadable.~~ An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts, ~~more suitably in conjunction with protection policies.~~

REPLACEMENT SHEET - CLEAN VERSION

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers (“PCs”) and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other “Downloadables” or “mobile code” in whole or part. A protection engine embodiment provides for monitoring information received, determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information. An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts.

Electronic Acknowledgement Receipt

EFS ID:	11897001
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paoella-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	23-JAN-2012
Filing Date:	07-NOV-2011
Time Stamp:	15:25:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	fin0001con1cip1con4_resp.pdf	92131 <small>07e8992a99efe6d4f98241e40a9ed26bb1406f9d</small>	no	4

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY,DOCKET,NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/290,708, 11/07/2011, 2431, 1250, FIN0001-CON1-CIP1-CON4, 18, 2

CONFIRMATION NO. 4120

74877
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

FILING RECEIPT



Date Mailed: 11/21/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Yigal Mordechai Edery, Pardesia, ISRAEL;
Nirmrod Itzhak Vered, Goosh Tel Mond, ISRAEL;
David R. Kroll, San Jose, CA;
Shlomo Touboul, Kefar-Haim, ISRAEL;

Power of Attorney: The patent practitioners associated with Customer Number 74877

Domestic Priority data as claimed by applicant

This application is a CON of 12/471,942 05/26/2009
which is a CON of 11/370,114 03/07/2006 PAT 7,613,926
which is a CON of 09/861,229 05/17/2001 PAT 7,058,822
which claims benefit of 60/205,591 05/17/2000
and is a CIP of 09/539,667 03/30/2000 PAT 6,804,780
which is a CON of 08/964,388 11/06/1997 PAT 6,092,194
and said 09/861,229 05/17/2001
is a CIP of 09/551,302 04/18/2000 PAT 6,480,962

Foreign Applications (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 11/17/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/290,708

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No
Title

Malicious Mobile Code Runtime Monitoring System and Methods

Preliminary Class

726

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

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LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
13/290,708

APPLICATION AS FILED - PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(j))	18	minus 20 = *
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

* If the difference in column 1 is less than zero, enter "0" in column 2.

SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

OR OTHER THAN SMALL ENTITY

RATE(\$)	FEE(\$)
N/A	380
N/A	620
N/A	250
x 60 =	0.00
x 250 =	0.00
	0.00
	0.00
TOTAL	1250

APPLICATION AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(j))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(j))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

OR OTHER THAN SMALL ENTITY

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/290,708), FILING OR 371(C) DATE (11/07/2011), FIRST NAMED APPLICANT (Yigal Mordechai Edery), ATTY. DOCKET NO./TITLE (FIN0001-CON1-CIP1-CON4)

CONFIRMATION NO. 4120

FORMALITIES LETTER



74877
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

Date Mailed: 11/21/2011

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- A replacement abstract not exceeding 150 words in length and commencing on a separate sheet in compliance with 37 CFR 1.72(b) and 37 CFR 1.121 is required.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/mkibret/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/290,708	11/07/2011	Yigal Mordechai Edery	FIN0001-CON1-CIP1-CON4

CONFIRMATION NO. 4120

POA ACCEPTANCE LETTER



74877
King and Spalding LLP
1700 Pennsylvania Ave, NW
Suite 200
Washington, DC 20006

Date Mailed: 11/21/2011

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/07/2011.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/llvuong/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Under the Paperwork Reduction Act of 1996, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in this application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 74877

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number		Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 74877

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
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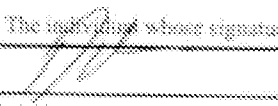
Assignee Name and Address:

Fujian, Inc.
2025 Gateway Place, Suite 180
San Jose, CA 95110

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SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	3/21/10
Name	Daniel Chinn	Telephone	
Title	Chief Executive Officer, Fujian, Inc.		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public when it is filed and by the USPTO to process an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: Finjan, Inc.Application No./Patent No.: To Be Assigned Filed/Issue Date: HerewithEntitled: Malicious Mobile Code Runtime Monitoring System and MethodsFinjan, Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. the assignee of the entire right, title, and interest; or
 2. an assignee of less than the entire right, title, and interest

The extent (by percentage) of its ownership interest is _____ %

in the patent application/patent identified above by virtue of either:

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: Yigal M. Eder, Nimrod I. Vered, David R. Kroll To: Finjan Software, Ltd.The document was recorded in the United States Patent and Trademark Office at Reel 022885, Frame 0070, or for which a copy thereof is attached.2. From: Shlomo Touboul To: Finjan Software, Ltd.The document was recorded in the United States Patent and Trademark Office at Reel 022885, Frame 0084, or for which a copy thereof is attached.3. From: Finjan Software, Ltd. To: Finjan, Inc.The document was recorded in the United States Patent and Trademark Office at Reel 023556, Frame 0853, or for which a copy thereof is attached. Additional documents in the chain of title are listed on a supplemental sheet. As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.**[NOTE:** A separate copy (i.e., a true copy of the original document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Dawn-Marie Bey/

Signature

Dawn-Marie Bey

Printed or Typed Name

Partner, King & Spalding LLP

Title

November 7, 2011

Date

202-626-8978

Telephone Number

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Yigal Mordechai EDERY, et al.

Serial No.:	To Be Assigned	Group Art Unit:	To Be Assigned
Filed:	Herewith	Examiner:	To Be Assigned
For:	MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS		

**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 AND 1.98**

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Sir:

In accordance with the requirements of 37 C.F.R. §§ 1.56, 1.97-1.98 and MPEP § 609, the references noted on the attached Form PTO-1449 are hereby brought to the attention of the Examiner.

No fees are believed to be necessary since the references cited in this statement are being submitted before the First Office Action. However, the Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment, to Deposit Account No. 50-4402.

The above information is presented so that the United States Patent and Trademark Office may, in the first instance, determine any materiality thereof to the claimed invention. See

**U.S. Serial No.: To Be Assigned
Information Disclosure Statement**

- 2 - Docket No. FIN0001-CON1-CIP1-CON4

37 C.F.R. §§ 1.104(a) conferring the PTO duty to consider and use any such information. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

Respectfully submitted,

Dated: November 7, 2011

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

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<h2 style="margin: 0;">UTILITY PATENT APPLICATION TRANSMITTAL</h2> <p style="font-size: small; margin: 5px 0;">(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"><i>Attorney Docket No.</i></td> <td>FIN0001-CON1-CIP1-CON4</td> </tr> <tr> <td><i>First Inventor</i></td> <td>Yigal Mordechai EDERY, et al.</td> </tr> <tr> <td><i>Title</i></td> <td>Malicious Mobile Code Runtime Monitoring System and Methods</td> </tr> <tr> <td><i>Express Mail Label No.</i></td> <td></td> </tr> </table>	<i>Attorney Docket No.</i>	FIN0001-CON1-CIP1-CON4	<i>First Inventor</i>	Yigal Mordechai EDERY, et al.	<i>Title</i>	Malicious Mobile Code Runtime Monitoring System and Methods	<i>Express Mail Label No.</i>	
<i>Attorney Docket No.</i>	FIN0001-CON1-CIP1-CON4								
<i>First Inventor</i>	Yigal Mordechai EDERY, et al.								
<i>Title</i>	Malicious Mobile Code Runtime Monitoring System and Methods								
<i>Express Mail Label No.</i>									

<p style="text-align: center;">APPLICATION ELEMENTS</p> <p style="font-size: x-small;">See MPEP chapter 600 concerning utility patent application contents.</p>	<p>ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria VA 22313-1450</p>
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<ol style="list-style-type: none"> 1. <input type="checkbox"/> Fee Transmittal Form (e.g., PTO/SB/17) <i>(Submit an original and a duplicate for fee processing)</i> 2. <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. 3. <input checked="" type="checkbox"/> Specification [Total Pages <u>33</u>] Both the claims and abstract must start on a new page <i>(For information on the preferred arrangement, see MPEP 608.01(a))</i> 4. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets <u>10</u>] 5. Oath or Declaration [Total Sheets <u>5</u>] <ol style="list-style-type: none"> a. <input type="checkbox"/> Newly executed (original or copy) b. <input checked="" type="checkbox"/> A copy from a prior application (37 CFR 1.63 (d)) <i>(for a continuation/divisional with Box 18 completed)</i> i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). 6. <input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76 7. <input type="checkbox"/> CD-ROM or CD-R in duplicate, large table or Computer Program (<i>Appendix</i>) <input type="checkbox"/> Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission <i>(if applicable, items a.-c. are required)</i> <ol style="list-style-type: none"> a. <input type="checkbox"/> Computer Readable Form (CRF) b. Specification Sequence Listing on: <ol style="list-style-type: none"> i. <input type="checkbox"/> CD-ROM or CD-R (2 copies); or ii. <input type="checkbox"/> Paper c. <input type="checkbox"/> Statements verifying identity of above copies 	<p style="text-align: center;">ACCOMPANYING APPLICATIONS PARTS</p> <ol style="list-style-type: none"> 9. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 10. <input checked="" type="checkbox"/> 37 C.F.R. 3.73(b) Statement <input checked="" type="checkbox"/> Power of Attorney <i>(when there is an assignee)</i> 11. <input type="checkbox"/> English Translation Document <i>(if applicable)</i> 12. <input checked="" type="checkbox"/> Information Disclosure Statement (PTO/SB/08 or PTO-1449) <input type="checkbox"/> Copies of citations attached 13. <input type="checkbox"/> Preliminary Amendment 14. <input type="checkbox"/> Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. <input type="checkbox"/> Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. <input type="checkbox"/> Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. <input checked="" type="checkbox"/> Other: Filed Electronically _____
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18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

Continuation
 Divisional
 Continuation-in-part (CIP)
 of prior application No: 12 / 471.942
 Prior application information:
 Examiner Christopher A. Revak
 Art Unit: 2431

19. CORRESPONDENCE ADDRESS

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Name					
Address					
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Signature	/Dawn-Marie Bey/	Date	November 7, 2011
Name (Print/Type)	Dawn-Marie Bey	Registration No. (Attorney/Agent)	44,442

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**MALICIOUS MOBILE CODE RUNTIME MONITORING
SYSTEM AND METHODS**

PRIORITY REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of assignee's pending U.S. patent application serial no. 12/471,942, filed May 26, 2009 by inventors Yigal Mordechai Edery, et al., entitled "Malicious Mobile Code Runtime Monitoring System and Methods," which is a continuation of assignee's U.S. patent application serial no. 11/370,114, filed March 7, 2006 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,613,926, entitled "Method and System for Protecting a Computer and a Network from Hostile Downloadables," which is a continuation of assignee's U.S. patent application serial no. 09/861,229, filed on May 17, 2001 by inventors Yigal Mordechai Edery, et al., now U.S. Patent No. 7,058,822, entitled "Malicious Mobile Code Runtime Monitoring System And Methods", all of which are hereby incorporated by reference. U.S. patent application serial no. 09/861,229 claims benefit of provisional U.S. patent application serial no. 60/205,591, entitled "Computer Network Malicious Code Run-time Monitoring," filed on May 17, 2000 by inventors Nimrod Itzhak Vered, et al., which is hereby incorporated by reference. U.S. patent application serial no. 09/861,229 is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/539,667, entitled "System and Method for Protecting a Computer and a Network From Hostile Downloadables" filed on March 30, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,804,780, and hereby incorporated by reference, which is a continuation of assignee's U.S. patent application serial no. 08/964,388, filed on November 6, 1997 by inventor Shlomo Touboul, now U.S. Patent No. 6,092,194, also entitled "System and Method for Protecting a Computer and a Network from Hostile Downloadables" and hereby incorporated by reference. U.S. Serial No. 09/861,229 is also a Continuation-In-Part of assignee's U.S. patent application serial no. 09/551,302, entitled "System and Method for Protecting a Client During Runtime From Hostile Downloadables", filed on April 18, 2000 by inventor Shlomo Touboul, now U.S. Patent No. 6,480,962, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION**Field of the Invention**

[0002] This invention relates generally to computer networks, and more particularly provides a system and methods for protecting network-connectable devices from undesirable downloadable operation.

Description of the Background Art

[0003] Advances in networking technology continue to impact an increasing number and diversity of users. The Internet, for example, already provides to expert, intermediate and even novice users the informational, product and service resources of over 100,000 interconnected networks owned by governments, universities, nonprofit groups, companies, etc. Unfortunately, particularly the Internet and other public networks have also become a major source of potentially system-fatal or otherwise damaging computer code commonly referred to as “viruses.”

[0004] Efforts to forestall viruses from attacking networked computers have thus far met with only limited success at best. Typically, a virus protection program designed to identify and remove or protect against the initiating of known viruses is installed on a network firewall or individually networked computer. The program is then inevitably surmounted by some new virus that often causes damage to one or more computers. The damage is then assessed and, if isolated, the new virus is analyzed. A corresponding new virus protection program (or update thereof) is then developed and installed to combat the new virus, and the new program operates successfully until yet another new virus appears - and so on. Of course, damage has already typically been incurred.

[0005] To make matters worse, certain classes of viruses are not well recognized or understood, let alone protected against. It is observed by this inventor, for example, that Downloadable information comprising program code can include distributable components (e.g. Java™ applets and JavaScript scripts, ActiveX™ controls, Visual Basic, add-ins and/or others). It can also include, for example, application programs, Trojan horses, multiple compressed programs such as zip or meta files, among others. U.S. Patent 5,983,348 to Shuang, however, teaches a protection system for protecting against only distributable components including “Java

applets or ActiveX controls”, and further does so using resource intensive and high bandwidth static Downloadable content and operational analysis, and modification of the Downloadable component; Shuang further fails to detect or protect against additional program code included within a tested Downloadable. U.S. Patent 5,974,549 to Golan teaches a protection system that further focuses only on protecting against ActiveX controls and not other distributable components, let alone other Downloadable types. U.S. patent 6,167,520 to Touboul enables more accurate protection than Shuang or Golan, but lacks the greater flexibility and efficiency taught herein, as do Shuang and Golan.

[0006] Accordingly, there remains a need for efficient, accurate and flexible protection of computers and other network connectable devices from malicious Downloadables.

SUMMARY OF THE INVENTION

[0007] The present invention provides protection systems and methods capable of protecting a personal computer (“PC”) or other persistently or even intermittently network accessible devices or processes from harmful, undesirable, suspicious or other “malicious” operations that might otherwise be effectuated by remotely operable code. While enabling the capabilities of prior systems, the present invention is not nearly so limited, resource intensive or inflexible, and yet enables more reliable protection. For example, remotely operable code that is protectable against can include downloadable application programs, Trojan horses and program code groupings, as well as software “components”, such as Java™ applets, ActiveX™ controls, JavaScript™/Visual Basic scripts, add-ins, etc., among others. Protection can also be provided in a distributed interactively, automatically or mixed configurable manner using protected client, server or other parameters, redirection, local/remote logging, etc., and other server/client based protection measures can also be separately and/or interoperably utilized, among other examples.

[0008] In one aspect, embodiments of the invention provide for determining, within one or more network “servers” (e.g. firewalls, resources, gateways, email relays or other devices/processes that are capable of receiving-and-transferring a Downloadable) whether received information includes executable code (and is a “Downloadable”). Embodiments also provide for delivering static, configurable and/or extensible remotely operable protection policies to a Downloadable-destination, more typically as a sandboxed package including the mobile

protection code, downloadable policies and one or more received Downloadables. Further client-based or remote protection code/policies can also be utilized in a distributed manner. Embodiments also provide for causing the mobile protection code to be executed within a Downloadable-destination in a manner that enables various Downloadable operations to be detected, intercepted or further responded to via protection operations. Additional server/information-destination device security or other protection is also enabled, among still further aspects.

[0009] A protection engine according to an embodiment of the invention is operable within one or more network servers, firewalls or other network connectable information re-communicating devices (as are referred to herein summarily one or more “servers” or “re-communicators”). The protection engine includes an information monitor for monitoring information received by the server, and a code detection engine for determining whether the received information includes executable code. The protection engine also includes a packaging engine for causing a sandboxed package, typically including mobile protection code and downloadable protection policies to be sent to a Downloadable-destination in conjunction with the received information, if the received information is determined to be a Downloadable.

[00010] A sandboxed package according to an embodiment of the invention is receivable by and operable with a remote Downloadable-destination. The sandboxed package includes mobile protection code (“MPC”) for causing one or more predetermined malicious operations or operation combinations of a Downloadable to be monitored or otherwise intercepted. The sandboxed package also includes protection policies (operable alone or in conjunction with further Downloadable-destination stored or received policies/MPCs) for causing one or more predetermined operations to be performed if one or more undesirable operations of the Downloadable is/are intercepted. The sandboxed package can also include a corresponding Downloadable and can provide for initiating the Downloadable in a protective “sandbox”. The MPC/policies can further include a communicator for enabling further MPC/policy information or “modules” to be utilized and/or for event logging or other purposes.

[00011] A sandbox protection system according to an embodiment of the invention comprises an installer for enabling a received MPC to be executed within a Downloadable-destination (device/process) and further causing a Downloadable application program,

distributable component or other received downloadable code to be received and installed within the Downloadable-destination. The protection system also includes a diverter for monitoring one or more operation attempts of the Downloadable, an operation analyzer for determining one or more responses to the attempts, and a security enforcer for effectuating responses to the monitored operations. The protection system can further include one or more security policies according to which one or more protection system elements are operable automatically (e.g. programmatically) or in conjunction with user intervention (e.g. as enabled by the security enforcer). The security policies can also be configurable/extensible in accordance with further downloadable and/or Downloadable-destination information.

[00012] A method according to an embodiment of the invention includes receiving downloadable information, determining whether the downloadable information includes executable code, and causing a mobile protection code and security policies to be communicated to a network client in conjunction with security policies and the downloadable information if the downloadable information is determined to include executable code. The determining can further provide multiple tests for detecting, alone or together, whether the downloadable information includes executable code.

[00013] A further method according to an embodiment of the invention includes forming a sandboxed package that includes mobile protection code (“MPC”), protection policies, and a received, detected-Downloadable, and causing the sandboxed package to be communicated to and installed by a receiving device or process (“user device”) for responding to one or more malicious operation attempts by the detected-Downloadable from within the user device. The MPC/policies can further include a base “module” and a “communicator” for enabling further up/downloading of one or more further “modules” or other information (e.g. events, user/user device information, etc.).

[00014] Another method according to an embodiment of the invention includes installing, within a user device, received mobile protection code (“MPC”) and protection policies in conjunction with the user device receiving a downloadable application program, component or other Downloadable(s). The method also includes determining, by the MPC, a resource access attempt by the Downloadable, and initiating, by the MPC, one or more predetermined operations corresponding to the attempt. (Predetermined operations can, for example, comprise initiating

user, administrator, client, network or protection system determinable operations, including but not limited to modifying the Downloadable operation, extricating the Downloadable, notifying a user/another, maintaining a local/remote log, causing one or more MPCs/policies to be downloaded, etc.)

[00015] Advantageously, systems and methods according to embodiments of the invention enable potentially damaging, undesirable or otherwise malicious operations by even unknown mobile code to be detected, prevented, modified and/or otherwise protected against without modifying the mobile code. Such protection is further enabled in a manner that is capable of minimizing server and client resource requirements, does not require pre-installation of security code within a Downloadable-destination, and provides for client specific or generic and readily updateable security measures to be flexibly and efficiently implemented. Embodiments further provide for thwarting efforts to bypass security measures (e.g. by “hiding” undesirable operation causing information within apparently inert or otherwise “friendly” downloadable information) and/or dividing or combining security measures for even greater flexibility and/or efficiency.

[00016] Embodiments also provide for determining protection policies that can be downloaded and/or ascertained from other security information (e.g. browser settings, administrative policies, user input, uploaded information, etc.). Different actions in response to different Downloadable operations, clients, users and/or other criteria are also enabled, and embodiments provide for implementing other security measures, such as verifying a downloadable source, certification, authentication, etc. Appropriate action can also be accomplished automatically (e.g. programmatically) and/or in conjunction with alerting one or more users/administrators, utilizing user input, etc. Embodiments further enable desirable Downloadable operations to remain substantially unaffected, among other aspects.

BRIEF DESCRIPTION OF THE DRAWINGS

[00017] FIG. 1a is a block diagram illustrating a network system in accordance with an embodiment of the present invention;

[00018] FIG. 1b is a block diagram illustrating a network subsystem example in accordance with an embodiment of the invention;

- [00019] FIG. 1c is a block diagram illustrating a further network subsystem example in accordance with an embodiment of the invention;
- [00020] FIG. 2 is a block diagram illustrating a computer system in accordance with an embodiment of the invention;
- [00021] FIG. 3 is a flow diagram broadly illustrating a protection system host according to an embodiment of the invention;
- [00022] FIG. 4 is a block diagram illustrating a protection engine according to an embodiment of the invention;
- [00023] FIG. 5 is a block diagram illustrating a content inspection engine according to an embodiment of the invention;
- [00024] FIG. 6a is a block diagram illustrating protection engine parameters according to an embodiment of the invention;
- [00025] FIG. 6b is a flow diagram illustrating a linking engine use in conjunction with ordinary, compressed and distributable sandbox package utilization, according to an embodiment of the invention;
- [00026] FIG. 7a is a flow diagram illustrating a sandbox protection system operating within a destination system, according to an embodiment of the invention;
- [00027] FIG. 7b is a block diagram illustrating memory allocation usable in conjunction with the protection system of FIG. 7a, according to an embodiment of the invention;
- [00028] FIG. 8 is a block diagram illustrating a mobile protection code according to an embodiment of the invention;
- [00029] FIG. 9 is a flowchart illustrating a protection method according to an embodiment of the invention;
- [00030] FIG. 10a is a flowchart illustrating method for determining if a potential-Downloadable includes or is likely to include executable code, according to an embodiment of the invention;
- [00031] FIG. 10b is a flowchart illustrating a method for forming a protection agent, according to an embodiment of the invention;

[00032] FIG. 11 is a flowchart illustrating a method for protecting a Downloadable destination according to an embodiment of the invention;

[00033] FIG. 12a is a flowchart illustrating a method for forming a Downloadable access interceptor according to an embodiment of the invention; and

[00034] FIG. 12b is a flowchart illustrating a method for implementing mobile protection policies according to an embodiment of the invention.

DETAILED DESCRIPTION

[00035] In providing malicious mobile code runtime monitoring systems and methods, embodiments of the invention enable actually or potentially undesirable operations of even unknown malicious code to be efficiently and flexibly avoided. Embodiments provide, within one or more “servers” (e.g. firewalls, resources, gateways, email relays or other information re-communicating devices), for receiving downloadable-information and detecting whether the downloadable-information includes one or more instances of executable code (e.g. as with a Trojan horse, zip/meta file etc.). Embodiments also provide for separately or interoperably conducting additional security measures within the server, within a Downloadable-destination of a detected-Downloadable, or both.

[00036] Embodiments further provide for causing mobile protection code (“MPC”) and downloadable protection policies to be communicated to, installed and executed within one or more received information destinations in conjunction with a detected-Downloadable. Embodiments also provide, within an information-destination, for detecting malicious operations of the detected-Downloadable and causing responses thereto in accordance with the protection policies (which can correspond to one or more user, Downloadable, source, destination, or other parameters), or further downloaded or downloadable-destination based policies (which can also be configurable or extensible). (Note that the term “or”, as used herein, is generally intended to mean “and/or” unless otherwise indicated.)

[00037] FIGS. 1a through 1c illustrate a computer network system **100** according to an embodiment of the invention. FIG. 1a broadly illustrates system **100**, while FIGS. 1b and 1c of 1c illustrate exemplary protectable subsystem implementations corresponding with system **104** or **106** of FIG. 1a.

[00038] Beginning with FIG. 1a, computer network system **100** includes an external computer network **101**, such as a Wide Area Network or “WAN” (e.g. the Internet), which is coupled to one or more network resource servers (summarily depicted as resource server-1 **102** and resource server-N **103**). Where external network **101** includes the Internet, resource servers 1-N (**102, 103**) might provide one or more resources including web pages, streaming media, transaction-facilitating information, program updates or other downloadable information, summarily depicted as resources **121, 131** and **132**. Such information can also include more traditionally viewed “Downloadables” or “mobile code” (i.e. distributable components), as well as downloadable application programs or other further Downloadables, such as those that are discussed herein. (It will be appreciated that interconnected networks can also provide various other resources as well.)

[00039] Also coupled via external network **101** are subsystems **104-106**. Subsystems **104-106** can, for example, include one or more servers, personal computers (“PCs”), smart appliances, personal information managers or other devices/processes that are at least temporarily or otherwise intermittently directly or indirectly connectable in a wired or wireless manner to external network **101** (e.g. using a dialup, DSL, cable modem, cellular connection, IR/RF, or various other suitable current or future connection alternatives). One or more of subsystems **104-106** might further operate as user devices that are connectable to external network **101** via an internet service provider (“ISP”) or local area network (“LAN”), such as a corporate intranet, or home, portable device or smart appliance network, among other examples.

[00040] FIG. 1a also broadly illustrates how embodiments of the invention are capable of selectively, modifiably or extensibly providing protection to one or more determinable ones of networked subsystems **104-106** or elements thereof (not shown) against potentially harmful or other undesirable (“malicious”) effects in conjunction with receiving downloadable information. “Protected” subsystem **104**, for example, utilizes a protection in accordance with the teachings herein, while “unprotected” subsystem-N **105** employs no protection, and protected subsystem-M **106** might employ one or more protections including those according to the teachings herein, other protection, or some combination.

[00041] System **100** implementations are also capable of providing protection to redundant elements **107** of one or more of subsystems **104-106** that might be utilized, such as

backups, failsafe elements, redundant networks, etc. Where included, such redundant elements are also similarly protectable in a separate, combined or coordinated manner using embodiments of the present invention either alone or in conjunction with other protection mechanisms. In such cases, protection can be similarly provided singly, as a composite of component operations or in a backup fashion. Care should, however, be exercised to avoid potential repeated protection engine execution corresponding to a single Downloadable; such “chaining” can cause a Downloadable to operate incorrectly or not at all, unless a subsequent detection engine is configured to recognize a prior packaging of the Downloadable.

[00042] FIGS. 1b and 1c further illustrate, by way of example, how protection systems according to embodiments of the invention can be utilized in conjunction with a wide variety of different system implementations. In the illustrated examples, system elements are generally configurable in a manner commonly referred to as a “client-server” configuration, as is typically utilized for accessing Internet and many other network resources. For clarity sake, a simple client-server configuration will be presumed unless otherwise indicated. It will be appreciated, however, that other configurations of interconnected elements might also be utilized (e.g. peer-peer, routers, proxy servers, networks, converters, gateways, services, network reconfiguring elements, etc.) in accordance with a particular application.

[00043] The FIG. 1b example shows how a suitable protected system **104a** (which can correspond to subsystem-I **104** or subsystem-M **106** of FIG. 1) can include a protection-initiating host “server” or “re-communicator” (e.g. ISP server **140a**), one or more user devices or “Downloadable-destinations” **145**, and zero or more redundant elements (which elements are summarily depicted as redundant client device/process **145a**). In this example, ISP server **140a** includes one or more email, Internet or other servers **141a**, or other devices or processes capable of transferring or otherwise “re-communicating” downloadable information to user devices **145**. Server **141a** further includes protection engine or “PE” **142a**, which is capable of supplying mobile protection code (“MPC”) and protection policies for execution by client devices **145**. One or more of user devices **145** can further include a respective one or more clients **146** for utilizing information received via server **140a**, in accordance with which MPC and protection policies are operable to protect user devices **145** from detrimental, undesirable or otherwise “malicious” operations of downloadable information also received by user device **145**.

[00044] The FIG. 1c example shows how a further suitable protected system **104b** can include, in addition to a “re-communicator”, such as server **142b**, a firewall **143c** (e.g. as is typically the case with a corporate intranet and many existing or proposed home/smart networks.) In such cases, a server **141b** or firewall **143** can operate as a suitable protection engine host. A protection engine can also be implemented in a more distributed manner among two or more protection engine host systems or host system elements, such as both of server **141** and firewall **143**, or in a more integrated manner, for example, as a standalone device. Redundant system or system protection elements **11**) can also be similarly provided in a more distributed or integrated manner (see above).

[00045] System **104b** also includes internal network **144** and user devices **145**. User devices **145** further include a respective one or more clients **146** for utilizing information received via server **140a**, in accordance with which the MPCs or protection policies are operable. (As in the previous example, one or more of user devices **145** can also include or correspond with similarly protectable redundant system elements, which are not shown.)

[00046] It will be appreciated that the configurations of FIGS 1a-1c are merely exemplary. Alternative embodiments might, for example, utilize other suitable connections, devices or processes. One or more devices can also be configurable to operate as a network server, firewall, smart router, a resource server servicing deliverable third-party/manufacture postings, a user device operating as a firewall/server, or other information-suppliers or intermediaries (i.e. as a “re-communicator” or “server”) for servicing one or more further interconnected devices or processes or interconnected levels of devices or processes. Thus, for example, a suitable protection engine host can include one or more devices or processes capable of providing or supporting the providing of mobile protection code or other protection consistent with the teachings herein. A suitable information-destination or “user device” can further include one or more devices or processes (such as email, browser or other clients) that are capable of receiving and initiating or otherwise hosting a mobile code execution.

[00047] FIG. 2 illustrates an exemplary computing system **200**, that can comprise one or more of the elements of FIGS. 1a through 1c. While other application-specific alternatives might be utilized, it will be presumed for clarity sake that system **100** elements (FIGS. 1a-c) are

implemented in hardware, software or some combination by one or more processing systems consistent therewith, unless otherwise indicated.

[00048] Computer system **200** comprises elements coupled via communication channels (e.g. bus **201**) including one or more general or special purpose processors **202**, such as a Pentium® or Power PC®, digital signal processor (“DSP”), etc. System **200** elements also include one or more input devices **203** (such as ~ mouse, keyboard, microphone, pen, etc.), and one or more output devices **204**, such as a suitable display, speakers, actuators, etc., in accordance with a particular application.

[00049] System **200** also includes a computer readable storage media reader **205** coupled to a computer readable storage medium **206**, such as a storage/memory device or hard or removable storage/memory media; such devices or media are further indicated separately as storage device **208** and memory **209**, which can include hard disk variants, floppy/compact disk variants, digital versatile disk (“DVD”) variants, smart cards, read only memory, random access memory, cache memory, etc., in accordance with a particular application. One or more suitable communication devices **207** can also be included, such as a modem, OSL, infrared or other suitable transceiver, etc. for providing inter-device communication directly or via one or more suitable private or public networks that can include but are not limited to those already discussed.

[00050] Working memory further includes operating system (“OS”) elements and other programs, such as application programs, mobile code, data, etc. for implementing system **100** elements that might be stored or loaded therein during use. The particular OS can vary in accordance with a particular device, features or other aspects in accordance with a **110** particular application (e.g. Windows, Mac, Linux, Unix or Palm OS variants, a proprietary OS, etc.). Various programming languages or other tools can also be utilized, such as C++, Java, Visual Basic, etc. As will be discussed, embodiments can also include a network client such as a browser or email client, e.g. as produced by Netscape, Microsoft or others, a mobile code executor such as an OS task manager, Java Virtual Machine (“JVM”), etc., and an application program interface (“API”), such as a Microsoft Windows or other suitable element in accordance with the teachings herein. (It will also become apparent that embodiments might also be implemented in conjunction with a resident application or combination of mobile code and resident application components.)

[00051] One or more system **200** elements can also be implemented in hardware, software or a suitable combination. When implemented in software (e.g. as an application program, object, downloadable, servlet, etc. in whole or part), a system **200** element can be communicated transitionally or more persistently from local or remote storage to memory (or cache memory, etc.) for execution, or another suitable mechanism can be utilized, and elements can be implemented in compiled or interpretive form. Input, intermediate or resulting data or functional elements can further reside more transitionally or more persistently in a storage media, cache or more persistent volatile or non-volatile memory, (e.g. storage device **207** or memory **208**) in accordance with a particular application.

[00052] FIG. 3 illustrates an interconnected re-communicator **300** generally consistent with system **140b** of FIG. 1, according to an embodiment of the invention. As with system **140b**, system **300** includes a server **301**, and can also include a firewall **302**. In this implementation, however, either server **301** or firewall **302** (if a firewall is used) can further include a protection engine (**310** or **320** respectively). Thus, for example, an included firewall can process received information in a conventional manner, the results of which can be further processed by protection engine **310** of server **301**, or information processed by protection engine **320** of an included firewall **302** can be processed in a conventional manner by server **301**. (For clarity sake, a server including a singular protection engine will be presumed, with or without a firewall, for the remainder of the discussion unless otherwise indicated. Note, however, that other embodiments consistent with the teachings herein might also be utilized.)

[00053] FIG. 3 also shows how information received by server **301** (or firewall **302**) can include non-executable information, executable information or a combination of non-executable and one or more executable code portions (e.g. so-called Trojan horses that include a hostile Downloadable within a friendly one, combined, compressed or otherwise encoded files, etc.). Particularly such combinations will likely remain undetected by a firewall or other more conventional protection systems. Thus, for convenience, received information will also be referred to as a “potential-Downloadable”, and received information found to include executable code will be referred to as a “Downloadable” or equivalently as a “detected-Downloadable” (regardless of whether the executable code includes one or more application programs, distributable “components” such as Java, ActiveX, add-in, etc.).

[00054] Protection engine **310** provides for detecting whether received potential-Downloadables include executable code, and upon such detection, for causing mobile protection code (“MPC”) to be transferred to a device that is a destination of the potential-Downloadable (or “Downloadable-destination”). Protection engine **310** can also provide protection policies in conjunction with the MPC (or thereafter as well), which MPC/policies can be automatically (e.g. programmatically) or interactively configurable in accordance user, administrator, downloadable source, destination, operation, type or various other parameters alone or in combination (see below). Protection engine **310** can also provide or operate separately or interoperably in conjunction with one or more of certification, authentication, downloadable tagging, source checking, verification, logging, diverting or other protection services via the MPC, policies, other local/remote server or destination processing, etc. (e.g. which can also include protection mechanisms taught by the above-noted prior applications; see FIG. 4).

[00055] Operationally, protection engine **310** of server **301** monitors information received by server **301** and determines whether the received information is deliverable to a protected destination, e.g. using a suitable monitor/data transfer mechanism and comparing a destination-address of the received information to a protected destination set, such as a protected destinations list, array, database, etc. (All deliverable information or one or more subsets thereof might also be monitored.) Protection engine **310** further analyzes the potential-Downloadable and determines whether the potential-Downloadable includes executable code. If not, protection engine **310** enables the not executable potential-Downloadable **331** to be delivered to its destination in an unaffected manner.

[00056] In conjunction with determining that the potential-Downloadable is a detected-Downloadable, protection engine **310** also causes mobile protection code or “MPC” **341** to be communicated to the Downloadable-destination of the Downloadable, more suitably in conjunction with the detected-Downloadable **343** (see below). Protection engine **310** further causes downloadable protection policies **342** to be delivered to the Downloadable-destination, again more suitably in conjunction with the detected-Downloadable. Protection policies **342** provide parameters (or can additionally or alternatively provide additional mobile code) according to which the MPC is capable of determining or providing applicable protection to a Downloadable-destination against malicious Downloadable operations.

[00057] (One or more “checked”, tag, source, destination, type, detection or other security result indicators, which are not shown, can also be provided as corresponding to determined non-Downloadables or Downloadables, e.g. for testing, logging, further processing, further identification tagging or other purposes in accordance with a particular application.)

[00058] Further MPCs, protection policies or other information are also deliverable to a the same or another destination, for example, in accordance with communication by an MPC/protection policies already delivered to a downloadable-destination. Initial or subsequent MPCs/policies can further be selected or configured in accordance with a Downloadable-destination indicated by the detected-Downloadable, destination-user or administrative information, or other information providable to protection engine **310** by a user, administrator, user system, user system examination by a communicated MPC, etc. (Thus, for example, an initial MPC/policies can also be initially provided that are operable with or optimized for more efficient operation with different Downloadable-destinations or destination capabilities.)

[00059] While integrated protection constraints within the MPC might also be utilized, providing separate protection policies has been found to be more efficient, for example, by enabling more specific protection constraints to be more easily updated in conjunction with detected-Downloadable specifics, post-download improvements, testing, etc. Separate policies can further be more efficiently provided (e.g. selected, modified, instantiated, etc.) with or separately from an MPC, or in accordance with the requirements of a particular user, device, system, administration, later improvement, etc., as might also be provided to protection engine **310** (e.g. via user/MPC uploading, querying, parsing a Downloadable, or other suitable mechanism implemented by one or more servers or Downloadable-destinations).

[00060] (It will also become apparent that performing executable code detection and communicating to a downloadable-Destination an MPC and any applicable policies as separate from a detected-Downloadable is more accurate and far less resource intensive than, for example, performing content and operation scanning, modifying a Downloadable, or providing completely Downloadable-destination based security.)

[00061] System **300** enables a single or extensible base-MPC to be provided, in anticipation or upon receipt of a first Downloadable, that is utilized thereafter to provide protection of one or more Downloadable-destinations. It is found, however, that providing an

MPC upon each detection of a Downloadable (which is also enabled) can provide a desirable combination of configurability of the MPC/policies and lessened need for management (e.g. given potentially changing user/destination needs, enabling testing, etc.).

[00062] Providing an MPC upon each detection of a Downloadable also facilitates a lessened demand on destination resources, e.g. since information-destination resources used in executing the MPC/policies can be re-allocated following such use. Such alternatives can also be selectively, modifiably or extensibly provided (or further in accordance with other application-specific factors that might also apply.) Thus, for example, a base-MPC or base-policies might be provided to a user device that is/are extensible via additionally downloadable “modules” upon server **301** detection of a Downloadable deliverable to the same user device, among other alternatives.

[00063] In accordance with a further aspect of the invention, it is found that improved efficiency can also be achieved by causing the MPC to be executed within a Downloadable-destination in conjunction with, and further, prior to initiation of the detected Downloadable. One mechanism that provides for greater compatibility and efficiency in conjunction with conventional client-based Downloadable execution is for a protection engine to form a sandboxed package **340** including MPC **341**, the detected-Downloadable **343** and any policies **342**. For example, where the Downloadable is a binary executable to be executed by an operating system, protection engine **310** forms a protected package by concatenating, within sandboxed package **340**, MPC **341** for delivery to a Downloadable-destination first, followed by protection policies **342** and Downloadable **343**. (Concatenation or techniques consistent therewith can also be utilized for providing a protecting package corresponding to a Java applet for execution by a NM of a Downloadable-destination, or with regard to ActiveX controls, add-ins or other distributable components, etc.)

[00064] The above concatenation or other suitable processing will result in the following. Upon receipt of sandboxed package **340** by a compatible browser, email or other destination-client and activating of the package by a user or the destination-client, the operating system (or a suitable responsively initiated distributed component host) will attempt to initiate sandboxed package **340** as a single Downloadable. Such processing will, however, result in initiating the MPC **341** and -in accordance with further aspects of the invention- the MPC will initiate the

Downloadable in a protected manner, further in accordance with any applicable included or further downloaded protection policies **342**. (While system **300** is also capable of ascertaining protection policies stored at a Downloadable-destination, e.g. by poll, query, etc. of available destination information, including at least initial policies within a suitable protecting package is found to avoid associated security concerns or inefficiencies.)

[00065] Turning to FIG. 4, a protection engine **400** generally consistent with protection engine **310** (or **320**) of FIG. 3 is illustrated in accordance with an embodiment of the invention. Protection engine **400** comprises information monitor **401**, detection engine **402**, and protected packaging engine **403**, which further includes agent generator **431**, storage **404**, linking engine **405**, and transfer engine **406**. Protection engine **400** can also include a buffer **407**, for temporarily storing a received potential-Downloadable, or one or more systems for conducting additional authentication, certification, verification or other security processing (e.g. summarily depicted as security system **408**.) Protection engine **400** can further provide for selectively re-directing, further directing, logging, etc. of a potential/detected Downloadable or information corresponding thereto in conjunction with detection, other security, etc., in accordance with a particular application.

[00066] (Note that FIG. 4, as with other figures included herein, also depicts exemplary signal flow arrows; such arrows are provided to facilitate discussion, and should not be construed as exclusive or otherwise limiting.)

[00067] Information monitor **401** monitors potential-Downloadables received by a host server and provides the information via buffer **407** to detection engine **402** or to other system **400** elements. Information monitor **401** can be configured to monitor host server download operations in conjunction with a user or a user-device that has logged-on to the server, or to receive information via a server operation hook, servlet, communication channel or other suitable mechanism.

[00068] Information monitor **401** can also provide for transferring, to storage **404** or other protection engine elements, configuration information including, for example, user, MPC, protection policy, interfacing or other configuration information (e.g. see FIG. 6). Such configuration information monitoring can be conducted in accordance with a user/device logging onto or otherwise accessing a host server, via one or more of configuration operations, using an

applet to acquire such information from or for a particular user, device or devices, via MPC/policy polling of a user device, or via other suitable mechanisms.

[00069] Detection engine **402** includes code detector **421**, which receives a potential-Downloadable and determines, more suitably in conjunction with inspection parameters **422**, whether the potential-Downloadable includes executable code and is thus a “detected-Downloadable”. (Code detector **421** can also include detection processors for performing me decompression or other “decoding”, or such detection-facilitating processing as decryption, utilization/support of security system **408**, etc. in accordance with a particular application.)

[00070] Detection engine **402** further transfers a detected-downloadable (“XEQ”) to protected packaging engine **403** along with indicators of such detection., or a determined non-executable (“NXEQ”) to transfer engine **406**. (Inspection parameters **422** enable analysis criteria to be readily updated or varied, for example, in accordance with particular source, destination or other potential Downloadable impacting parameters, and are discussed in greater detail with reference to FIG. 5). Detection engine **402** can also provide indicators for delivery of initial and further MPCs/policies, for example, prior to or in conjunction with detecting a Downloadable and further upon receipt of an indicator from an already downloaded MPC/policy. A downloaded MPC/policy can further remain resident at a user device with further modules downloaded upon or even after delivery of a sandboxed package. Such distribution can also be provided in a configurable manner, such that delivery of a complete package or partial packages are automatically or interactively determinable in accordance with user/administrative preferences/policies, among other examples.

[00071] Packaging engine **403** provides for generating mobile protection code and protection policies, and for causing delivery thereof (typically with a detected-Downloadable) to a Downloadable-destination for protecting the Downloadable-destination against malicious operation attempts by the detected Downloadable. In this example, packaging engine **403** includes agent generator **431**, storage **404** and linking engine **405**.

[00072] Agent generator **431** includes an MPC generator **432** and a protection policy generator **433** for “generating” an MPC and a protection policy (or set of policies) respectively upon receiving one or more “generate MPC/policy” indicators from detection engine **402**, indicating that a potential-Downloadable is a detected-Downloadable. MPC generator **432** and

protection policy generator **433** provide for generating MPCs and protection policies respectively in accordance with parameters retrieved from storage **404**. Agent generator **431** is further capable of providing multiple MPCs/policies, for example, the same or different MPCs/policies in accordance with protecting ones of multiple executables within a zip file, or for providing initial MPCs/policies and then further MPCs/policies or MPC/policy “modules” as initiated by further indicators such as given above, via an indicator of an already downloaded MPC/policy or via other suitable mechanisms. (It will be appreciated that pre-constructed MPCs/policies or other processing can also be utilized, e.g. via retrieval from storage **404**, but with a potential decrease in flexibility.)

[00073] MPC generator **432** and protection policy generator **433** are further configurable. Thus, for example, more generic MPCs/policies can be provided to all or a grouping of serviced destination-devices (e.g. in accordance with a similarly configured/administered intranet), or different MPCs/policies that can be configured in accordance with one or more of user, network administration, Downloadable-destination or other parameters (e.g. see FIG. 6). As will become apparent, a resulting MPC provides an operational interface to a destination device/process. Thus, a high degree of flexibility and efficiency is enabled in providing such an operational interface within different or differently configurable user devices/processes or other constraints.

[00074] Such configurability further enables particular policies to be utilized in accordance with a particular application (e.g. particular system uses, access limitations, user interaction, treating application programs or Java components from a particular known source one way and unknown source ActiveX components, or other considerations). Agent generator **431** further transfers a resulting MPC and protection policy pair to linking engine **405**.

[00075] Linking engine **405** provides for forming from received component elements (see above) a sandboxed package that can include one or more initial or complete MPCs and applicable protection policies, and a Downloadable, such that the sandboxed package will protect a receiving Downloadable-destination from malicious operation by the Downloadable. Linking engine **405** is implementable in a static or configurable manner in accordance, for example, with characteristics of a particular user device/process stored intermittently or more persistently in storage **404**. Linking engine **405** can also provide for restoring a Downloadable, such as a compressed, encrypted or otherwise encoded file that has been decompressed, decrypted or

otherwise decoded via detection processing **20** (e.g. see FIG. 6b). It is discovered, for example, that the manner in which the Windows OS initiates a binary executable or an ActiveX control can be utilized to enable protected initiation of a detected-Downloadable. Linking engine **405** is, for example, configurable to form, for an ordinary single-executable Downloadable (e.g. an application program, applet, etc.) a sandboxed package **340** as a concatenation of ordered elements including an MPC **341**, applicable policies **342** and the Downloadable or “XEQ” **343** (e.g. see FIG. 4).

[00076] Linking engine **405** is also configurable to form, for a Downloadable received by a server as a compressed single or multiple-executable Downloadable such as a zipped or meta file, a protecting package **340** including one or more MPCs, applicable policies and the one or more included executables of the Downloadable. For example, a sandboxed package can be formed in which a single MPC and policies precede and thus will affect all such executables as a result of inflating and installation. An MPC and applicable policies can also, for example, precede each executable, such that each executable will be separately sandboxed in the same or a different manner according to MPC/policy configuration (see above) upon inflation and installation. (See also FIGS. 5 and 6.) Linking engine is also configurable to form an initial MPC, MPC-policy or sandboxed package (e.g. prior to upon receipt of a downloadable) or an additional MPC, MPC-policy or sandboxed package (e.g. upon or following receipt of a downloadable), such that suitable MPCs/policies can be provided to a Downloadable-destination or other destination in a more distributed manner. In this way, requisite bandwidth or destination resources can be minimized (via two or more smaller packages) in compromise with latency or other considerations raised by the additional required communication.

[00077] A configurable linking engine can also be utilized in accordance with other requirements of particular devices/processes, further or different elements or other permutations in accordance with the teachings herein. (It might, for example be desirable to modify the ordering of elements, to provide one or more elements separately, to provide additional information, such as a header, etc., or perform other processing in accordance with a particular device, protocol or other application considerations.)

[00078] Policy/authentication reader-analyzer **481** summarily depicts other protection mechanisms that might be utilized in conjunction with Downloadable detection, such as already

discussed, and that can further be configurable to operate in accordance with policies or parameters (summarily depicted by security/authentication policies **482**). Integration of such further protection in the depicted configuration, for example, enables a potential-Downloadable from a known unfriendly source, a source failing authentication or a provided-source that is confirmed to be fictitious to be summarily discarded, otherwise blocked, flagged, etc. (with or without further processing). Conversely, a potential-Downloadable from a known friendly source (or one confirmed as such) can be transferred with or without further processing in accordance with particular application considerations. (Other configurations including pre or post Downloadable detection mechanisms might also be utilized.)

[00079] Finally, transfer engine **406** of protection agent engine **303** provides for receiving and causing linking engine **405** (or other protection) results to be transferred to a destination user device/process. As depicted, transfer engine **406** is configured to receive and transfer a Downloadable, a determined non-executable or a sandboxed package. However, transfer engine **406** can also be provided in a more configurable manner, such as was already discussed for other system **400** elements. (Anyone or more of system **400** elements might be configurably implemented in accordance with a particular application.) Transfer engine **406** can perform such transfer, for example, by adding the information to a server transfer queue (not shown) or utilizing another suitable method.

[00080] Turning to FIG. 5 with reference to FIG. 4, a code detector **421** example is illustrated in accordance with an embodiment of the invention. As shown, code detector **421** includes data fetcher **501**, parser **502**, file-type detector **503**, inflater **504** and control **506**; other depicted elements. While implementable and potentially useful in certain instances, are found to require substantial overhead, to be less accurate in certain instances (see above) and are not utilized in a present implementation; these will be discussed separately below. Code detector elements are further configurable in accordance with stored parameters retrievable by data fetcher **501**. (A coupling between data fetcher **501** and control **506** has been removed for clarity sake.)

[00081] Data fetcher **501** provides for retrieving a potential-Downloadable or portions thereof stored in buffer **407** or parameters from storage **404**, and communicates such information or parameters to parser **502**. Parser **502** receives a potential-Downloadable or portions thereof

from data fetcher **501** and isolates potential-Downloadable elements, such as file headers, source, destination, certificates, etc. for use by further processing elements.

[00082] File type detector **502** receives and determines whether the potential-Downloadable (likely) is or includes an executable file type. File-reader **502** can, for example, be configured to analyze a received potential-Downloadable for a file header, which is typically included in accordance with conventional data transfer protocols, such as a portable executable or standard “.exe” file format for Windows OS application programs, a Java class header for Java applets, and so on for other applications, distributed components, etc. “Zipped”, meta or other compressed files, which might include one or more executables, also typically provide standard single or multi-level headers that can be read and used to identify included executable code (or other included information types). File type detector **502** is also configurable for analyzing potential-Downloadables for all potential file type delimiters or a more limited subset of potential file type delimiters (e.g. “.exe” or “.com” in conjunction with a DOS or Microsoft Windows as Downloadable-destination).

[00083] Known file type delimiters can, for example, be stored in a more temporary or more persistent storage (e.g. storage **404** of FIG. **4**) which file type detector **502** can compare to a received potential-Downloadable. (Such delimiters can thus also be updated in storage **404** as a new file type delimiter is provided, or a more limited subset of delimiters can also be utilized in accordance with a particular Downloadable-destination or other considerations of a particular application.) File type detector **502** further transfers to controller **506** a detected file type indicator indicating that the potential-Downloadable includes or does not include (i.e. or likely include) an executable file type.

[00084] In this example, the aforementioned detection processor is also included as pre-detection processor or, more particularly, a configurable file inflater **504**. File inflater **504** provides for opening or “inflating” compressed files in accordance with a compressed file type received from file type detector **503** and corresponding file opening parameters received from data fetcher **501**. Where a compressed file (e.g. a meta file) includes nested file type information not otherwise reliably provided in an overall file header or other information, inflater **504** returns such information to parser **502**. File inflater **504** also provides any now-accessible included

executables to control **506** where one or more included files are to be separately packaged with an MPC or policies.

[00085] Control **506**, in this example, operates in accordance with stored parameters and provides for routing detected non-Downloadables or Downloadables and control information, and for conducting the aforementioned distributed downloading of packages to Downloadable-destinations. In the case of a non-Downloadable, for example, control **506** sends the non-Downloadable to transfer engine **406** (FIG. 4) along with any indicators that might apply. For an ordinary single-executable Downloadable, control **506** sends control information to agent generator **431** and the Downloadable to linking engine **405** along with any other applicable indicators (see **641** of FIG. 6b). Control **506** similarly handles a compressed single-executable Downloadable or a multiple downloadable to be protected using a single sandboxed package. For a multiple-executable Downloadable, control **506** sends control information for each corresponding executable to agent generator agent generator **431**, and sends the executable to linking engine **405** along with controls and any applicable indicators, as in **643b** of FIG. 6b. (The above assumes, however, that distributed downloading is not utilized; when used - according to applicable parameters- control **506** also operates in accordance with the following.)

[00086] Control **506** conducts distributed protection (e.g. distributed packaging) by providing control signals to agent generator **431**, linking engine **405** and transfer engine **406**. In the present example, control **506** initially sends controls to agent generator **431** and linking engine **405** (FIG. 4) causing agent generator to generate an initial MPC and initial policies, and sends control and a detected-Downloadable to linking engine **405**. Linking engine **405** forms an initial sandboxed package, which transfer engine causes (in conjunction with further controls) to be downloaded to the Downloadable destination (**643a** of FIG. 6b). An initial MPC within the sandboxed package includes an installer and a communicator and performs installation as indicated below. The initial MPC also communicates via the communicator controls to control **506** (FIG. 5) in response to which control **506** similarly causes generation of MPC-M and policy-M modules **643c**, which linking engine **405** links and transfer engine **406** causes to be sent to the Downloadable destination, and so on for any further such modules.

[00087] (It will be appreciated, however, that an initial package might be otherwise configured or sent prior to receipt of a Downloadable in accordance with configuration

parameters or user interaction. Information can also be sent to other user devices, such as that of an administrator. Further MPCs/policies might also be coordinated by control **506** or other elements, or other suitable mechanisms might be utilized in accordance with the teachings herein.)

[00088] Regarding the remaining detection engine elements illustrated in FIG. 5, where content analysis is utilized, parser **502** can also provide a Downloadable or portions thereof to content detector **505**. Content detector **505** can then provide one or more content analyses. Binary detector **551**, for example, performs detection of binary information; pattern detector **552** further analyzes the Downloadable for patterns indicating executable code, or other detectors can also be utilized. Analysis results therefrom can be used in an absolute manner, where a first testing result indicating executable code confirms Downloadable detection, which result is then sent to control **506**. Alternatively, however, composite results from such analyses can also be sent to control **506** for evaluation. Control **506** can further conduct such evaluation in a summary manner (determining whether a Downloadable is detected according to a majority or minimum number of indicators), or based on a weighting of different analysis results. Operation then continues as indicated above. (Such analysis can also be conducted in accordance with aspects of a destination user device or other parameters.)

[00089] FIG. 6a illustrates more specific examples of indicators/parameters and known (or “knowledge base”) elements that can be utilized to facilitate the above-discussed system **400** configurability and detection. For clarity sake, indicators, parameters and knowledge base elements are combined as indicated “parameters.” It will be appreciated, however, that the particular parameters utilized can differ in accordance with a particular application, and indicators, parameters or known elements, where utilized, can vary and need not correspond exactly with one another. Any suitable explicit or referencing list, database or other storage structure(s) or storage structure configuration(s) can also be utilized to implement a suitable user/device based protection scheme, such as in the above examples, or other desired protection schema.

[00090] Executable parameters **601** comprise, in accordance with the above examples, executable file type parameters **611**, executable code parameters **612** and code pattern parameters **613** (including known executable file type indicators, header/code indicators and

patterns respectively, where code patterns are utilized). Use parameters **602** further comprise user parameters **621**, system parameters **622** and general parameters **623** corresponding to one or more users, user classifications, user-system correspondences or destination system, device or processes, etc. (e.g. for generating corresponding MPCs/policies, providing other protection, etc.). The remaining parameters include interface parameters **631** for providing MPC/policy (or further) configurability in accordance with a particular device or for enabling communication with a device user (see below), and other parameters **632**.

[00091] FIG. 6b illustrates a linking engine **405** according to an embodiment of the invention. As already discussed, linking engine **405** includes a linker for combining MPCs, policies or agents via concatenation or other suitable processing in accordance with an OS, JVM or other host executor or other applicable factors that might apply. Linking engine **405** also includes the aforementioned post-detection processor which, in this example, comprises a compressor **508**. As noted, compressor **508** receives linked elements from linker **507** and, where a potential-Downloadable corresponds to a compressed file that was inflated during detection, re-forms the compressed file. (Known file information can be provided via configuration parameters, substantially reversal of inflating or another suitable method.) Encryption or other post-detection processing can also be conducted by linking engine **508**.

[00092] FIGS. 7a, 7b and 8 illustrate a “sandbox protection” system, as operable within a receiving destination-device, according to an embodiment of the invention.

[00093] Beginning with FIG. 7a, a client **146** receiving sandbox package **340** will “recognize” sandbox package **340** as a (mobile) executable and cause a mobile code installer **711** (e.g. an OS loader, JVM, etc.) to be initiated. Mobile code installer **711** will also recognize sandbox package **340** as an executable and will attempt to initiate sandbox package **340** at its “beginning.” Protection engine **400** processing corresponding to destination **700** use of a such a loader, however, will have resulted in the “beginning” of sandbox package **340** as corresponding to the beginning of MPC **341**, as noted with regard to the above FIG. 4 example.

[00094] Such protection engine processing will therefore cause a mobile code installer (e.g. OS loader **711**, for clarity sake) to initiate MPC **341**. In other cases, other processing might also be utilized for causing such initiation or further protection system operation. Protection engine processing also enables MPC **341** to effectively form a protection “sandbox” around

Downloadable (e.g. detected-Downloadable or “XEQ”) **343**, to monitor Downloadable **343**, intercept determinable Downloadable **343** operation (such as attempted accesses of Downloadable **343** to destination resources) and, if “malicious”, to cause one or more other operations to occur (e.g. providing an alert, offloading the Downloadable, offloading the MPC, providing only limited resource access, possibly in a particular address space or with regard to a particularly “safe” resource or resource operation, etc.).

[00095] MPC **341**, in the present OS example, executes MPC element installation and installs any policies, causing MPC **341** and protection policies **342** to be loaded into a first memory space, PI. MPC **341** then initiates loading of Downloadable **343**. Such Downloadable initiation causes OS loader **711** to load Downloadable **343** into a further working memory space-**P2 703** along with an API import table (“IAT”) **731** for providing Downloadable **631** with destination resource access capabilities. It is discovered, however that the IA T can be modified so that any call to an API can be redirected to a function within the MPC. The technique for modifying the IA T is documented within the MSDN (Microsoft Developers Network) Library CD in several articles. The technique is also different for each operating system (e.g. between Windows **9x** and Windows NT), which can be accommodated by agent generator configurability, such as that given above. MPC **341** therefore has at least initial access to API IAT **731** of Downloadable **632**, and provides for diverting, evaluating and responding to attempts by Downloadable **632** to utilize system APIs **731**, or further in accordance with protection policies **342**. In addition to API diverting, MPC **341** can also install filter drivers, which can be used for controlling access to resources such as a Downloadable-destination file system or registry. Filter driver installation can be conducted as documented in the MSDN or using other suitable methods.

[00096] Turning to FIG. 8 with reference to FIG. 7b, an MPC **341** according to an embodiment of the invention includes a package extractor **801**, executable installer **802**, sandbox engine installer **803**, resource access diverter **804**, resource access (attempt) analyzer **805**, policy enforcer **806** and MPC de-installer **807**. Package extractor **801** is initiated upon initiation of MPC **341**, and extracts MPC **341** elements and protection policies **342**. Executable installer **802** further initiates installation of a Downloadable by extracting the downloadable from the protected package, and loading the process into memory in suspended mode (so it only loads into memory, but does not start to run). Such installation further causes the operating system to

initialize the Downloadable's IAT **731** in the memory space of the downloadable process, **P2**, as already noted.

[00097] Sandbox engine installer **803** (running in process space **PI**) then installs the sandbox engine (**803-805**) and policies **342** into the downloadable process space **P2**. This is done in different way in each operating system (e.g. see above). Resource access diverter **804** further modifies those Downloadable-API IAT entries that correspond with protection policies **342**, thereby causing corresponding Downloadable accesses via Downloadable-API IAT **731** to be diverted resource access analyzer **805**.

[00098] During Downloadable operation, resource access analyzer or “RAA” **805** receives and determines a response to diverted Downloadable (i.e. “malicious”) operations in accordance with corresponding protection policies of policies **342**. (RAA **805** or further elements, which are not shown, can further similarly provide for other security mechanisms that might also be implemented.) Malicious operations can for example include, in a Windows environment: file operations (e.g. reading, writing, deleting or renaming a file), network operations (e.g. listen on or connect to a socket, send/receive data or view intranet), OS registry or similar operations (read/write a registry item), OS operations (exit as/client, kill or change the priority of a process/thread, dynamically load a class library), resource usage thresholds (e.g. memory, CPU, graphics), etc.

[00099] Policy enforcer **806** receives RAA **805** results and causes a corresponding response to be implemented, again according to the corresponding policies. Policy enforcer **806** can, for example, interact with a user (e.g. provide an alert, receive instructions, etc.), create a log file, respond, cause a response to be transferred to the Downloadable using “dummy” or limited data, communicate with a server or other networked device (e.g. corresponding to a local or remote administrator), respond more specifically with a better known Downloadable, verify accessibility or user/system information (e.g. via local or remote information), even enable the attempted Downloadable access, among a wide variety of responses that will become apparent in **20** view of the teachings herein.

[000100] The FIG. 9 flowchart illustrates a protection method according to an embodiment of the invention. In step **901**, a protection engine monitors the receipt, by a server or other re-communicator of information, and receives such information intended for a protected

information-destination (i.e. a potential-Downloadable) in step **903**. Steps **905-911** depict an adjunct trustworthiness protection that can also be provided, wherein the protection engine determines whether the source of the received information is known to be “unfriendly” and, if so, prevents current (at least unaltered) delivery of the potential-Downloadable and provides any suitable alerts. (The protection engine might also continue to perform Downloadable detection and nevertheless enable delivery or protected delivery of a non-Downloadable, or avoid detection if the source is found to be “trusted”, among other alternatives enabled by the teachings herein.)

[000101] If, in step **913**, the potential-Downloadable source is found to be of an unknown or otherwise suitably authenticated/certified source, then the protection engine determines whether the potential-Downloadable includes executable code in step **915**. If the potential-Downloadable does not include executable code, then the protection engine causes the potential-Downloadable to be delivered to the information-destination in its original form in step **917**, and the method ends. If instead the potential-Downloadable is found to include executable code in step **915** (and is thus a “detected-Downloadable”), then the protection engine forms a sandboxed package in step **919** and causes the protection agent to be delivered to the information-Destination in step **921**, and the method ends. As was discussed earlier, a suitable protection agent can include mobile protection code, policies and the detected-Downloadable (or information corresponding thereto).

[000102] The FIG. 10a flowchart illustrates a method for analyzing a potential-Downloadable, according to an embodiment of the invention. As shown, one or more aspects can provide useful indicators of the inclusion of executable code within the potential-Downloadable. In step **1001**, the protection engine determines whether the potential-Downloadable indicates an executable file type, for example, by comparing one or more included file headers for file type indicators (e.g. extensions or other descriptors). The indicators can be compared against all known file types executable by all protected Downloadable destinations, a subset, in accordance with file types executable or desirably executable by the Downloadable-destination, in conjunction with a particular user, in conjunction with available information or operability at the destination, various combinations, etc.

[000103] Where content analysis is conducted, in step **1003** of FIG. 10a, the protection engine analyzes the potential-Downloadable and determines in accordance therewith whether the potential-Downloadable does or is likely to include binary information, which typically indicates executable code. The protection engine further analyzes the potential-Downloadable for patterns indicative of included executable code in step **1003**. Finally, in step **1005**, the protection engine determines whether the results of steps **1001** and **1003** indicate that the potential-Downloadable more likely includes executable code (e.g. via weighted comparison of the results with a suitable level indicating the inclusion or exclusion of executable code). The protection engine, given a suitably high confidence indicator of the inclusion of executable code, treats the potential-Downloadable as a detected-Downloadable.

[000104] The FIG. 10b flowchart illustrates a method for forming a sandboxed package according to an embodiment of the invention. As shown, in step **1011**, a protection engine retrieves protection parameters and forms mobile protection code according to the parameters. The protection engine further, in step **1013**, retrieves protection parameters and forms protection policies according to the parameters. Finally, in step **1015**, the protection engine couples the mobile protection code, protection policies and received-information to form a sandboxed package. For example, where a Downloadable-destination utilizes a standard windows executable, coupling can further be accomplished via concatenating the MPC for delivery of MPC first, policies second, and received information third. (The protection parameters can, for example, include parameters relating to one or more of the Downloadable destination device/process, user, supervisory constraints or other parameters.)

[000105] The FIG. 11 flowchart illustrates how a protection method performed by mobile protection code (“MPC”) according to an embodiment of the invention includes the MPC installing MPC elements and policies within a destination device in step **1101**. In step **1102**, the MPC loads the Downloadable without actually initiating it (i.e. for executables, it will start a process in suspended mode). The MPC further forms an access monitor or “interceptor” for monitoring or “intercepting” downloadable destination device access attempts within the destination device (according to the protection policies in step **1103**, and initiates a corresponding Downloadable within the destination device in step **1105**).

[000106] If, in step **1107**, the MPC determines, from monitored/intercepted information, that the Downloadable is attempting or has attempted a destination device access considered undesirable or otherwise malicious, then the MPC performs steps **1109** and **1111**; otherwise the MPC returns to step **1107**. In step **1109**, the MPC determines protection policies in accordance with the access attempt by the Downloadable, and in step **1111**, the MPC executes the protection policies. (protection policies can, for example, be retrieved from a temporary, e.g. memory/cache, or more persistent storage.)

[000107] As shown in the FIG. 12a example, the MPC can provide for intercepting Downloadable access attempts by a Downloadable by installing the Downloadable (but not executing it) in step **1201**. Such installation will cause a Downloadable executor, such as a the Windows operating system, to provide all required interfaces and parameters (such as the IAT, process ill, etc.) for use by the Downloadable to access device resources of the host device. The MPC can thus cause Downloadable access attempts to be diverted to the MPC by modifying the Downloadable IAT, replacing device resource location indicators with those of the MPC (step **1203**).

[000108] The FIG. 12b example further illustrates an example of how the MPC can apply suitable policies in accordance with an access attempt by a Downloadable. As shown, the MPC receives the Downloadable access request via the modified IAT in step **1211**. The MPC further queries stored policies to determine a policy corresponding to the Downloadable access request in step **1213**.

[000109] The foregoing description of preferred embodiments of the invention is provided by way of example to enable a person skilled in the art to make and use the invention, and in the context of particular applications and requirements thereof. Various modifications to the embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles, features and teachings disclosed herein. The embodiments described herein are not intended to be exhaustive or limiting. The present invention is limited only by the following claims.

CLAIMS

What is claimed is:

1. A computer-based method, comprising the steps of:
receiving an incoming Downloadable;
deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and
storing the Downloadable security profile data in a database.
2. The computer-based method of claim 1 further comprising storing a date & time when the Downloadable security profile data was derived, in the database.
3. The computer-based method of claim 1 wherein the Downloadable includes an applet.
4. The computer-based method of claim 1 wherein the Downloadable includes an active control.
5. The computer-based method of claim 1 wherein the Downloadable includes program script.
6. The computer-based method of claim 1 wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.
7. The computer-based method of claim 1 wherein the Downloadable security profile data includes a URL from where the Downloadable originated.
8. The computer-based method of claim 1 wherein the Downloadable security profile data includes a digital certificate.
9. The computer-based method of claim 1 wherein said deriving Downloadable security profile data comprises disassembling the incoming Downloadable.
10. A system for managing Downloadables, comprising:
a receiver for receiving an incoming Downloadable;

a Downloadable scanner coupled with said receiver, for deriving security profile data for the Downloadable, including a list of suspicious computer operations that may be attempted by the Downloadable; and

a database manager coupled with said Downloadable scanner, for storing the Downloadable security profile data in a database.

11. The system of claim 10 wherein said database manager also stores a date & time when the Downloadable security profile data was derived by said Downloadable scanner, in the database.

12. The system of claim 10 wherein the Downloadable includes an applet.

13. The system of claim 10 wherein the Downloadable includes an active control.

14. The system of claim 10 wherein the Downloadable includes program script.

15. The system of claim 10 wherein suspicious computer operations include calls made to an operating system, a file system, a network system, and to memory.

16. The system of claim 10 wherein the Downloadable security profile data includes a URL from where the Downloadable originated.

17. The system of claim 10 wherein the Downloadable security profile data includes a digital certificate.

18. The system of claim 10 wherein said Downloadable scanner comprises a disassembler for disassembling the incoming Downloadable.

ABSTRACT

Protection systems and methods provide for protecting one or more personal computers (“PCs”) and/or other intermittently or persistently network accessible devices or processes from undesirable or otherwise malicious operations of Java TN applets, ActiveX™ controls, JavaScript™ scripts, Visual Basic scripts, add-ins, downloaded/uploaded programs or other “Downloadables” or “mobile code” in whole or part. A protection engine embodiment provides, within a server, firewall or other suitable “recommunicator,” for monitoring information received by the communicator, determining whether received information does or is likely to include executable code, and if so, causes mobile protection code (MPC) to be transferred to and rendered operable within a destination device of the received information, more suitably by forming a protection agent including the MPC, protection policies and a detected-Downloadable. An MPC embodiment further provides, within a Downloadable-destination, for initiating the Downloadable, enabling malicious Downloadable operation attempts to be received by the MPC, and causing (predetermined) corresponding operations to be executed in response to the attempts, more suitably in conjunction with protection policies.

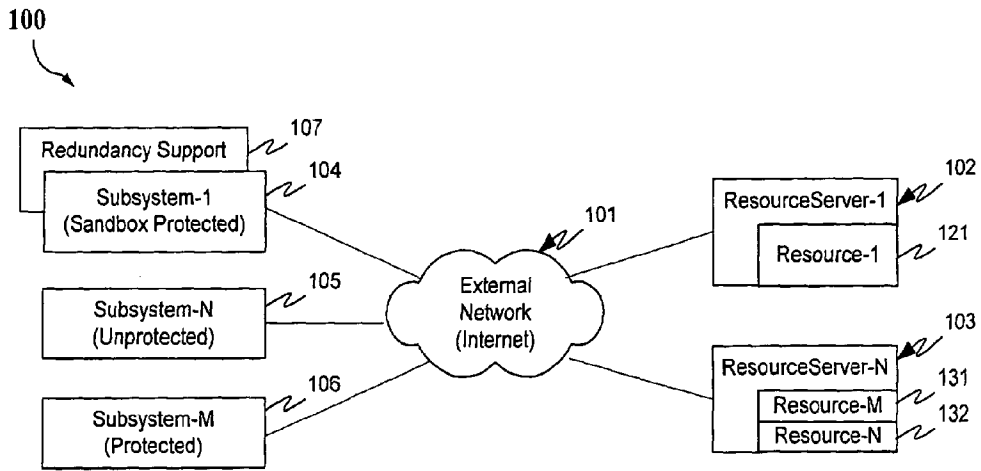


FIG. 1a

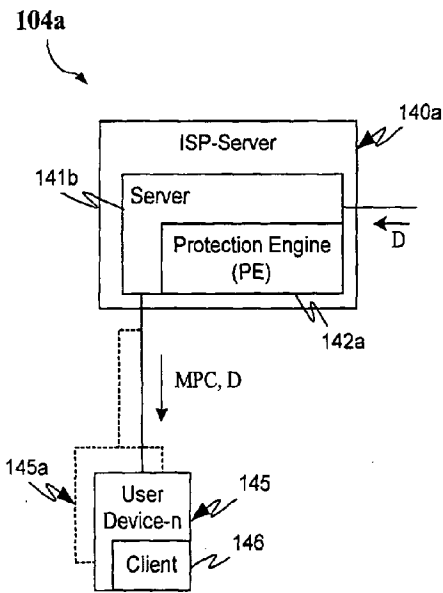


FIG. 1b

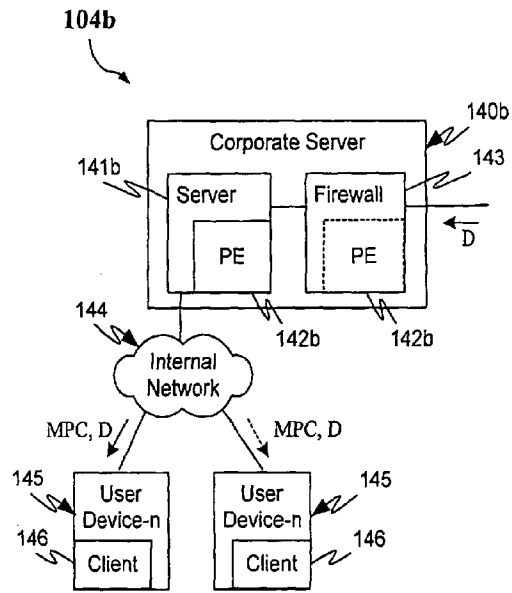


FIG. 1c

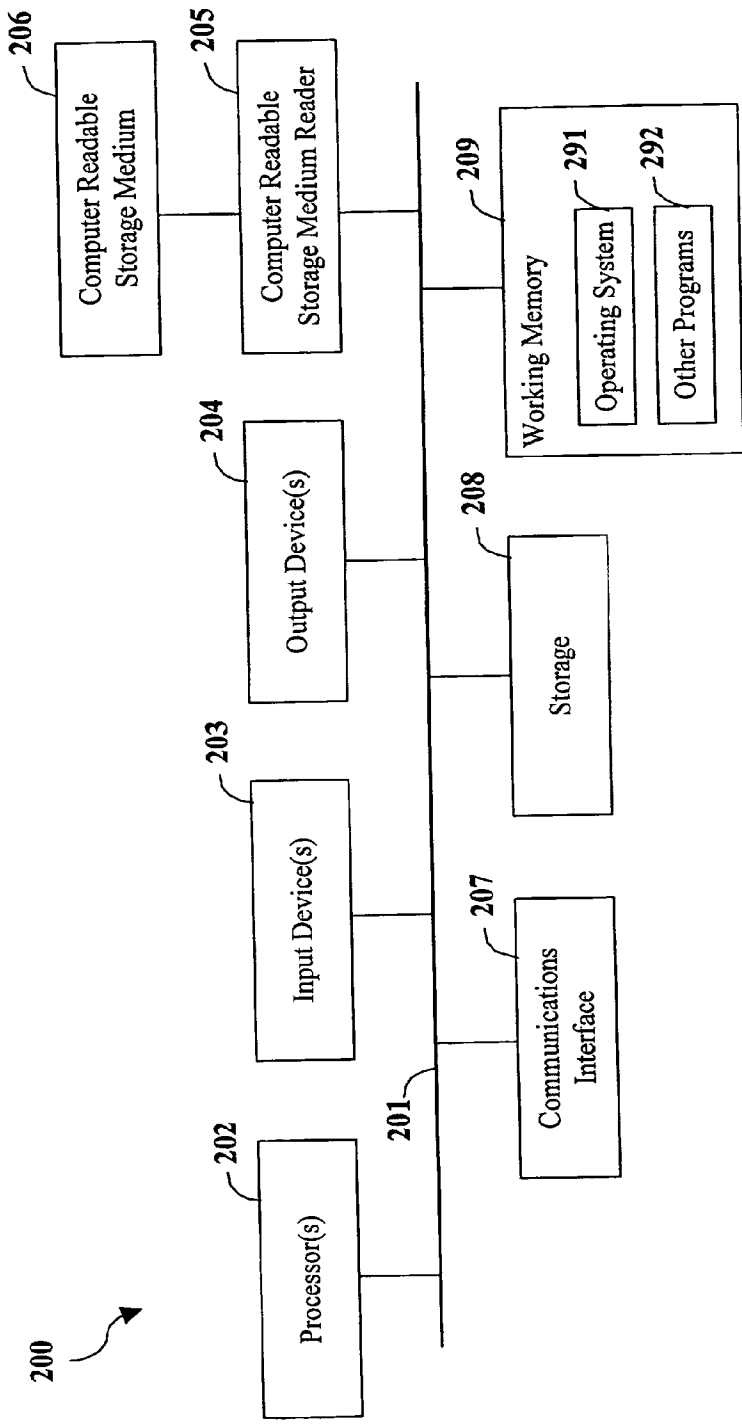


FIG. 2

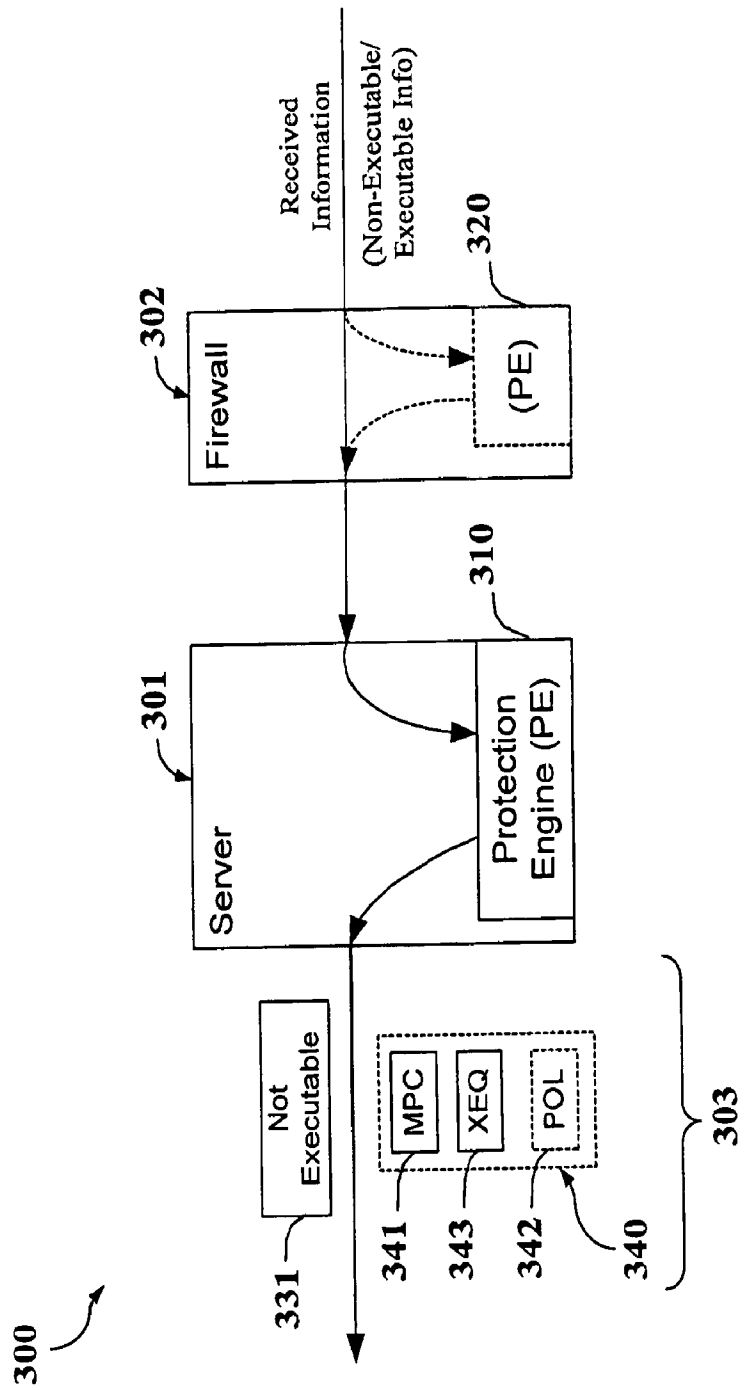


FIG. 3

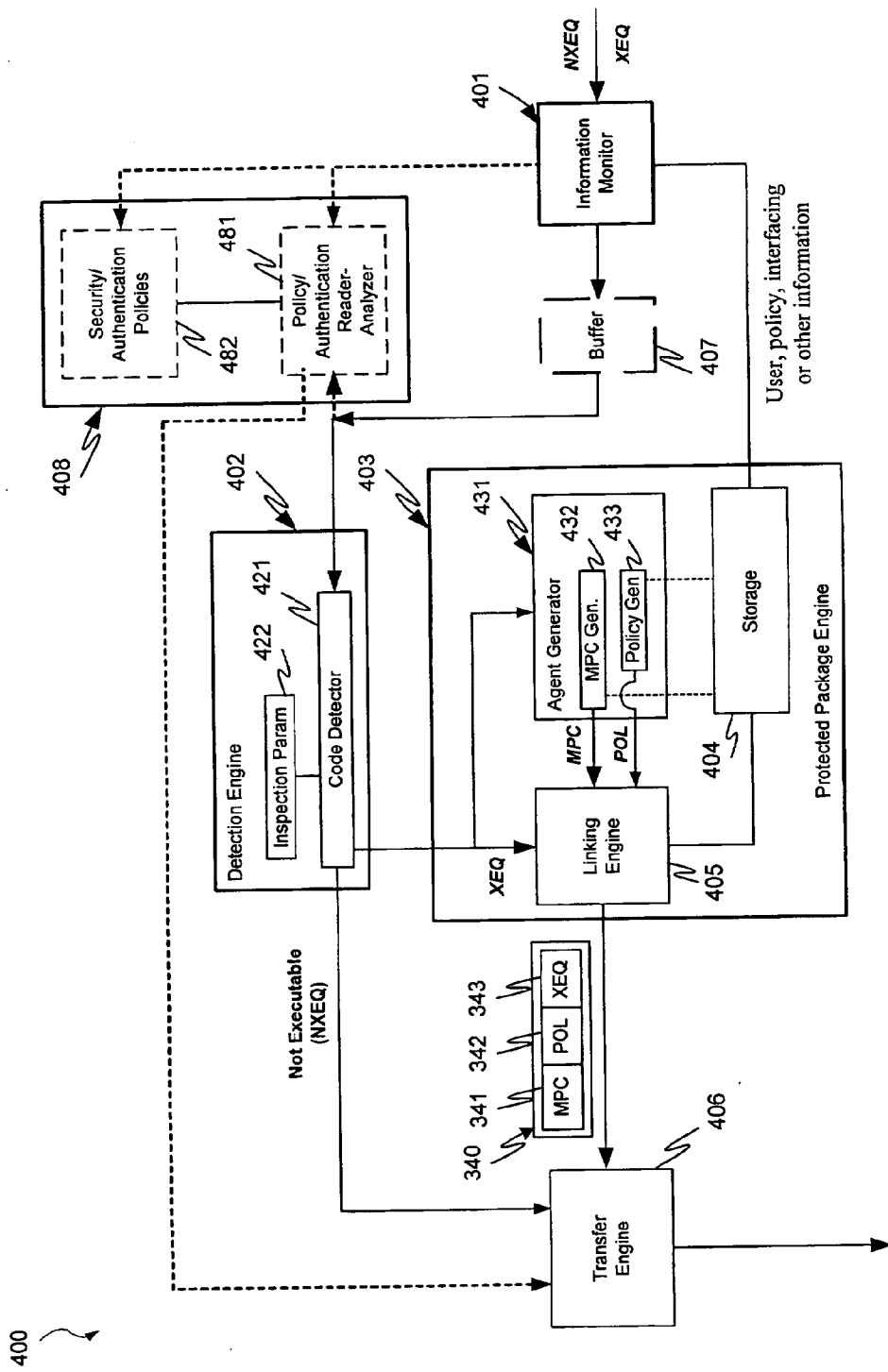


FIG. 4

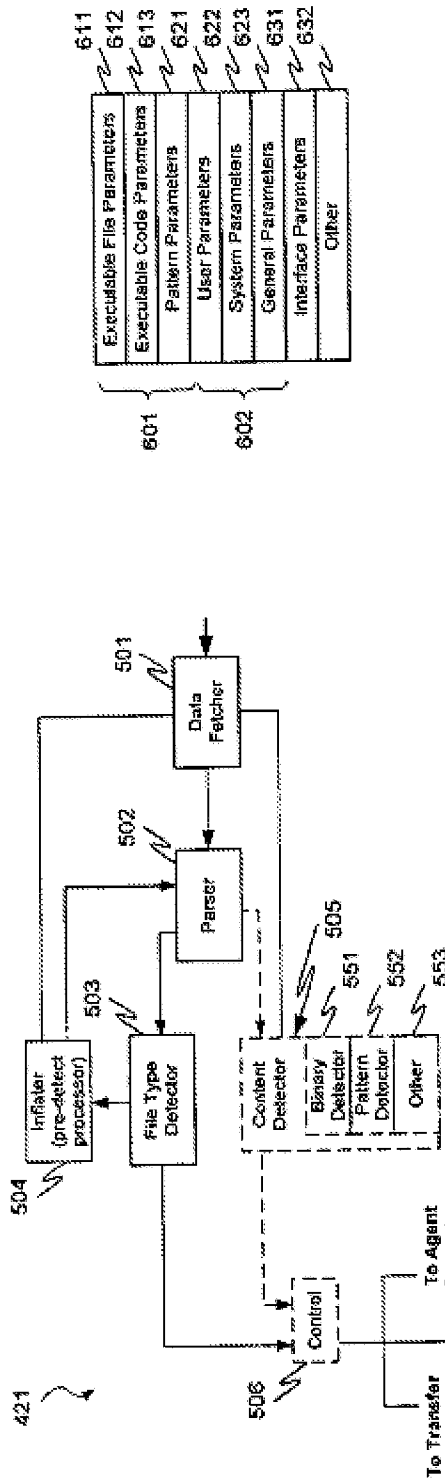


FIG. 5

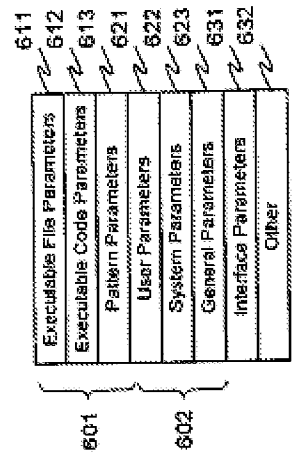


FIG. 6a

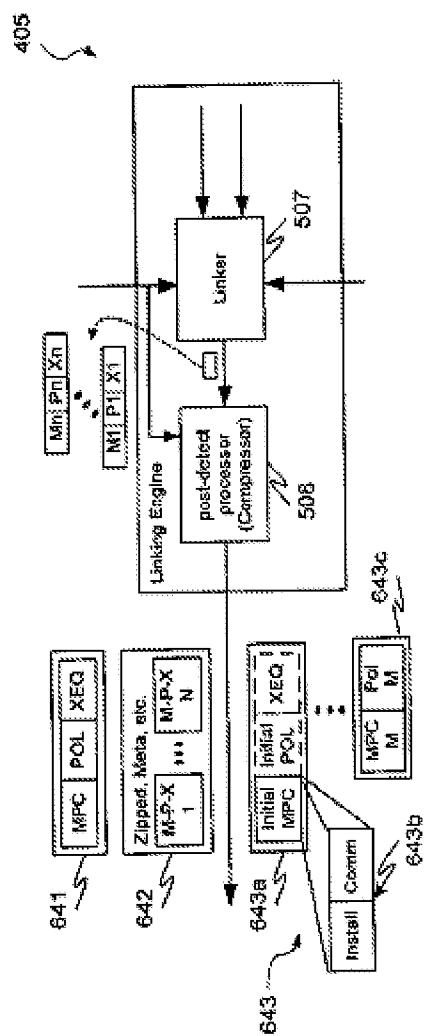


FIG. 6b

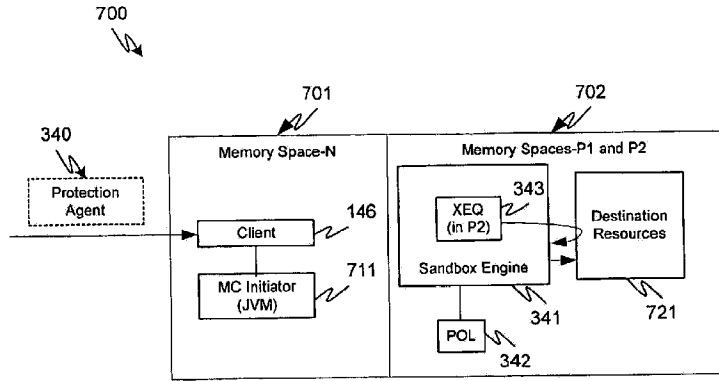


FIG. 7a

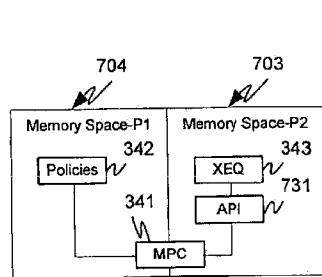


FIG. 7b

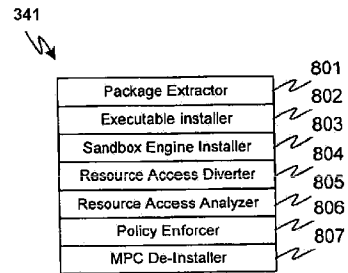


FIG. 8

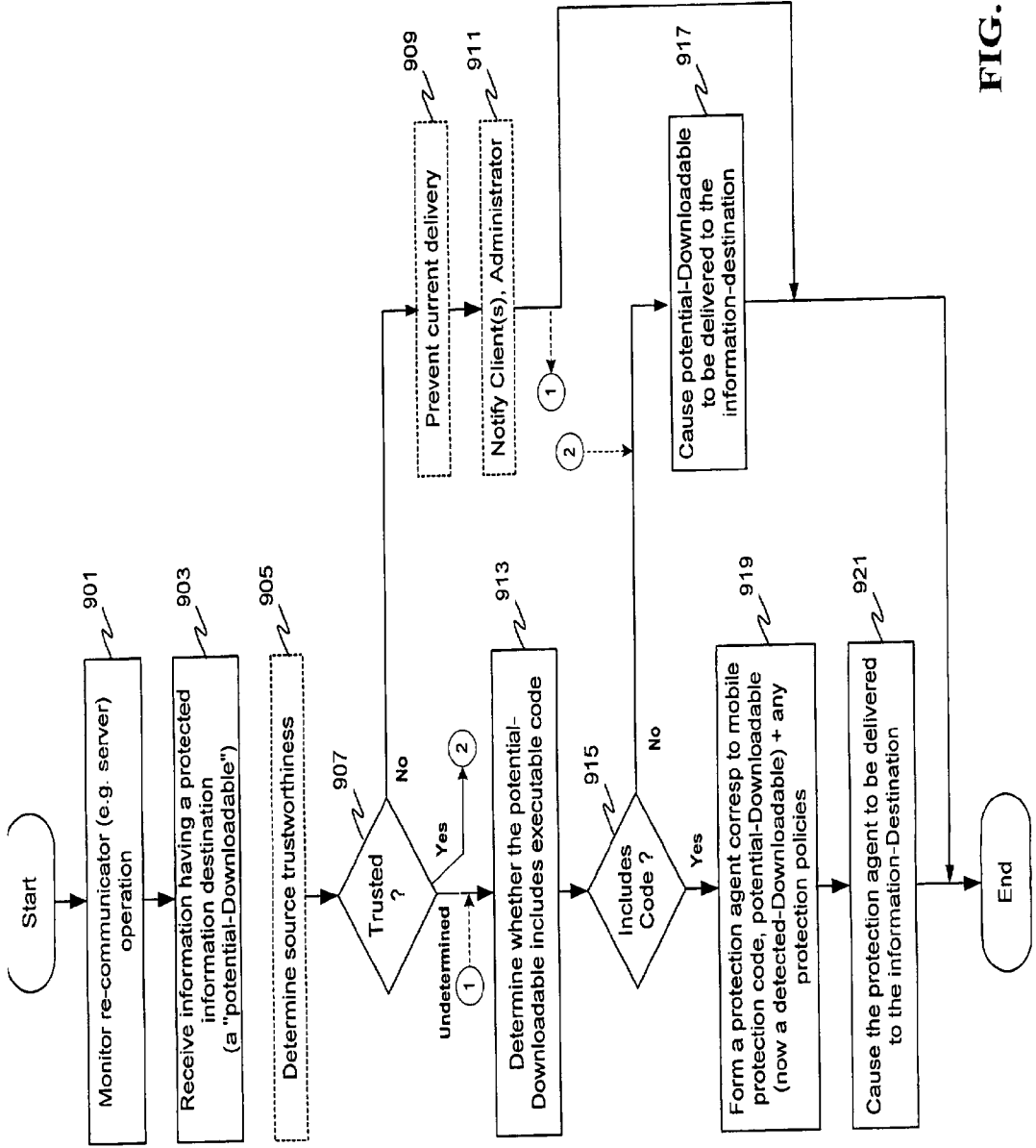


FIG. 9

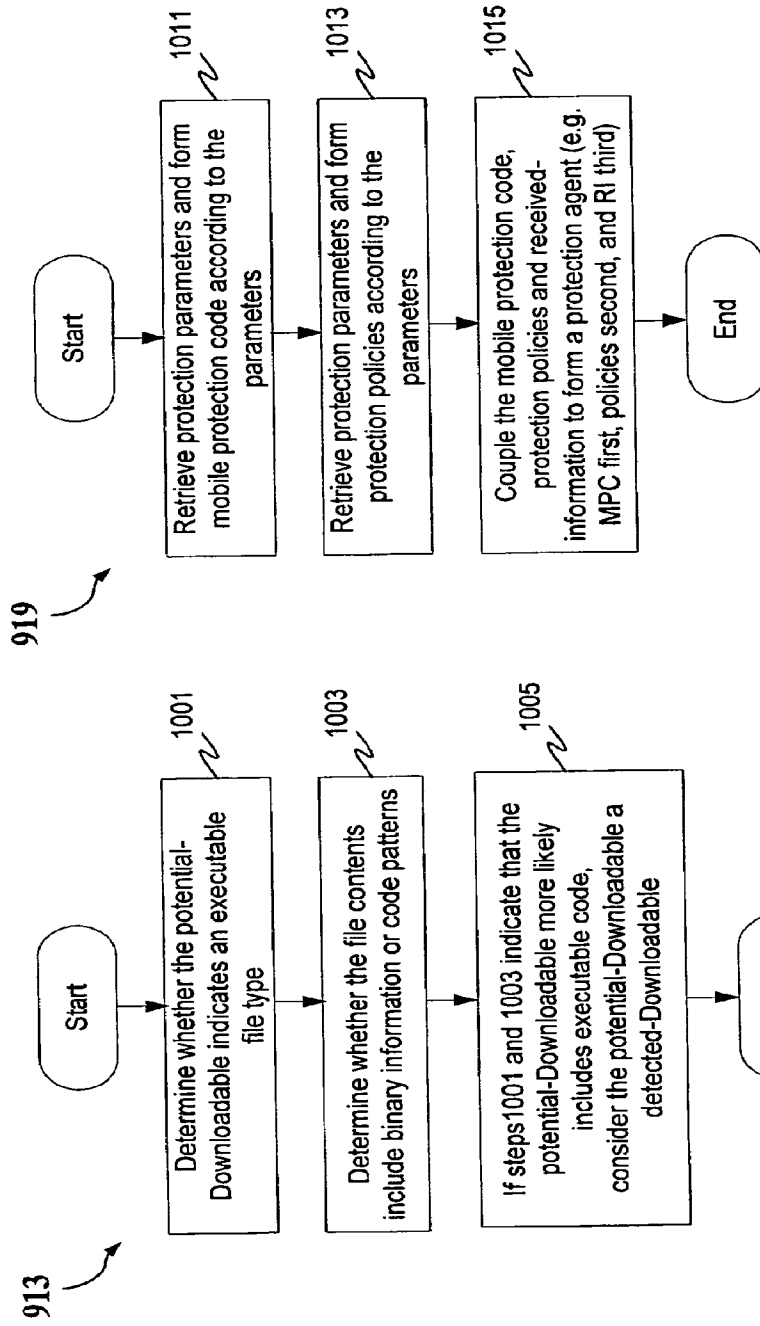


FIG. 10A

FIG. 10B

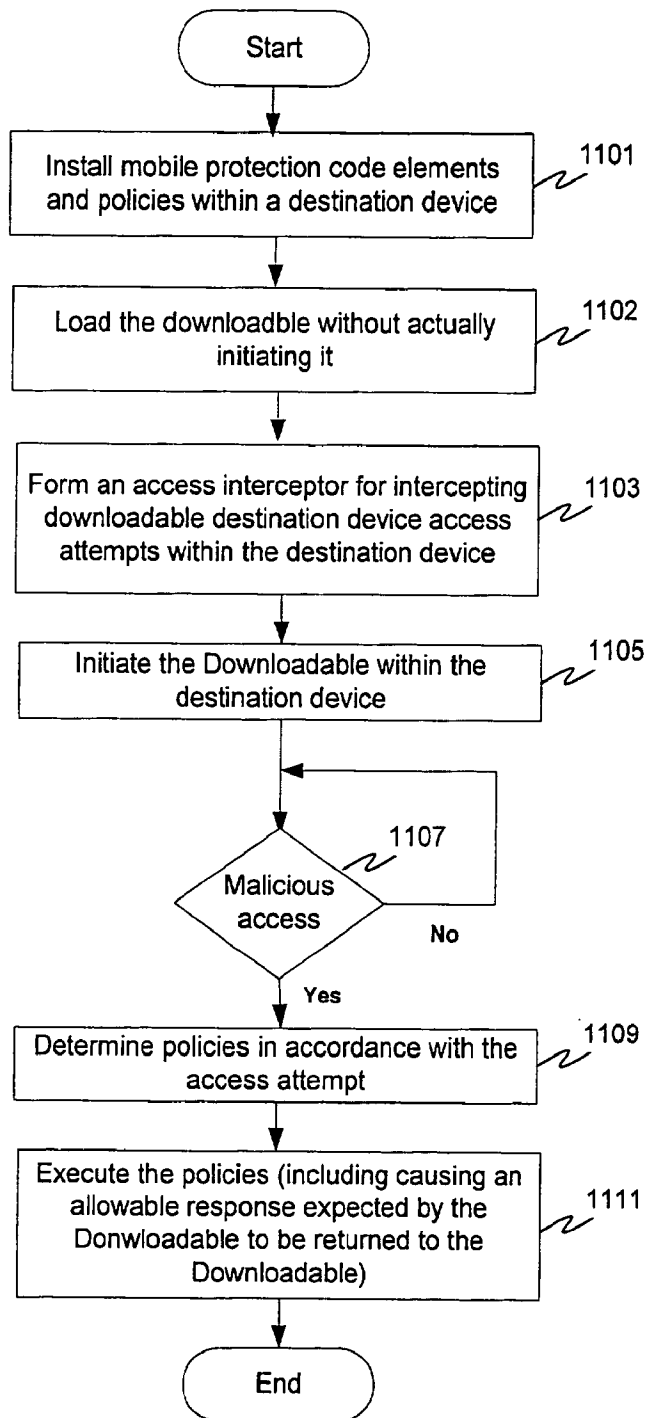


FIG. 11

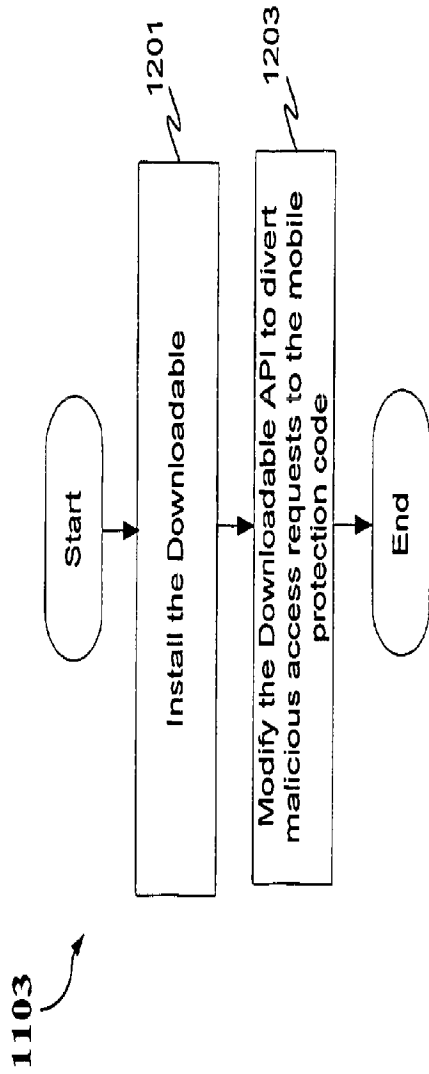


FIG. 12a

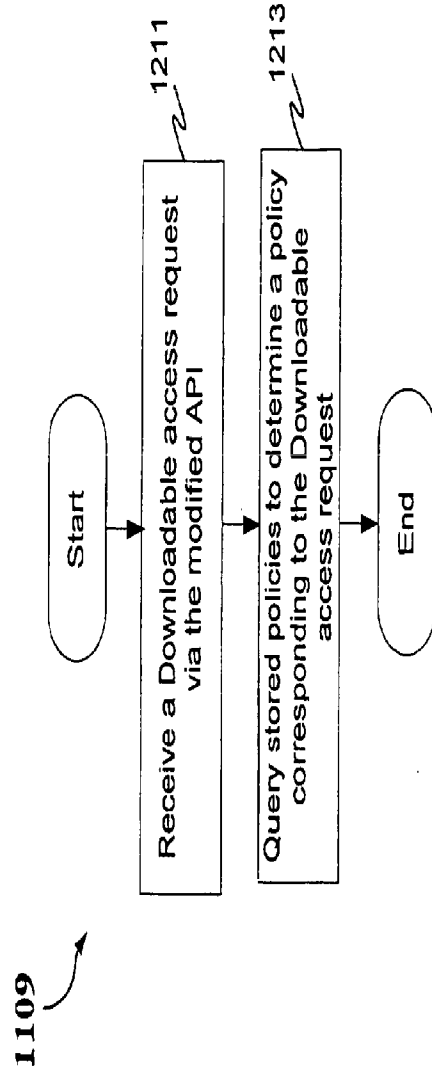


FIG. 12b

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:)		
)	Examiner:	To Be Assigned
Yigal Mordechai Eder)		
Nimrod Itzhak Vered)	Art Unit:	To Be Assigned
David R. Kroll)		
Shlomo Touboul)		
)		
Application No: To Be Assigned)		
)		
Filed: Herewith)		
)		
For: MALICIOUS MOBILE CODE)		
RUNTIME MONITORING)		
SYSTEM AND METHODS)		
_____)		

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 P. O. Box 1450
 Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Prior to examination, please consider the following remarks relating to the above-identified application.

Remarks begin on page 2 of this paper.

REMARKS

Applicants' representative has carefully reviewed the June 15, 2011 Office Action for the parent application, U.S. Serial No. 12/471,942 (the "June 2011 Office Action"). In Paragraphs 12 and 13 of the June 2011 Office Action, claims **77 – 94 (renumbered as claims 1-18 in this application)** were rejected under 35 U.S.C. §102(e) as being anticipated by Ji, U.S. Patent No. 5,983,348 ("Ji").

In Applicants' preliminary amendment for the parent application, U.S. Serial No. 12/471,942, Applicants argued that Ji is not admissible prior art because Ji has a priority date of September 10, 1997, whereas the claimed invention is supported in the priority document of November 8, 1996, which pre-dates Ji. Moreover, Ji itself references the claimed invention at col. 1, line 64 – col. 2, line 42. In Paragraph 2 of the June 2011 Office Action, the Examiner requested a specific showing of support for the claimed invention in the priority document, U.S. Provisional Serial No. 60/030,639 filed on November 8, 1996, in order to overcome the prior art of Ji. Applicants are providing this showing in the details that follow.

Support for the Claimed Invention in Touboul, U.S. Provisional Patent Application No. 60/030,639 (“Touboul”)

Claim 77 (**now claim 1**) is supported in Touboul at least by page 8, lines 14 – 19: “Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion”; by page 15, lines 2 and 3: “... code scanner 325, which in step 650 decomposes the received Downloadable into DSP data ...”

Claim 79 (**now claim 3**) is supported in Touboul at least by page 2, line 4: “Examples of Downloadables include applets designed for use in the JavaTM distributing environment produced by Sun Microsystems ...”

Claim 80 (**now claim 4**) is supported in Touboul at least by page 2, lines 4 – 7: “Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation.”

Claim 82 (**now claim 6**) is supported in Touboul at least by page 9, lines 9 – 13: “DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;” and by page 16, lines 3 – 8: “Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class.”

Claim 85 (**now claim 9**) is supported in Touboul at least by page 15, line 15 – page 16, line 4: “FIG. 7 is a flowchart illustrating details of method 650 for decomposing a Downloadable. Method 650 begins in step 705 with code scanner 325 disassembling the machine code of the Downloadable. Code scanner 325 in step 710 resolves a respective command in the machine code. Code scanner 325 in step 715 determines whether the resolved command is a suspect command ... code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data ...”

Claim 86 (**now claim 10**) is supported in Touboul at least by page 8, lines 14 – 19: “Security database 240 stores ... Downloadable Security Profiles (DSPs) ... in a third data storage device 230 portion”; by page 10, lines 16 – 19: “Code scanner 325 receives unknown

Downloadables from first comparator 320 and uses conventional parsing techniques to decompose the byte code of the unknown Downloadable into DSP data;” and by page 11, lines 13 – 16: “... if second comparator 330 received the non-hostile Downloadable from code scanner 325, then ... its corresponding DSP data is stored in DSP data 310.”

Claim **88 (now claim 12)** is supported in Touboul at least by page 2, line 4: *“Examples of Downloadables include applets designed for use in the Java™ distributing environment produced by Sun Microsystems ...”*

Claim **89 (now claim 13)** is supported in Touboul at least by page 2, lines 4 – 7: *“Examples of Downloadables include applets designed for use ... in the Active X distributing environment produced by Microsoft Corporation.”*

Claim **91 (now claim 15)** is supported in Touboul at least by page 9, lines 9 – 13: *“DSP data 310 ... may include READs, WRITEs, file management operations, system management operations, memory management operations and CPU allocation operations;”* and by page 16, lines 3 – 8: *“Code scanner 325 in step 720 decodes and registers the command and the command parameters as DSP data. Code scanner 325 in step 720 registers command and command parameters into a format based on command class, e.g., file system class, network system class, memory system class and CPU system class.”*

Claim **94 (now claim 18)** is supported in Touboul at least by page 15, line 15, lines 2 and 3: *“... code scanner 325 ... decomposes the received Downloadable into DSP data ...”*

Moreover, because claims **78 – 85 (now claims 2 - 9)** depend from claim **77 (now claim 1)** and include additional features, applicants respectfully submit that claims **78 – 85 (now claims 2-9)** are allowable.

Similarly, because claims **87 – 94 (now claims 11 - 18)** depend from claim **86 (now claim 10)** and include additional features, applicants respectfully submit that claims **87 – 94 (now claims 11-18)** are allowable.

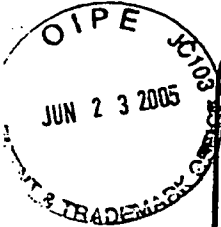
For the foregoing reasons, applicants respectfully submit that the applicable objections and rejections have been overcome and that the claims are in condition for allowance.

Respectfully submitted,

Dated: November 7, 2011
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Washington, D.C. 20006-4706
(202) 737-0500

By: /Dawn-Marie Bey - 44,442/
Dawn-Marie Bey
Registration No. 44,442

15157/105034



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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input type="checkbox"/> Declaration Submitted With Initial Filing OR <input checked="" type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	43426.00014
	First Named Inventor	Yigal EDERY
	COMPLETE IF KNOWN	
	Application Number	09/861,229
	Filing Date	May 17, 2001
	Art Unit	2152
Examiner Name	Unknown	

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MALICIOUS MOBILE CODE RUNTIME MONITORING SYSTEM AND METHODS

the specification of which (Title of the Invention)

is attached hereto
 OR
 was filed on (MM/DD/YYYY) 5/17/2001 as United States Application Number or PCT International Application Number 09/861,229 and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 385(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 3]

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.					
NAME OF SOLE OR FIRST INVENTOR:			<input type="checkbox"/> A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))		Yigal Mordechai		Family Name or Surname	
				EDERY	
Inventor's Signature			Date		
			17/4/2005		
Residence: City		State		Country	
Pardesia		N/A		Israel	
Citizenship		Israel			
Mailing Address					
Hashikma 11, POB 1115					
City		State		Zip	
Pardesia		N/A		42815	
Country		Israel			
NAME OF SECOND INVENTOR:			<input type="checkbox"/> A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))		Nimrod Itzhak		Family Name or Surname	
				VERED	
Inventor's Signature			Date		
Residence: City		State		Country	
Goosh Tel-Mond		N/A		Israel	
Citizenship		Israel			
Mailing Address					
Moshav Mismaret #81					
City		State		Zip	
Goosh Tel-Mond		N/A		40695	
Country		Israel			
<input checked="" type="checkbox"/> Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.					

[Page 2 of 3]

TOTAL P. 11

PTO/SB/01 (39-00)

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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))	Yigal Mordechai	Family Name or Surname	EDERY
Inventor's Signature	Date		
Residence: City	State	Country	Citizenship
Pardesia	N/A	Israel	Israel
Mailing Address			
Hashikma 11, POB 1115			
City	State	Zip	Country
Pardesia	N/A	42815	Israel
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))	Nimrod Itzhak	Family Name or Surname	VERED
Inventor's Signature	Date		
	19/5/05		
Residence: City	State	Country	Citizenship
Goosh Tel-Mend	N/A	Israel	Israel
Mailing Address			
Moshav Mismeret #81			
City	State	Zip	Country
Goosh Tel-Mend	N/A	40885	Israel
<input checked="" type="checkbox"/> Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.			

TOTAL P.02

PTO/BB/02A (05-04)

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DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet
	Page 3 of 3

Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
David E. KROLL			
Inventor's Signature <i>[Signature]</i>		Date <i>May 8, 2005</i>	
Residence: City San Jose	State CA	Country USA	Citizenship USA
Mailing Address 4050 Kingbrook Drive			
Mailing Address			
City San Jose	State CA	Zip 95134	Country USA
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
Shlomo TOMEHIL			
Inventor's Signature <i>[Signature]</i>		Date <i>MARCH 6, 2005</i>	
Residence: City Kfar-Haim	State N/A	Country Israel	Citizenship Israel
Mailing Address			
Mailing Address			
City Kfar-Haim	State N/A	Zip 43946	Country Israel
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle if any)		Family Name or Surname	
Inventor's Signature		Date	
Residence: City	State	Country	Citizenship
Mailing Address			
Mailing Address			
City	State	Zip	Country

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TO

03-MAY-2005 11:33 FROM FINJIN SOFTWARE




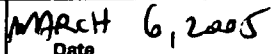
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Blue Coat Systems - Exhibit 1004

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DECLARATION**ADDITIONAL INVENTOR(S)
Supplemental Sheet**

Page 3 of 3

Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
David R.		KROLL	
Inventor's Signature 		Date 	
Residence: City	San Jose	State	CA
		Country	USA
Citizenship USA			
Mailing Address 4856 Kingbrook Drive			
Mailing Address			
City	San Jose	State	CA
		ZIP	95124
		Country	USA
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Shlomo		TOUBOUL	
Inventor's Signature 		Date 	
Residence: City	Kefar-Haim	State	N/A
		Country	Israel
Citizenship Israel			
Mailing Address			
Mailing Address			
City	Kefar-Haim	State	N/A
		Zip	42945
		Country	Israel
Name of Additional Inventor, if any		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
		Country	
Citizenship			
Mailing Address			
Mailing Address			
City		State	
		Zip	
		Country	

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Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. FIN0001-CON1-CIP1- CON4		Serial No. To Be Assigned	
INFORMATION DISCLOSURE STATEMENT							
<i>(Use several sheets if necessary)</i>				Applicant Yigal Mordechai EDERY, et al.			
				Filing Date Herewith		Group To Be Assigned	
U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
		2010/0195909	8/5/10	Wasson, et al.	382	176	1/19/10
		7,647,633	1/12/10	Edery, et al.	726	22	6/22/05
		7,613,926	11/3/09	Edery, et al.	713	181	3/7/06
		7,418,731	8/26/08	Touboul	726	22	5/3/04
		2008/0066160	3/13/08	Becker, et al.	726	4	9/11/06
		7,343,604	3/11/08	Grabarnik, et al.	719	313	7/25/03
		7,308,648	12/11/07	Buchthal, et al.	715	234	11/27/02
		7,210,041	4/24/07	Gryaznov, et al.	713	188	4/30/01
		7,143,444	11/28/06	Porras, te al.	726	30	11/28/01
		7,058,822	6/6/06	Edery, et al.	726	22	5/17/01
		2006/0048224	3/2/06	Duncan, et al.	726	22	8/30/04
		2006/0031207	2/9/06	Bjarnestam, et al.	707	3	6/8/05
		2005/0172338	8/4/05	Sandu, et al.	726	22	1/30/04
		6,917,953	7/12/05	Simon, et al.	707	204	12/17/01
		2005/0050338	3/3/05	Liang, et al.	713	188	10/9/03
		6,804,780	10/12/04	Touboul	713	181	3/30/00
		2004/0088425	5/6/04	Rubinstein, et al.	709	230	10/31/02
		6,732,179	5/4/04	Brown, et al.	709	229	10/26/99
EXAMINER				DATE CONSIDERED			
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U.S. PATENT DOCUMENTS CONT'D.							
		2004/0073811	4/15/04	Sanin	726	13	10/15/02
		6,598,033	7/22/03	Ross, et al.	706	46	7/14/97
		2003/0101358	5/29/03	Porras, et al.	726	4	11/28/01
		6,519,679	2/11/03	Devireddy, et al.	711	114	6/11/99
		2003/0014662	1/16/03	Gupta, et al.	726	23	6/13/02
		6,487,666	11/26/02	Shanklin, et al.	726	23	1/15/99
		6,480,962	11/12/02	Touboul	726	22	4/18/00
		6,434,669	8/13/02	Arimilli, et al.	711	128	9/7/99
		6,434,668	8/13/02	Arimilli, et al.	711	128	9/7/99
		6,425,058	7/23/02	Arimilli, et al.	711	134	9/7/99
		6,339,829	1/15/02	Beadle, et al.	726	15	7/30/98
		6,167,520	12/26/00	Touboul	726	23	1/29/97
		6,154,844	11/28/00	Touboul, et al.	726	24	12/22/97
		6,092,194	7/18/00	Touboul	726	24	11/6/97
		6,088,803	7/11/00	Tso, et al.	726	22	12/30/97
		6,088,801	7/11/00	Grecsek	726	1	1/10/97
		5,987,611	11/16/99	Freund	726	4	5/6/97
		5,983,348	11/9/99	Ji	726	13	9/10/97
		5,978,484	11/2/99	Apperson, et al.	705	54	4/25/96
		5,974,549	10/26/99	Golan	726	23	3/27/97
		5,963,742	10/5/99	Williams	717	143	9/8/97
		5,956,481	9/21/99	Walsh, et al.	726	23	2/6/97
		5,951,698	9/14/99	Chen, et al.	714	38	10/2/96
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U.S. PATENT DOCUMENTS CONT'D.							
		5,892,904	4/6/99	Atkinson, et al.	726	22	12/6/96
		5,884,033	3/16/99	Duvall, et al.	709	206	5/15/96
		5,881,151	3/9/99	Yamamoto	726	24	7/20/94
		5,864,683	1/26/99	Boebert, et al.	709	249	10/12/94
		5,859,966	1/12/99	Hayman, et al.	726	23	10/10/95
		5,850,559	12/15/98	Angelo, et al.	713	320	8/7/96
		5,832,274	11/3/98	Cutler, et al.	717	171	10/9/96
		5,832,208	11/3/98	Chen, et al.	726	24	9/5/96
		5,805,829	9/8/98	Cohen, et al.	709	202	10/1/96
		5,796,952	8/18/98	Davis, et al.	709	224	3/21/97
		5,784,459	7/21/98	Devarakonda, et al.	713	165	8/15/96
		5,765,205	6/9/98	Breslau, et al.	711	203	12/27/95
		5,761,421	6/2/98	van Hoff, et al.	709	223	3/25/96
		5,740,441	4/14/98	Yellin, et al.	717	134	12/20/95
		5,740,248	4/14/98	Fieres, et al.	713	156	12/19/96
		5,724,425	3/3/98	Chang, et al.	705	52	6/10/94
		5,720,033	2/17/98	Deo	726	2	7/25/95
		5,692,124	11/25/97	Holden, et al.	726	2	8/30/96
		5,692,047	11/25/97	McManis	713	167	12/8/95
		5,675,711	10/7/97	Kephart, et al.	706	12	5/13/94
		5,638,446	6/10/97	Rubin	705	51	8/28/95
		5,623,600	4/22/97	Ji, et al.	726	24	9/26/95
		5,606,668	2/25/97	Shwed	726	13	12/15/93
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U.S. PATENT DOCUMENTS CONT'D.							
		5,579,509	11/26/96	Furtney, et al.	703	27	2/8/91
		5,572,643	11/5/96	Judson	709	218	10/19/95
		5,485,575	1/16/96	Chess, et al.	714	38	11/21/94
		5,485,409	1/16/96	Gupta, et al.	726	25	4/30/92
		5,414,833	5/9/95	Hershey, et al.	726	22	10/27/93
		5,361,359	11/1/94	Tajalli, et al.	726	23	8/31/92
		5,359,659	10/25/94	Rosenthal	726	24	6/19/92
		5,077,677	12/31/91	Murphy, et al.	706	62	6/12/89
FOREIGN PATENT DOCUMENTS							
	*	EP 1132796	9/12/01	Universite Catholique De Louvain	G06F	1/00	3/8/00
	*	EP 1091276	4/11/01	Alcatel	G06F	1/00	10/6/99
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)							
	*	Zhong, et al., "Security in the Large: is Java's Sandbox Scalable?," <i>Seventh IEEE Symposium on Reliable Distributed Systems</i> , pp. 1-6, October, 1998					
	*	Rubin, et al., "Mobile Code Security," <i>IEEE Internet</i> , pp. 30-34, December, 1998					
	*	Schmid, et al. "Protecting Data From Malicious Software," <i>Proceeding of the 18th Annual Computer Security Applications Conference</i> , pp. 1-10, 2002					
	*	Corradi, et al., "A Flexible Access Control Service for Java Mobile Code," <i>IEEE</i> , pp. 356-365, 2000					
EXAMINER				DATE CONSIDERED			
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.							

* Reference cited in parent (Serial No. 12/471,942), and not provided herewith.

OTHER DOCUMENTS CONT'D. (Including Author, Title, Date, Pertinent Pages, Etc.)		
	*	International Search Report for Application No. PCT/IB97/01626, 3 pp., May 14, 1998 (mailing date)
	*	International Search Report for Application No. PCT/IL05/00915, 4 pp., dated March 3, 2006
	*	Written Opinion for Application No. PCT/IL05/00915, 5 pp., dated March 3, 2006 (mailing date)
	*	International Search Report for Application No. PCT/IB01/01138, 4 pp., September 20, 2002 (mailing date)
	*	International Preliminary Examination Report for Application No. PCT/IB01/01138, 2 pp., dated December 19, 2002
	*	Gerzic, Amer, "Write Your Own Regular Expression Parser," November 17, 2003, 18 pp., Retrieved from the Internet: http://www.codeguru.com/Cpp/Cpp/cpp_mfc/parsing/article.php/c4093/
	*	Power, James, "Lexical Analysis," 4 pp., May 14, 2006, Retrieved from the Internet: http://www.cs.may.ie/~jpower/Courses/compilers/notes/lexical.pdf
	*	Sitaker, Kragen, "Rapid Genetic Evolution of Regular Expressions" [online], <i>The Mail Archive</i> , April 24, 2004 (retrieved on December 7, 2004), 5 pp., Retrieved from the Internet: http://www.mail-archive.com/kragen-tol@canonical.org/msg00097.html
	*	"Lexical Analysis: DFA Minimization & Wrap Up" [online], Fall, 2004 [retrieved on March 2, 2005], 8 pp., Retrieved from the Internet: http://www.owlnet.rice.edu/~comp412/Lectures/L06LexWrapup4.pdf
EXAMINER		DATE CONSIDERED
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.		

* Reference cited in parent (Serial No. 12/471,942), and not provided herewith.

OTHER DOCUMENTS CONT'D. (Including Author, Title, Date, Pertinent Pages, Etc.)		
	*	“Minimization of DFA” [online], [retrieved on December 7, 2004], 7 pp., Retrieved from the Internet: http://www.cs.odu.edu/~toida/nerzic/390teched/regular/fa/rmin-fa.html
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15157/105032
 Doc. No. 17208862

* Reference cited in parent (Serial No. 12/471,942), and not provided herewith.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods			
First Named Inventor/Applicant Name:	Yigal Mordechai Edery			
Filer:	Dawn-Marie Bey./Jeanne Paolella-Bald			
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4			
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1250

Electronic Acknowledgement Receipt

EFS ID:	11352338
Application Number:	13290708
International Application Number:	
Confirmation Number:	4120
Title of Invention:	Malicious Mobile Code Runtime Monitoring System and Methods
First Named Inventor/Applicant Name:	Yigal Mordechai Edery
Customer Number:	74877
Filer:	Dawn-Marie Bey./Jeanne Paoletta-Bald
Filer Authorized By:	Dawn-Marie Bey.
Attorney Docket Number:	FIN0001-CON1-CIP1-CON4
Receipt Date:	07-NOV-2011
Filing Date:	
Time Stamp:	16:49:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1250
RAM confirmation Number	3726
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part Exhibit	Pages (if any)

1	Transmittal of New Application	fin0001con1cip1con4_utiltrans.pdf	121040 fbb7298421dd9e0f0a31c1c558332f5a52e2bb2	no	1
Warnings:					
Information:					
2	Specification	fin0001con1cip1con4_spec.pdf	178668 b9e76a32f9489f148d53e676137d2b6153c5a512	no	33
Warnings:					
Information:					
3	Drawings-only black and white line drawings	fin0001con1cip1con4_figs.pdf	382915 fa887782cde124ff5d6d99b89acb6e5c8e4589b	no	10
Warnings:					
Information:					
4	Preliminary Amendment	fin0001con1cip1con4_prelimamndmt.pdf	123574 9892457818b73a876f1b4f2a1cb7caa7bcb0ff62	no	5
Warnings:					
Information:					
5	Oath or Declaration filed	fin0001con1cip1con4_dec.pdf	248478 12e9bf41fd6b07713250217d20c1236b2e2f1e1	no	5
Warnings:					
Information:					
6	Power of Attorney	fin0001con1cip1con4_poa.pdf	505089 77f01be906d59a30c1f52d47aa38e93d7a9fb07a	no	1
Warnings:					
Information:					
7	Assignee showing of ownership per 37 CFR 3.73(b).	fin0001con1cip1con4_373b.pdf	99023 3d0c968b892d9ebb95f3ec8c81cd4a882c4e6066	no	1
Warnings:					
Information:					
8	Transmittal Letter	fin0001con1cip1con4_idstrans.pdf	101405 655fd8a0c3d9da180c3edfb32ab15832af15862ef	no	2
Warnings:					
Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	fin0001con1cip1con4_1449frm.pdf	160528 d87d34bfe1490c9320dbedc942ef1f29be241cfa	no	8
Warnings:					
Information:					

This is not an USPTO supplied IDS fillable form

10	Fee Worksheet (SB06)	fee-info.pdf	33051	no	2
			77f3f0ce01e72cd7d21e4e4e59861ddd084f7946		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/290,708	Filing Date 11/07/2011	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	SMALL ENTITY <input type="checkbox"/>	OR		SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input checked="" type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	380
<input checked="" type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A			N/A	620
<input checked="" type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	18 minus 20 =	* 0	X \$ =		OR	X \$60 =	0
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	2 minus 3 =	* 0	X \$ =			X \$250 =	0
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1250

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT	11/07/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus ** 20	= 0	X \$ =		OR	X \$60 =	0
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus *** 3	= 0	X \$ =		OR	X \$250 =	0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus **	=	X \$ =		OR	X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus ***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
 /SUSAN HAY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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