

EXHIBIT 2



US006928442B2

(12) **United States Patent**
Farber et al.

(10) **Patent No.:** US 6,928,442 B2
(45) **Date of Patent:** Aug. 9, 2005

(54) **ENFORCEMENT AND POLICING OF LICENSED CONTENT USING CONTENT-BASED IDENTIFIERS**

FOREIGN PATENT DOCUMENTS

EP 0592045 4/1994

OTHER PUBLICATIONS

(75) Inventors: **David A. Farber**, Ojai, CA (US);
Ronald D. Lachman, Northbrook, IL (US)

Gwartzman, James, et al. "The Case for Geographical Push-Caching." Technical Report HU TR 34-94 (excerpt), Harvard University, DAS, Cambridge, MA 02138, 1994, 2 pgs.
Grigni, Michelangelo, et al. "Tight Bounds on Minimum Broadcasts Networks." SIAM Journal of Discrete Mathematics, vol. 4, No. 2, May 1991, pp. 207-222.

(73) Assignees: **Kinetech, Inc.**, Northbrook, IL (US);
Savvis, Inc., Town & Country, MO (US)

Devine, Robert. "Design and Implementation of DDII: A Distributed Dynamic Hashing Algorithm." In Proceedings of 4th International Conference on Foundations of Data Organizations and Algorithms, 1993, pp. 101-114.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Deering, Stephen, et al. "Multicast Routing in Datagram Internetworks and Extended LANs." ACM Transactions on Computer Systems, vol. 8, No. 2, May 1990, pp. 85-110.

(21) Appl. No.: **09/987,723**

(22) Filed: **Nov. 15, 2001**

(65) **Prior Publication Data**

US 2002/0052884 A1 May 2, 2002

(Continued)

Related U.S. Application Data

Primary Examiner—Luke S Wossum

Assistant Examiner—Khanh Pham

(63) Continuation of application No. 09/283,160, filed on Apr. 1, 1999, now Pat. No. 6,415,280, which is a division of application No. 08/960,079, filed on Oct. 24, 1997, now Pat. No. 5,978,791, which is a continuation of application No. 08/425,160, filed on Apr. 11, 1995, now abandoned.

(74) *Attorney, Agent, or Firm*—Davidson Berquist Jackson & Gowdey, LLP

(51) **Int. Cl.**⁷ **G06F 17/30**

(57) **ABSTRACT**

(52) **U.S. Cl.** **707/10; 707/3; 707/101; 707/200; 709/203; 709/219; 709/229**

Data files are distributed across a plurality of computers. The computers may form a network such as a content delivery network (CDN) or a peer-to-peer network. The network may operate as a TCP/IP network such as the Internet. Data files may represent may represent digital messages, images, videos or audio signals. For content—data items or files in the system—a name is obtained (or determined), where the name is based, at least in part, on a given function of the data in a data item or file. The given function may be a message digest or hash function, and it may be MD4, MD5, and SHA. A copy of a requested file is only provided to licensed (or authorized) parties. The system may check one or more computers for unauthorized or unlicensed content. Content is served based on a measure of availability of servers.

(58) **Field of Search** **707/3, 6, 9, 10, 707/101, 200; 709/203, 219, 229**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,668,647 A 6/1972 Evangelisti
4,215,402 A 7/1980 Mitchell
4,290,105 A 9/1981 Cichelli
4,376,299 A 3/1983 Rivest
4,405,829 A 9/1983 Rivest
4,412,285 A 10/1983 Neches

(Continued)

56 Claims, 31 Drawing Sheets

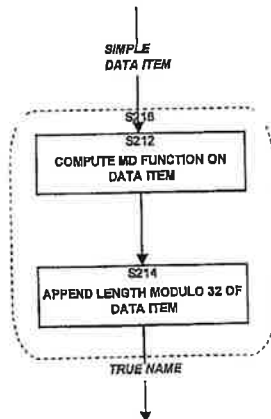


EXHIBIT 2 1

US 6,928,442 B2

Page 2

U.S. PATENT DOCUMENTS

4,414,624 A 11/1983 Summer, Jr.
 4,441,155 A 4/1984 Fletcher
 4,464,713 A 8/1984 Benhase
 4,490,782 A 12/1984 Dixon
 4,571,700 A 2/1986 Emry, Jr.
 4,577,293 A 3/1986 Matick
 4,642,793 A 2/1987 Meaden
 4,675,810 A 6/1987 Gruner
 4,691,299 A 9/1987 Rivest
 4,725,945 A 2/1988 Kronstadt
 4,773,039 A 9/1988 Zamora
 4,887,235 A 12/1989 Holloway
 4,888,681 A 12/1989 Barnes
 4,922,414 A 5/1990 Holloway
 4,922,417 A 5/1990 Churm et al. 707/1
 4,972,367 A 11/1990 Burke
 5,025,421 A 6/1991 Cho
 5,050,074 A 9/1991 Marca
 5,050,212 A 9/1991 Dyson
 5,057,837 A 10/1991 Colwell
 5,077,658 A 12/1991 Bendert
 5,129,081 A 7/1992 Kobayashi
 5,129,082 A 7/1992 Tirfing
 5,144,667 A 9/1992 Pogue, Jr.
 5,179,680 A 1/1993 Colwell
 5,202,982 A 4/1993 Gramlich et al. 707/2
 5,208,858 A 5/1993 Vollert
 5,276,901 A 1/1994 Howell
 5,287,499 A 2/1994 Nemes 707/2
 5,301,286 A 4/1994 Rajani
 5,301,316 A 4/1994 Hamilton
 5,341,477 A 8/1994 Pitkin et al. 709/226
 5,343,527 A 8/1994 Moore
 5,357,623 A 10/1994 Megory-Cohen
 5,384,565 A 1/1995 Cannon
 5,404,508 A 4/1995 Konrad
 5,452,447 A 9/1995 Nelson et al. 707/205
 5,459,860 A 10/1995 Burnett
 5,542,087 A 7/1996 Neimat et al. 707/10
 5,581,758 A 12/1996 Burnett
 5,638,443 A 6/1997 Stefik et al. 705/54
 5,640,564 A 6/1997 Hamilton et al. 709/303
 5,781,629 A * 7/1998 Haber et al. 713/177
 5,802,291 A 9/1998 Balick et al. 709/202
 5,809,494 A 9/1998 Nguyen 707/1
 5,835,087 A * 11/1998 Herz et al. 345/810
 5,907,704 A 5/1999 Gudmundson et al.
 6,006,018 A 12/1999 Burnett et al. 395/200.49
 6,134,603 A 10/2000 Jones et al. 709/330

OTHER PUBLICATIONS

Cormen, Thomas H., et al. *Introduction to Algorithms*, The MIT Press, Cambridge, Massachusetts, 1994, pp. 219–243, 991–993.

Naor, Moni, et al. “The Load, Capacity and Availability of Quorum Systems.” In Proceedings of the 35th IEEE Symposium on Foundations of Computer Science, Nov. 1994, pp. 214–225.

Nisan, Noam. “Pseudorandom Generators for Space-Bounded Computation.” In Proceedings of the Twenty-Second Annual ACM Symposium on Theory of Computing, May 1990, pp. 204–212.

Palmer, Mark, et al. “Fido: A Cache that Learns to Fetch.” In Proceedings of the 17th International Conference on Very Large Data Bases, Sep. 1991, pp. 255–264.

Peleg, David, et al. “The Availability of Quorum Systems.” *Information and Computation* 123, 1995, 210–223.

Rabin, Michael. “Efficient Dispersal of Information for Security, Load Balancing, and Fault Tolerance.” *Journal of the ACM*, vol. 36, No. 2, Apr. 1989, pp. 335–348.

Ravi, R., “Rapid Rumor Ramification: Approximating the Minimum Broadcast Time.” In Proceedings of the 35th IEEE Symposium on Foundation of Computer Science, Nov. 1994, pp. 202–213.

Schmidt, Jeanette, et al. “Chernoff–Hoeffding Bounds for Applications with Limited Independence.” In Proceedings of the 4th ACS–SIAM Symposium on Discrete Algorithms, 1993, pp. 331–340.

Tarjan, Robert Endre, et al. “Storing a Sparse Table.” *Communications of the ACM*, vol. 22, No. 11, Nov. 1979, pp. 606–611.

Wegman, Mark, et al. “New Hash Functions and Their Use in Authentication and Set Equality.” *Journal of Computer and System Sciences* vol. 22, Jun. 1981, pp. 265–279.

Vitter, Jeffrey Scott, et al. “Optimal Prefetching via Data Compression.” In Proceedings of 32nd IEEE Symposium on Foundations of Computer Science, Nov. 1991, pp. 121–130.

Fredman, Michael, et al. “Storing a Sparse Table with $O(1)$ Worst Case Access Time.” *Journal of the Association for Computing Machinery*, vol. 31, No. 3, Jul. 1984, pp. 538–544.

Yao, Andrew Chi-Chih. “Should Tables be Sorted?” *Journal of the Association for Computing Machinery*, vol. 28, No. 3, Jul. 1981, pp. 615–628.

Floyd, Sally, et al. “A reliable Multicast Framework for Light-Weight Sessions and Application Level Framing.” In Proceeding of ACM SIGCOMM '95, pp. 342–356.

Footey, Michael, et al. “Implementing Global Memory Management in a Workstation Cluster.” In Proceedings of the 15th ACM Symposium on Operating Systems Principles, 1995, pp. 201–212.

Carter, J. Lawrence, et al. “Universal Classes of Hash Functions.” *Journal of Computer and System Sciences*, vol. 18, No. 2, Apr. 1979, pp. 143–154.

Patent Abstracts of Japan, “Electronic Mail Multiplexing System and Communication Control Method in The System.” Jun. 30, 1993, JP 05162529.

Kim et al., “Experiences with Tripwire: Using Integrity Checkers For Intrusion Detection”, COAST Labs. Dept. of Computer Sciences Purdue University, Feb. 22, 1995, pp. 1–12.

Kim et al., “The Design and Implementation of Tripwire: A file System Integrity Checker”, COAST Labs. Dept. of Computer Sciences Purdue University, Nov. 19, 1993, pp. 1–21.

Bert dem Boer et al., Collisions for the compression function of MD₅, pp. 292–304.

Sakti Pramanik et al., Multi-Directory Hasing, 1993, Info. Sys., vol. 18, No. 1, pp. 63–74.

Murlidhar Koushik, Dynamic Hashing with Distributed Overflow Space: A File Organization with Good Insertion Performance, 1993, Info. Sys., vol. 18, No. 5, pp. 299–317.

Witold Litwin et al., LH⁺—Linear Hashing for Distributed Files, HP Labs Tech. Report No. HPL–93–21, Jun. 1993, pp. 1–22.

Yuliang Zheng et al., HAVAI.—A One-Way Hashing Algorithm with Variable Length of Output (Extended Abstract), pp. 83–105.

Chris Charnes and Josef Pieprzky, Linear Nonquivalence versus Nonlinearity, Pieprzky, pp. 156–164.

EXHIBIT 2 - 2

US 6,928,442 B2

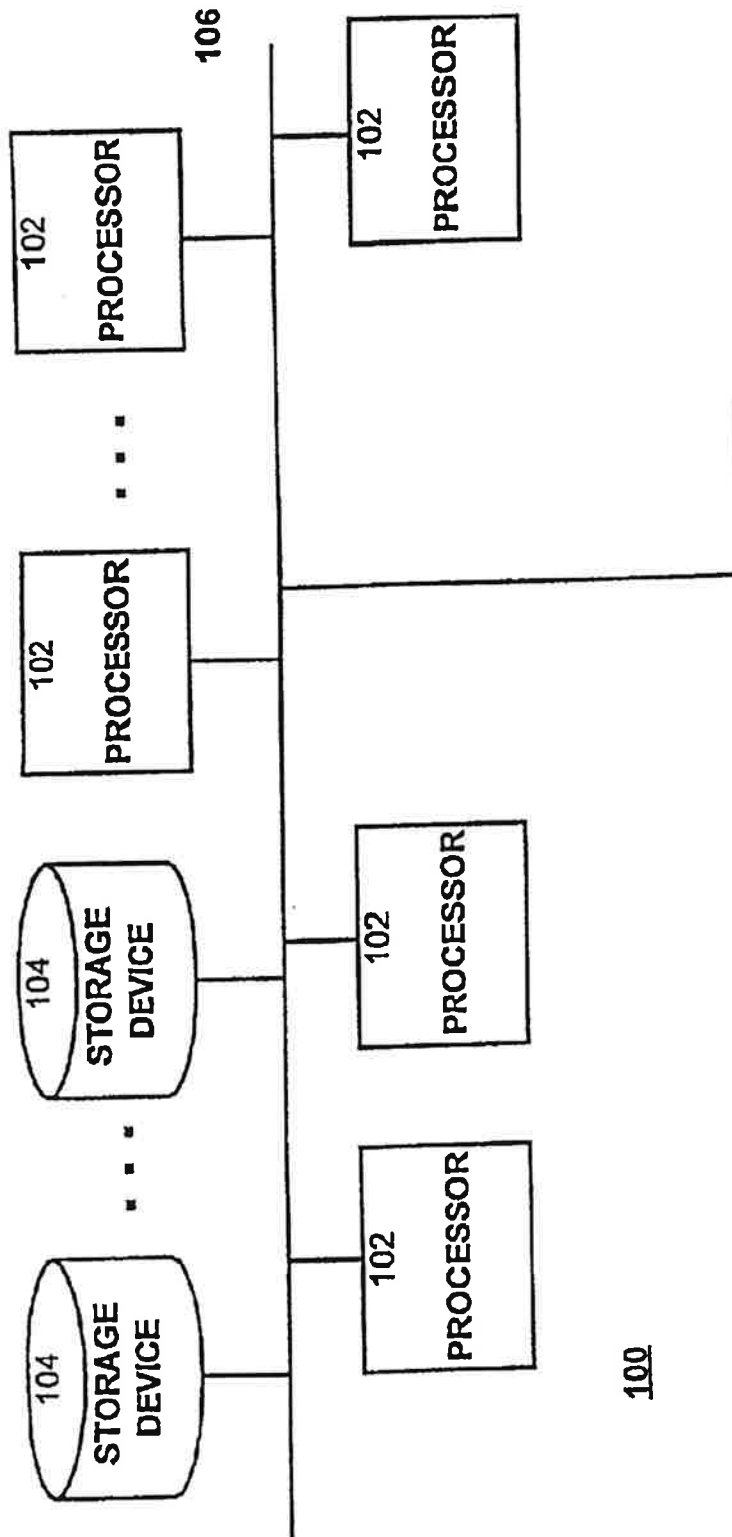
Page 3

- Witold Litwin et al., Linear Hashing for Distributed Files, ACM SIGMOD, May 1993, pp. 327–336.
- Ming-Ling Lo et al., On Optimal Processor Allocation to Support Pipelined Hash Joins, ACM SIGMOD, pp. 69–78, May 1993.
- Thomas A. Berson, Differential Cryptanalysis Mod 2^{32} with Applications to MD5, pp. 69–81.
- William Perrizo et al., Distributed Join Processing Performance Evaluation, Twenty-Seventh Hawaii International Conference on System Sciences, vol. II, pp. 236–244.
- Vijay Kumar, A Concurrency Control Mechanism Based on Extendible Hashing for Main Memory Database Systems, ACM, vol. 3, 1989, pp. 109–113.
- Birgit Pfitzman, Sorting Out Signature Schemes, Nov. 1993, 1st Conf. Computer & Comm. Security '93, p. 74–85.
- Zhiyu Tian et al., A New Hashing Function: Statistical Behaviour and Algorithm, pp. 3–13.
- G. L. Friedman, Digital Camera with Apparatu for Authentication of Images Produced from an Image File, NASA Case No. NPO–19108–1–CU, U.S. Appl. No. 08/159,980, filed Nov. 24, 1993.
- H. Goodman, Ada, Object-Oriented Techniques, and Concurrency in Teaching Data Structures and File Management Report Documentation p. AD–A275 385 – 94–04277.
- Advances in Cryptology—Eurocrypt'93, Workshop on the Theory and Application of Cryptographic Techniques Lofthus, Norway, May 23–27, 1993 Proceedings.
- Proceedings of the 1993 ACM SIGMOD International Conference on Management of Data, vol. 22, Issue 2, Jun. 1993.
- Advances in Cryptology—AUSCRYPT '92—Workshop on the Theory and Application of Cryptographic Techniques Gold Coast, Queensland, Australia, Dec. 13–16, 1992 Proceedings.
- Peter Deutsch (peterd@bunyip.com), “Re: MD5 and LIFNs (was: Misc Comments)”, www.acl.lanl.gov/URI/archive/uri-94q2.messages/0106.html, Apr. 26, 1994.
- Alexander Dupuy (dupuy@smarts.com), “RE: MD5 and LIFNs (was: Misc Comments)”, www.acl.lanl.gov/URI/archive/uri-94q2.messages/0113.html, Apr. 26, 1994.
- Alexander Dupuy (dupuy@smarts.com), “MD5 and LIFNs (was: Misc Comments)”, www.acl.lanl.gov/URI/archive/uri-94q2.messages/0081.html, Apr. 17, 1994.
- Albert Langer (cmf851@anu.oz.au), <http://groups.google.com/groups?selm=1991Aug7.225159.786%40newshost.anu.edu.au&oe=UTF-8&output=gplain>, Aug. 7, 1991.
- Clifford Lynch (Calur@uccmvs.bitnet), “ietf url/uri overview draft paper (long)”, www.acl.lanl.gov/URI/archive/uri-93q1.messages/0015.html, Mar. 25, 1993.
- K. Sollins and L. Masinter, “Functional Requirements for Uniform Resource Names”, www.w3.org/Addressing/rfc1737.txt, Dec. 1994, pp. 1–7.
- W3C:ID, HTTP: A protocol for networked information, “Basic HTTP as defined in 1992”, www.w3.org/Protocols/HTTP2.html, 1992.
- European Search Report issued Dec. 23, 2004.

* cited by examiner

EXHIBIT 2 - 3

FIG. 1(a)



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.