

EXHIBIT 2



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Farber et al.

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(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

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Gwertzman, 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.

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Grigni, Michelangelo, et al. "Tight Bounds on Minimum Broadcasts Networks." SIAM Journal of Discrete Mathematics, vol. 4, No. 2, May 1991, pp. 207-222.

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

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

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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.

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Related U.S. Application Data

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(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.

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(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**

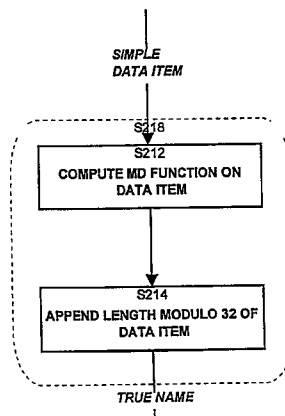
(56) **References Cited**

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



US 6,928,442 B2

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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.

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.

Feeley, 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.

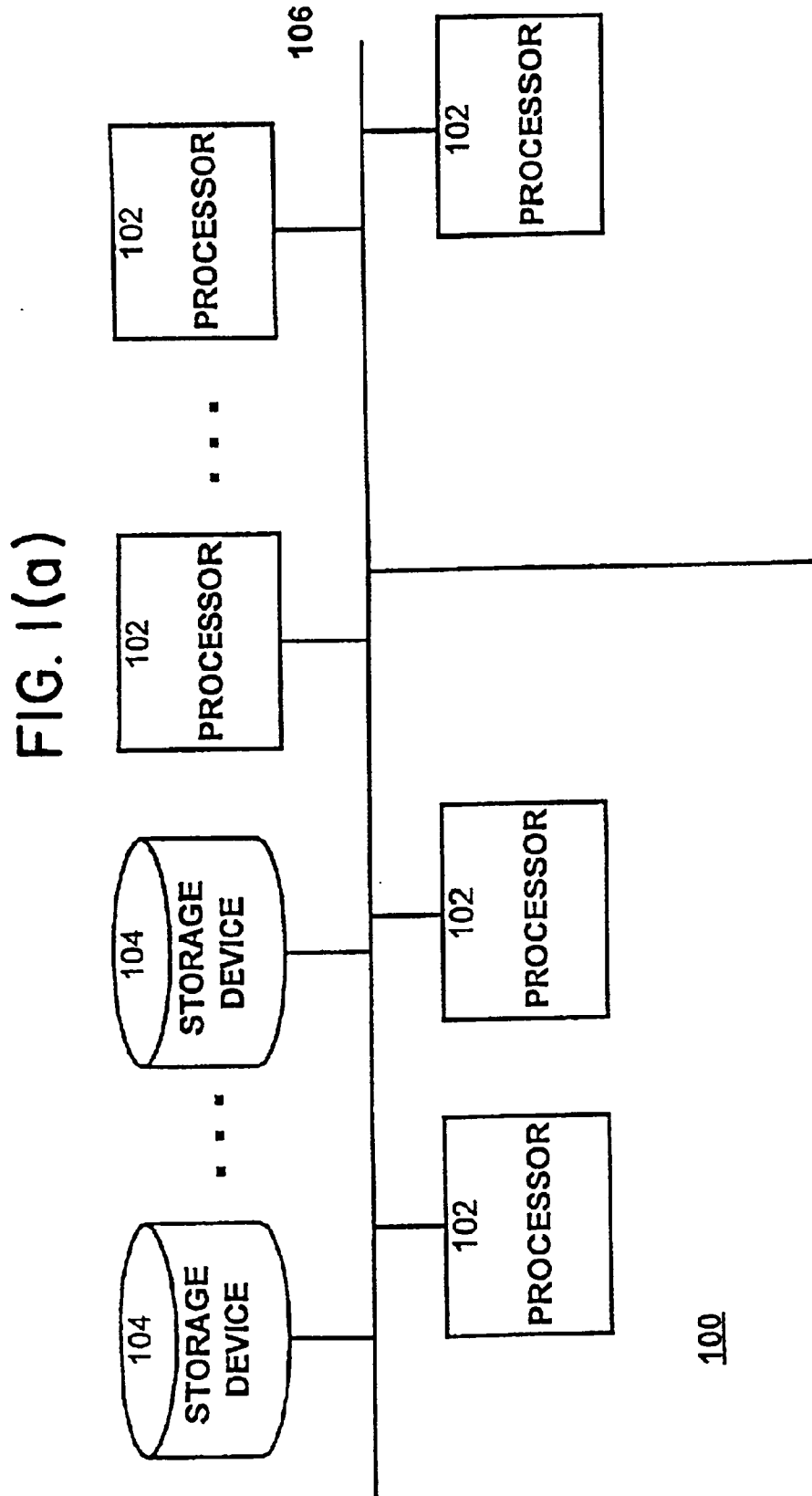
Yuliang Zheng et al., HAVAL—A One-Way Hashing Algorithm with Variable Length of Output (Extended Abstract), pp. 83–105.

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.a.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



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