

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

FIRST DATA CORPORATION

Petitioner

v.

CARDSOFT INTERNATIONAL PTY LIMITED

Patent Owner

U.S. Patent No. 7,302,683

Filing Date: August 22, 2005

Issue Date: November 27, 2007

Title: METHOD AND APPARATUS FOR
CONTROLLING COMMUNICATIONS

Inter Partes Review No. Unassigned

DECLARATION OF STEPHEN GRAY

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I, Stephen Gray, declare as follows:

I. INTRODUCTION

1. I have been retained by First Data Corporation (“First Data” or “Petitioner”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office.

2. I am being compensated at a rate of \$405/hour for my work.

3. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of any proceeding.

4. I understand that this proceeding involves U.S. Patent No. 7,302,683 (“the ‘683 patent”). The application for the ‘683 patent was filed on August 22, 2005, as U.S. Patent Application No. 11/207,771 (“the ’771 application”) a continuation of U.S. Application No. 09/381,143, filed on October 22, 1999, now Patent No. 6,934,945 claiming priority to a PCT filed March 16, 1998. The ’771 application issued as the ‘683 patent on November 27, 2007.

5. I have been asked to consider whether certain references disclose or suggest the features recited in the claims of the ‘683 patent. My opinions are set forth below.

II. QUALIFICATIONS

6. I am an independent consultant. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, and deploying digital image processing systems, distributed client/server systems, graphical user interfaces, and website platforms, and e-commerce systems, and on the documents and information referenced in this declaration.

7. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I have attached to this declaration a copy of my current curriculum vitae, which details my education and experience, and a list of all other cases during the previous four years in which I testified as an expert at trial or by deposition. The following provides an overview of some of my experience that is relevant to the matters set forth in this declaration.

8. I graduated from California Polytechnic University in 1973 with a Bachelor's Degree in Economics.

9. Since the mid-1970s, I have designed, developed, and deployed distributed computing systems and products that operate in distributed computing environments, including image processing systems. As such, I have acquired

expertise and am an expert in the areas of distributed computing architecture and design, graphical user interfaces, website platforms, eCommerce systems, image processing systems, operating systems, local area and wide area networks, and various programming languages used in the development of those systems and products. I have been employed by or retained as a consultant, including acting as a litigation consultant, for numerous companies such as Burroughs, Filenet, Fujitsu, Marriott Corporation, MCI, Northern Telecom, Olivetti, TRW, and Xerox, as well as other companies.

10. As a consultant to TRW Financial Systems (TFS) in the late 1980s and early 1990s, I worked on several projects that performed various aspects of image-assisted item processing. I worked on a joint project with TFS and IBM to develop a distributed remote item processing system using IBM components including Check Processing Control System (CPCS), High Performance Transaction Systems (HPTS), CIMS, and others. Also I led the design of a high performance, LAN-based image capture and statement printing subsystem using IBM system components including CPCS, Multiple Virtual Storage/Enterprise Systems Architecture (MVS/ESA) and DB2 relational database for TFS. Finally, I led the design of an image assisted, remittance processing system using IBM system components such as CPCS, MVS/ESA and Sybase relational database in a client/server architecture for TFS.

11. I have developed and presented numerous public and in-house courses in computer system technology, including courses relating to applications for IBM MVS, UNIX, Linux, IBM OS/2, Microsoft Windows, and related networking technologies. I have lectured on distributed image processing in numerous publicly offered training sessions oriented to engineers interested in maintaining their professional credentials with continuing education units.

12. As my curriculum vitae shows, much of my career has been spent as a software development professional. As a software development professional, I have had numerous occasions to write, modify, analyze, and otherwise review bodies of source code. I have analyzed source code written in several variants of C, SQL, COBOL, RPG, variants of Basic, Java, Perl, several Assembler languages, and others. For example, as an individual contributor at Xerox during the mid-1980s to 1990, I evaluated the quality of source code from third party software providers for possible inclusion in the Xerox product line. Also, as another example, I evaluated the source code of several application software packages for completeness and maintainability for possible inclusion into the NTN product line in 2000-2001. During my early career, I spent time maintaining source code written by others. In each of these assignments, I analyzed the source code to identify the data structures, logical flow, algorithms and other aspects.

13. In addition, on several occasions, I have served as an expert witness where source code analysis was required to render an opinion. These matters include Autobytel v. Dealix; NetRatings v. Coremetrics, et al.; Ampex v. Kodak, et al.; AB Cellular v. City of Los Angeles; Oracle v. Mangosoft; Harrah’s Casino v. Station’s Casino; Autobytel v. Dealix; MediaTek v. Sanyo; MathWorks v. Comsol; and other matters still pending.

14. Also, I have served as an expert witness where operating system technology was an issue in the matter. These matters include SuperSpeed v. IBM; FedEx v. U.S.; MathWorks v. Comsol; Ametron-American Electronic Supply v. Entin, et al; BMC Software v. Peregrine Systems, Inc.; and ADV Freeman v. Boole & Babbage.

15. I was retained as an expert witness by US Bank in the DataTreasury v. Wells Fargo et al. litigation and testified during that litigation.

III. MATERIALS REVIEWED

16. In forming my opinions, I have reviewed the ‘683 patent and its file history, as well as the following documents:

Exhibit No.	Description
1001	Ogilvy U.S. Patent No. 6,934,945 (the “‘683 Patent,”)
1002	EMV ’96, Integrated Circuit Card Terminal Specification for Payment Systems, Version 3.0, June 30, 1996 (EMV ’96) 102(b)

	prior art
1004	OMNI 300 Series Terminal, Programmer’s Manual, Volume 1 and Volume 2 (“OMNI 300”), 102(b) prior art)
1005	Custy US Pat. No. 5,774,879, assigned to First Data (“First Data ‘879 Patent”) 102(e) prior art
1008	Claim Construction Order in Cardsoft, Inc., et al. v. Verifone Holdings, Inc., et al., case no. 2:08-CV-98-CE
1010	Europay Open Terminal Architecture – A Forth-based Token System for Payment Terminals (“OTA”) 102(b) prior art

17. All of the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the claims of the ‘683 patent at the time of the alleged invention, which I have been asked to initially consider as March 16, 1998, the PCT filing date of the ’143 application, and earlier.

IV. LEGAL STANDARDS

18. For purposes of this declaration, I have been asked to opine only on issues regarding 35 U.S.C. §§ 102 and 103. I have been informed of the following legal standards, which I have applied in forming my opinions.

19. I have been advised that a claim is invalid under 35 U.S.C. § 102 when a single prior art reference discloses all of the subject matter of the claim, and the claim is said to be “anticipated by the prior art.”

20. I have been advised that a patent claim may be invalid as obvious under 35 U.S.C. § 103 if the differences between the subject matter patented and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. I have also been advised that several factual inquiries underlie a determination of obviousness. These inquiries include (1) the scope and content of the prior art, (2) the level of ordinary skill in the field of the invention, (3) the differences between the claimed invention and the prior art, and (4) any objective evidence of non-obviousness.

21. I also have been advised that the law requires a “common sense” approach of examining whether the claimed invention would have been obvious to a person skilled in the art. For example, I have been advised that combining familiar elements according to known methods and in a predictable way is likely to suggest obviousness when such a combination would yield predictable results.

V. PERSON OF ORDINARY SKILL IN THE ART

22. In my opinion, the art relevant to the ‘683 patent relates to controlling remote payment transactions over a distributed network.

23. I have been advised that “a person of ordinary skill in the art in the relevant field” is a hypothetical person to whom one could assign a routine task in the relevant field (e.g., the field of networking or software for business or financial activities) with reasonable confidence that the task would be successfully carried out.

24. I was asked to give an opinion as to the level of one of ordinary skill in the art pertinent to the subject matter set forth in the ‘683 patent at the time of the invention.

25. I am familiar with the level of experience required of a person of ordinary skill in the art to be able to understand, make, and use the technology presented in the ‘683 patent. In my opinion, a person of ordinary skill in the art would be someone with a degree in Management Information Systems, Computer Science, or Electrical Engineering, or equivalent professional system development experience, plus two years of work experience with payment systems and computer networking. It is my opinion that work experience would substitute for formal education and that additional formal education, such as graduate studies, could substitute for work experience.

26. The basis for my familiarity with the level of ordinary skill is my interaction with large numbers of workers in the computing field who were at this level of skill as well as my own professional experience in the pertinent field. The

pertinent art was the configuration and arrangement of commercially available computer components, networks, systems, and software to satisfy particular customer payment system specifications, together with such programming as might be necessary to tie the components together to operate in the desired manner.

27. In reaching this opinion as to the hypothetical person of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level and professional capabilities of workers in the field.

VI. OVERVIEW OF THE '683 PATENT

28. The '683 patent is entitled "METHOD AND APPARATUS FOR CONTROLLING COMMUNICATIONS" and issued to Ian Charles Ogilivy on August 23, 2005. (Ex. 1001). The application that resulted in the '683 patent was filed on March 16, 1998 as Appl. No.: 09/381,143. There are five claims in the '683. Claim 1 is the independent claim, the rest are dependent on claim 1.

29. The '683 Patent is directed to "preparing and processing information to be communicated via a network" using a "virtual machine" (see Abstract). The main embodiment discussed is a POS device for payment transactions using credit cards.

30. Figure 2 is a schematic that illustrates the architecture of the purported invention:

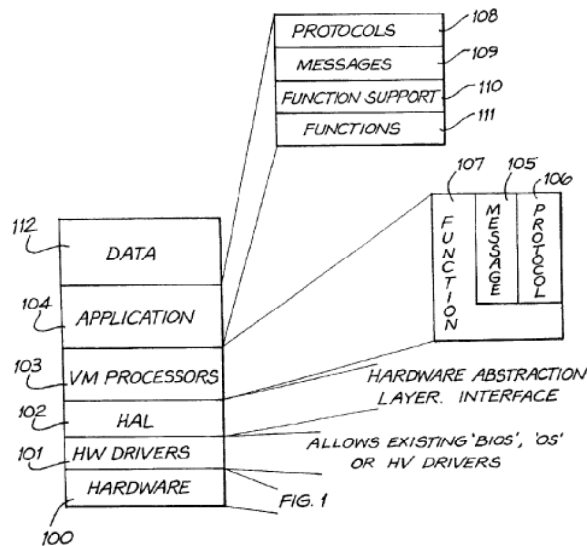


FIG. 2

31. The patent describes the “virtual machine” as containing two separate virtual processors 103, (1) a “virtual function processor” 107 for controlling operation of the device, including calling (2) a “virtual message processor” 105 to carry out “message handling tasks.” The message handling tasks include such things as receiving the input card number, PIN, etc. and transmitting them to a remote financial institution for authorization. The use of dual virtual processors is a common technique in computer operating systems of having different modules or subroutines for different tasks.

32. According to the '683 specification, the application of the concept of a virtual machine is not inventive: "The technique of creating a virtual processor (or in this case microprocessor) is well known and referred to as an interpreter" ('683 Patent, col. 3, ll 48-50). The '683 specification describes the "virtual machine" as being emulatable on different hardware platforms but, again, the specification states that the use of emulations is well understood prior art. Cardsoft '683 Patent, col. 3, lines 48-57.

33. However, the '683 specification claims that the specific embodiment of the virtual machine emulation is done in "native code" which is claimed to be inventive. Since "emulatable" logically means the code implementing the virtual machine can be rewritten to run on different machines, any code would satisfy this:

A virtual machine is computer programmed to emulate a hypothetical computer. Different incompatible computers may be programmed to emulate the same hypothetical computer.

('683 Patent, col. 3, ll. 55-58).

34. It should be noted that the use of "native code" is not required in the independent claims as discussed under claim construction below.

35. The dependent claims are directed to various features that are not defined in the '683 patent, as discussed under claim construction below.

VII. CLAIM CONSTRUCTION

36. In preparing this declaration, I was asked to consider the meaning that certain claim terms would have had to those of ordinary skill in the art. I understand that, for each claim term construed, I should use the broadest reasonable interpretation that would have been understood by one of ordinary skill in the art reading the specification of the '683 patent at the time of the patent filings.

37. I understand that the standard for claim construction at the United States Patent and Trademark Office is different from the standard used in United States District Courts. I understand that a U.S. District Court interprets claim terms based on the plain and ordinary meaning. I understand also that the United States Patent and Trademark Office interprets claim terms based on the broadest reasonable interpretation.

38. I understand that the broadest reasonable interpretation may be broader in scope than the plain and ordinary meaning. Accordingly, I understand that the United States Patent and Trademark Office may adopt a different construction from a district court when the broadest reasonable interpretation is different from the plain and ordinary meaning. The table below defines the meaning of terms used in this declaration:

Claim Term	Adopted or Proposed Meaning
<i>virtual function processor</i>	software which controls and/or selects general operations of a communication device
<i>function processor instructions</i>	a set of instructions that control operation of the communications device
<i>virtual message processor</i>	software that processes messages, including assembling, disassembling and/or comparing messages, for communication to and/or from a communications device
<i>virtual machine means</i>	not construed as means plus function language
<i>emulatable in different computers having incompatible hardware or operating systems</i>	the code can be rewritten to run on otherwise incompatible hardware
<i>message instruction means</i>	the function is: providing directions for operation of the virtual message processor; the structure is: 13:29-14:2; 15:23-34; Figure 11 and Figure 8, and equivalents thereof.
<i>an application associated with said device</i>	any application which runs on the device
<i>implementing cryptograph</i>	data transmitted to or from the terminal is

<i>series</i>	encrypted
<i>personal mobile device</i>	the device can be moved by a person
<i>implements secure communication services</i>	data transmitted to or from the terminal is encrypted

39. I note that the meanings for several of the terms stated above are the same as those definitions found in the claim construction order from *Cardsoft v. Verifone* (Ex. 1008). Any proposed differences between the claims construed in the *Cardsoft v. Verifone* matter and those proposed above are discussed below.

40. The term *virtual message processor* was construed by the court in the *Cardsoft v. Verifone* matter to mean “software implemented in the native code of the communications device that processes messages, including assembling, disassembling and/or comparing messages, for communication to and/or from a communications device.” First Data has proposed that the words “implementation in the native code of the communication device” be eliminated from this construction. The term “native code” does not appear in claim 1 with this language, but does appear in dependent claim 5, which recites the native code of the processor. There would be no difference between the native code of the processor and native code of the device. The doctrine of claim differentiation would thus suggest that the claim 1 language is broader under the IPR standard of

“broadest reasonable interpretation.” I have considered First Data’s proposal and agree with the change to the definition of the term *virtual message processor* for the purposes of this declaration.

41. The term *emulatable in different computers having incompatible hardware or operating systems* was construed by the court in the *Cardsoft v. Verifone* matter to mean “capable of executing programs on different computers having incompatible hardware or operating systems.” See *‘683 Patent at 3:43-46* (“*Any computer programmed to emulate the hypothetical computer will thus be capable of executing programs for the virtual computer.*”) First Data has proposed that the term “emulatable” simply means that the code can be rewritten to run on otherwise incompatible hardware, and thus would cover any code under a broadest reasonable construction. The patent says “the virtual machine processors are constructed using C” (*‘945 patent 11:10-11*) in the preferred embodiment. C is a popular source code language that multiple application programs can be written in. I have considered First Data’s proposal and agree with the change to the definition of the term *emulatable in different computers having incompatible hardware or operating systems* for the purposes of this declaration.

42. Claim 2 further requires that the virtual message processor be used for communication with “an application associated with the device.” *Ogilvy ‘683* states one description of an application by saying that “Application 104 controls

the virtual machine 101, 102, 103 which in turn controls operation of the hardware 100” (Ogilvy, col. 10, ll. 49-52) and that “the ‘application’ will therefore comprise instructions for the message, protocol and function processor means.” Id., at col. 5, l. 65 – col. 6, l. 2. However, there is also reference to applications that can be added to the machine, “CardScript programs” of Appendix A (col. 18, ll. 35-67). These appear to be applications which run on the virtual machine, such as a hotkeys application (Col. Col. 21, ll. 5-18). Under a broadest reasonable construction, First Data proposes to construe this term to mean “any application which runs on the device.” I have considered First Data’s proposal and agree with the definition of the term *an application associated with the device* for the purposes of this declaration.

43. Claim 3 of the Ogilvy ‘683 patent requires that the communication means that implements the virtual message processor also implements *cryptographic series*. The term “cryptographic series” and “cryptographic” only appears in claim 3, and is not described in the file history. The only mention of “encrypt” is 3 mentions in the background: “At least some and perhaps all of the transmitted data may be encrypted for security purposes and the payment terminal is therefore, in such a case, required to have means (3) providing encryption.Again, this transmitted information may be encrypted and, if so, will require translation (5) in the payment terminal.” Col. 1, l. 64- col. 2, l. 10. Accordingly,

First Data proposes to construe this term to simply mean “data transmitted to or from the terminal is encrypted.” I have considered First Data’s proposal and agree with the definition of the term *cryptographic series* for the purposes of this declaration.

44. Claim 4 of the Ogilvy ‘683 patent requires that the device be both personal and mobile. The only place the term *mobile* appears is in this claim, added in the continuation without discussion. Also, *personal* only appears in reference to a “Personal Identification Number (PIN)” in the background (col. 1, l. 54). First Data proposes that the term *personal mobile* is construed under the ordinary meaning of the words to simply mean that “the device can be moved by a person.” I have considered First Data’s proposal and agree with the definition of the term *personal mobile* for the purposes of this declaration.

45. Claim 5 of the Ogilvy ‘683 patent requires that the virtual message processor implement *secure communication services*. Again, “secure communication” only appears in this claim, and was added in the continuation without discussion. The word “secure” only appears in the appendix, where it is used to describe “secure memory,” “secure prompts,” and “secure display.” None of these appear to be the intent. First Data assumes that *secure communications services* would be construed under the ordinary meaning of the words to simply mean “the data transmitted to or from the terminal is encrypted.” I have

considered First Data's proposal and agree with the definition of the term *secure communications services* for the purposes of this declaration.

VIII. PRIOR ART CONSIDERED

46. 1. EMV '96, Integrated Circuit Card Terminal Specification for Payment Systems, Version 3.0, June 30, 1996 (EMV '96) 102(b) prior art. This is a specification by EMV (Europay, MasterCard & Visa) for terminals that accept integrated circuit cards (smart cards with chips, as opposed to mag stripe cards). It describes a virtual machine instruction set to allow terminals to emulate a virtual machine.

47. 2. OMNI 300 Series Terminal, Programmer's Manual, Volume 1 and Volume 2 ("OMNI 300"), 102(b) prior art). This manual was provided with the 300 series terminals and includes description of the message assembling, disassembling and comparison functions.

48. 3. Custy US Pat. No. 5,774,879, assigned to First Data ("First Data '879 Patent") 102(e) prior art. This is a patent of the petitioner that describes dividing the software for a terminal into a virtual execution control processor (the claimed function processor) and a virtual communication processor (the claimed message processor).

49. 4. Europay Open Terminal Architecture – A Forth-based Token System for Payment Terminals ("OTA") 102(b) prior art. This 1996 paper was

presented at the June 19-22, 1996 Rochester Forth Conference - Open Systems, in Toronto Canada. It describes prototypes exhibited and used for 4060 transactions at an Europay Members meeting in Seville, Spain June 5-7, 1996 (see Ex. __, p. 29). The paper describes a “virtual machine” with a “kernel” having functions that “can be run on any [POS] terminal” in “native code.” The functions include “message management” (the claimed virtual message processor).

IX. APPLICATION OF THE PRIOR ART TO THE CLAIMS

50. It is my opinion that claims 1 to 5 of the ‘683 patent are anticipated by EMV ‘96. Details regarding my analysis and opinion are found in Exhibit A to this declaration.

51. It is my opinion that claims 1 to 5 of the ‘683 patent are obvious over EMV ‘96 in view of OMNI 300. Details regarding my analysis and opinion are found in Exhibit A to this declaration.

52. It is my opinion that claims 1 to 5 of the ‘683 patent are obvious over EMV ‘96 in view of OTA, OMNI 300 and First Data’s ‘879 Patent. Details regarding my analysis and opinion are found in Exhibit A to this declaration.

X. MOTIVATION TO COMBINE REFERENCES

53. EMV ‘96 and OMNI 300. OMNI 300 describes software for mag stripe POS terminals using Verifone’s TXO operating system with source code in

the standard C language. EMV '96 provides standards for terminals reading integrated circuit cards (ICCs). EMV '96 basically describes desired upgrades for mag stripe terminals, such as the OMNI 300 series, to support ICC cards. EMV '96 states “This specification provides the requirements necessary to support the implementation of ICCs. These requirements are in addition to those already defined by individual payment systems and acquirers for terminals that accept magnetic stripe cards.” (p. vii). Both EMV '96 and OMNI 300 are directed to POS devices and one of skill in the art looking at updating the OMNI 300 in 1998 would want to make sure it complied with EMV '96, the de facto industry standard.

54. EMV '96, OTA, OMNI 300 and First Data '879. It would be obvious to combine these references because all relate to POS terminals. In 1998, it would have been obvious to a person looking to improve EMV '96 to incorporate aspects of OTA because both documents are directed to point of service (POS) terminals, both relate to ICC readers, and both relate to Europay terminals. The OTA title refers to Europay, the E in EMV '96. The First Data '879 Patent describes a virtual processor with virtual processor modules for a POS terminal, and thus would be obvious to combine with the virtual machines of EMV '96 and OTA. Both deal with virtual processors for such devices. EMV '96 and the First Data '879 Patent disclose financial processing systems that are intended to be portable

among various software and hardware platforms (see First Data '879 col. 2, lines 43-45), and thus are not just related POS subject matter, but are both directed to the same emulation concept. The First Data '879 Patent would show one of skill in the art the division of the virtual machine into different modules, to provide a robust implementation of the EMV and OTA systems. The OMNI 300 would need to comply with the EMV and OTA industry standards as described in paragraph 52 above. OMNI 300 would provide one of skill in the art with the details of message processing that would need to be accomplished by a virtual machine as described in EMV and OTA, and to implement a virtual communication processor as described in the First Data '879 Patent.

XI. CONCLUSION

55. In summary, as set forth in this declaration and in the attached exhibits, it is my opinion that all of the features recited in claims 1-5 of the '683 patent are invalid as anticipated or obvious to a person of ordinary skill in the art at the time of the invention.

56. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for

cross-examination within the United States during the time allotted for cross-examination.

57. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and 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.

Dated: April 30, 2014

A handwritten signature in blue ink that reads "Stephen Gray". The signature is written in a cursive style and is positioned above a horizontal line.

66242619V.1

EXHIBIT A

Preamble. The preamble simply refers to admitted prior art. Further, EMV '96 – Integrated Circuit Card Terminal Specification for Payment Systems (“EMV ‘96”) and Europay Open Terminal Architecture – A Forth-based Token System for Payment Terminals (“OTA”) both refer to the use of a virtual machine being implemented. In 1998, it would have been obvious to a person looking to improve EMV '96 to incorporate aspects of OTA because both documents are directed to point of service (POS) terminals and both relate to Europay terminals.

<p>The ‘683 Patent</p>	<p><u>EMV ‘96</u> A point-of-service terminal which communicates with a host via messages is presented: “This specification applies to all terminals operating in attended or unattended environments, having offline or online capabilities, and supporting transaction types such as purchase of goods, services, and cash. Terminals include but are not limited to automated teller machines (ATMs), branch terminals, cardholder-activated terminals, electronic cash registers, personal computers, and point of service (POS) terminals.” <i>EMV ‘96</i>, at p. vii, ¶2.</p> <p>“An interpreter implementation defines a single software kernel, common across multiple terminal types. This kernel creates a virtual machine” <i>Id.</i>, at §1.4.1, pp. II-3–II-4.</p> <p><u>The ‘683 patent – Admitted Prior Art</u> “The technique of creating a virtual processor (or in this case microprocessor) is well known and referred to as</p>
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