

(12) **United States Patent**
Menage(10) **Patent No.:** **US 6,618,736 B1**
(45) **Date of Patent:** **Sep. 9, 2003**(54) **TEMPLATE-BASED CREATION AND
ARCHIVAL OF FILE SYSTEMS**(75) Inventor: **Paul Menage**, Sunnyvale, CA (US)(73) Assignee: **Ensim Corporation**, Sunnyvale, CA
(US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.(21) Appl. No.: **09/802,613**(22) Filed: **Mar. 9, 2001**(51) Int. Cl.⁷ **G06F 17/30**; G06F 12/00(52) U.S. Cl. **707/204**; 707/202; 707/203;
707/8(58) Field of Search 707/202, 201,
707/203, 204, 8(56) **References Cited****U.S. PATENT DOCUMENTS**

3,377,624 A	4/1968	Nelson et al.	
4,177,510 A	12/1979	Appell et al.	364/200
5,088,026 A *	2/1992	Bozman et al.	395/425
5,226,160 A	7/1993	Waldron et al.	
5,263,147 A	11/1993	Francisco et al.	395/425
5,528,753 A	6/1996	Fortin	
5,603,020 A	2/1997	Hashimoto et al.	395/616
5,636,371 A	6/1997	Yu	395/500
5,692,047 A	11/1997	McManis	380/4
5,706,097 A	1/1998	Schelling et al.	358/296
5,706,504 A *	1/1998	Atkinson et al.	707/100
5,715,441 A *	2/1998	Atkinson et al.	707/1
5,761,477 A	6/1998	Wahbe et al.	395/406 A
5,781,550 A	7/1998	Templin et al.	370/401
5,809,527 A	9/1998	Cooper et al.	711/133
5,819,292 A	10/1998	Hitz et al.	707/203
5,828,893 A	10/1998	Weid et al.	395/800
5,838,916 A	11/1998	Domenikos et al. ...	395/200.49
5,842,002 A	11/1998	Schnurer et al.	395/500

5,845,129 A	12/1998	Wendorf et al.	395/726
5,913,024 A	6/1999	Green et al.	395/186
5,915,085 A	6/1999	Koved	395/186
5,918,018 A	6/1999	Gooderum et al.	395/200.55
5,937,159 A	8/1999	Meyers et al.	395/187.01
5,956,481 A	9/1999	Walsh et al.	395/186
5,963,962 A	10/1999	Hitz et al.	707/202
6,023,721 A	2/2000	Cummings	709/201
6,065,118 A	5/2000	Bull et al.	713/200
6,075,938 A	6/2000	Bugnion et al.	395/500.48
6,108,759 A	8/2000	Orcutt et al.	711/173
6,125,367 A *	9/2000	NA	707/104
6,167,520 A	12/2000	Touboul	713/200
6,192,389 B1	2/2001	Ault et al.	709/101
6,192,512 B1	2/2001	Chess	717/5
6,353,837 B1 *	3/2002	Blumenau	707/205

FOREIGN PATENT DOCUMENTS

WO WO 99/39261 8/1999

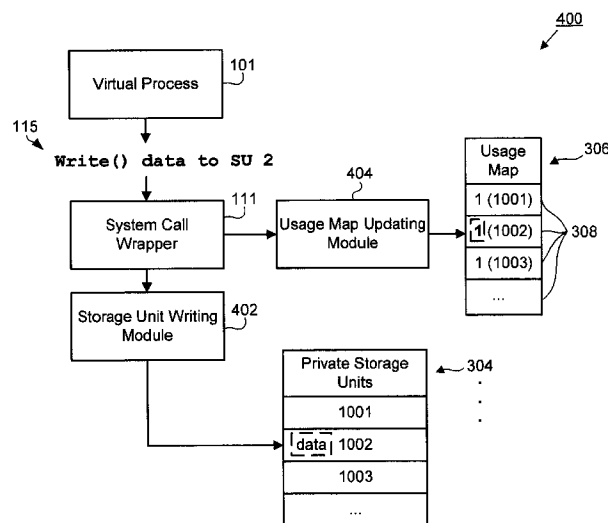
OTHER PUBLICATIONS

Boehm, B., "Managing Software Productivity and Reuse," IEEE Computer, vol. 32, No. 9, Sep. 1999, 3 pages.
Corbato, F. J. et al. "An Experimental Timesharing System," Proceedings of the American Federation Of Information Processing Societies Spring Joint Computer Conference, San Francisco, CA, May 1-3, 1962, pp. 335-344.
Deutsch, P. and Grant, C.A., "A Flexible Measurement Tool for Software Systems," Information Processing 71 (Proc. of the IFIP Congress), 1971, pp. 320-326.

(List continued on next page.)

Primary Examiner—Frantz Coby(74) *Attorney, Agent, or Firm*—Fenwick & West LLP(57) **ABSTRACT**

File systems are created and archived by providing a set of shared storage units and one or more templates, each template including a set of private storage units and a corresponding usage map.

53 Claims, 12 Drawing Sheets

OTHER PUBLICATIONS

- Edjlali, G., et al., "History-based Access Control for Mobile Code," Fifth ACM Conference on Computer and Communication Security, Nov. 3-5, 1998, 19 pages.
- Erlingsson, U. and Schneider, F. B., "SASI Enforcement of Security Policies: A Retrospective," Proc. New Security Paradigms Workshop, Apr. 2, 1999, pp. 1-17.
- Erlingsson, U. and Schneider, F. B., IRM Enforcement of Java Stack Inspection, [online], Feb. 19, 2000, [retrieved on Apr. 2, 2002]. Retrieved from the Internet: <URL: tr.cs.cornell.edu/Diens/U12.0/Show Page/ncstrl.cornell/TR2000-1786>.
- Evans, D. and Twyman, A., "Flexible Policy-Directed Code Safety," Proc. of 1999 IEEE Symposium on Security and Privacy, Oakland, CA, May 9-12, 1999, pp. 1-14.
- Fraser, T. et al., "Hardening COTS Software with Generic Software Wrappers," Proc. of 1999 IEEE Symposium on Security and Privacy, 1999, 15 pages.
- Goldberg, I. et al., "A Secure Environment For Untrusted Helper Applications (Confining the Wily Hacker)," Proc. of the Sixth USENIX UNIX Security Symposium, San Jose, CA, Jul. 1996, 14 pages.
- Goldberg, R.P., "Survey of Virtual Machine Research," IEEE Computer, Jun. 1974, pp. 34-45.
- Pandey, R. and Hashii, B., "Providing Fine-Grained Access Control For Mobile Programs Through Binary Editing," Technical Report TR98 08, University of California, Davis, CA, 1998, pp. 1-22.
- Ritchie, D. M., "The Evolution of the Unix Time-Sharing System," AT&T Bell Laboratories Technical Journal 63, No. 6, Part 2, Oct. 1984, (originally presented 1979), 11 pages.
- Saltzer, J., H. and Schroeder, M.D., The Protection of Information in Computer Systems, [online], 1973, [retrieved on Apr. 2, 2002]. Retrieved from the Internet: <URL: cs.virginia.edu/~evans/cs551/saltzer/>.
- Wahbe, R., et al., "Efficient Software-Based Fault Isolation," Proc. of the Symposium on Operating System Principles, 1993, 14 pages.
- Keshav, S., An Engineering Approach to Computer Networking: ATM Networks, the Internet, and the Telephone Network, Reading, MA, Addison-Wesley, 1997, pp. vii-xi, 85-115, 209-355, 395-444.
- Stevens, R. W., UNIX Network Programming vol. 1 Networking APIs: Sockets and XTI, Upper Saddle River, NJ, Prentice hall, 1998, pp. v-xiv, 29-53, 85-110, 727-760.
- Tanenbaum, A. S. and Woodhull, A. S., Operating Systems: Design and Implementation, Upper Saddle River, NJ, Prentice Hall, 1997, pp. vii-xiv, 1-46, 401-454.
- Rubini, A., LINUX Device Drivers, Sebastopol, CA, O'Reilly & Associates, Inc., 1998, pp. v-x, 13-40.
- Goyal, P., et al., "A Hierarchical CPU Scheduler for Multimedia Operating Systems," Proceedings of the Second Symposium on Operating Design and Implementations (OSDI'96), Seattle, WA, Oct. 1996, 15 pages.
- Laurie, B. and Laurie, P., *Apache The Definitive Guide*, Sebastopol, CA, O'Reilly & Associates, Inc., Feb. 1999, pp. v-viii, 43-74.
- Aho, A. V. and Ullman J. D., *Principles of Compiler Design*, Reading, MA, 1977, pp. vii-x, 359-362, 519-522.
- Jonsson, J., "Exploring the Importance of Preprocessing Operations in Real-Time Multiprocessor Scheduling," *Proc. of the IEEE Real-Time Systems Symposium—Work-in-Progress session*, San Francisco, CA, Dec. 4, 1997, pp. 31-34.
- Rusling, D. A., Processes, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: <URL: cebaf.gov/~saw/linux/tlk-htm/node44.html>.
- Rusling, D. A., Linux Processes, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: cebaf.gov/~saw/linux/tlk-htm/node45.html>.
- Rusling, D. A., Identifiers, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: cebaf.gov/linux/tlk-htm/node46.html>.
- Rusling, D. A., Scheduling, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: <URL: cebaf.gov/~saw/linux/tlk-htm/node47.html>.
- Rusling, D. A., Scheduling in Multiprocessor Systems, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: cebaf.gov/~saw/linux/tlk-htm/node48.html>.
- Rusling, D. A., Files, [online], [retrieved on Dec. 7, 1999]. Retrieved from the Internet: <URL: cebaf.gov/~saw/linux/tlk-htm/node49.html>.
- Plummer, D. C., An Ethernet Address Resolution Protocol—or—Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware, Nov. 1982, [online], [retrieved on Jan. 17, 2000]. Retrieved from the Internet: <URL: msg.net/kadow/answers/extras/rfc/rfc826.txt>.
- Huang, X. W. et al., "The ENTRAPID Protocol Development Environment," *Proceedings of IEEE Infocom'99*, Mar. 1999, nine pages.
- Duffield, N.G., et al., "A Flexible Model for Resource Management in Virtual Private Networks," Computer Communication Review Conference, Computer Communication, ACM SIGCOMM '99 Conference, Cambridge, MA, Aug. 30, 1999-Sep. 3, 1999, pp. 95-108.
- Campbell, A. T. and Keshav, S., "Quality of Service in Distributed Systems," *Computer Communications* 21, 1998, pp. 291-293.
- Bach, M. J., The Design of the Unix® Operating System, New Delhi, Prentice-Hall of India, 1989, pp. v-x, 19-37.
- McDougall, R., et al., *Resource Management*, Upper Saddle River, NJ, Prentice-Hall, 1999, pp. iii-xix, 135-191.
- Rijsinghani, A., RFC 1624, May 1994, [online], [retrieved Feb. 2, 2000]. retrived from the internet: faqs.org/rfcs/rfc1624.html>.
- Mallory, T and Kullberg, A., RFC 1141, Jan. 1990 [online], [retrieved Feb. 2, 2000]. retrieved from the Internet: faqs.org/rfcs/rfc1141.html>.
- Egevang, K. and Francis P., RFC 1631, May 1994 [online], [retrieved Feb. 2, 2000]. retrieved from the internet: faqs.org/rfcs/rfc1631.html>.
- Goyal, P. et al., "Start-time Fair Queuing: A Scheduling Algorithm for Integrated Services Packet Switching Networks," Proceedings of ACM SIGCOMM '96, San Francisco, CA, Aug. 1996, 14 pages.
- János, T., "Notes on 'A Hierarchical CPU Scheduler for Multimedia Operating Systems' by Pawan Goyal, Xingang Guo and Harrick Vin," [online], [retrieved on May 8, 2000]. Retrieved from the Internet: <URL:http://cs.cornell.edu/Info/Courses/Spring-97/CS614/goy.html>.
- Goyal, P., "Packet Scheduling Algorithms for Integrated Services Networks," PhD Dissertation, University of Texas, Austin, TX, Aug. 1997.
- Pending United States patent application entitled "Providing Quality of Service Guarantees to Virtual Hosts," serial No. 09/452,286, filing date Nov. 30, 1999.

Pending United States patent application entitled "Selective Interception of System Calls," serial No. 09/499,098, filing date Feb. 4, 2000.

Pending United States patent application entitled "Dynamic Scheduling of Task Streams in a Multiple-Resource System to Ensure Task Stream Quality of Service," serial No. 09/498,450, filing date Feb. 4, 2000.

Pending United States patent application entitled "Disambiguating File Descriptors," serial No. 09/500,212, filing date Feb. 8, 2000.

Pending United States patent application entitled "Restricting Communication Between Network Devices on a Common Network," serial No. 09/502,155, filing date Feb. 11, 2000.

Pending United States patent application entitled "Enabling a Service Provider to Provide Intranet Services," serial No. 09/526,980, filing date Mar. 15, 2000.

Pending United States patent application entitled "Dynamically Modifying the Resources of a Virtual Server," serial No. 09/569,371, filing date May 11, 2000.

Pending United States patent application entitled "Regulating File Access Rates According to File Type," serial No. 09/572,672, filing date May 16, 2000.

Pending United States patent application entitled "Modifying Internal Components of a Running Operating System," serial No. 09/576,393, filing date May 22, 2000.

Pending United States patent application entitled "Associating Identifiers With Virtual Processes," serial No. 09/611,877, filing date Jul. 7, 2000.

Pending United States patent application entitled "Fairly Partitioning Resources While Limiting the Maximum Fair Share," serial No. 09/633,575, filing date Aug. 7, 2000.

Pending United States patent application entitled "Intercepting I/O Multiplexing Operation Involving Cross Domain File Descriptor Sets," serial No. 09/664,914, filing date Sep. 18, 2000.

Pending United States patent application entitled "Virtualizing Port Addresses for Non-Conflicting Use by Multiple Virtual Processes," serial No. 09/679,396, filing date Oct. 3, 2000.

Pending United States patent application entitled "Intercepting Calls to Non-Local Procedures," serial No. 09/687,031, filing date Oct. 12, 2000.

Pending United States patent application entitled "Virtualizing Super-User Privileges for Multiple Virtual Processes," serial No. 09/747,687, filing date Dec. 22, 2000.

Pending United States patent application entitled "Virtualizing Resource Ownership For Multiple Virtual Processes," serial No. 09/747,664, filing date Dec. 22, 2000.

Brown, K. et al., SnapMirr and SnapRestore: Advances in Snapshot Technology, [online], [retrieved on Jul. 2, 2001]. Retrieved from the Internet: <URL:http://www.netapp.com/tech_library/3043.print>.

HOWTO: Multi Disk system Tuning: Technologies, [online], [retrieved Jul. 2, 2001]. Retrieved from the Internet: linux.com/howto/Multi-Disk-HOWTO-6.html?printable=yes.

Almesberger, W., The truth about IFS, Mar. 3, 1998, [online], [retrieved Jun. 6, 2001]. Retrieved from the Internet: epfl.ch/~almesber/ifs.html.

Hendricks, D., The Translucent File Service, [online], [retrieved Jun. 6, 2001]. Retrieved from the Internet: sun.com/smcc/solaris-migration/docs/postscript/tfs.ps.

* cited by examiner

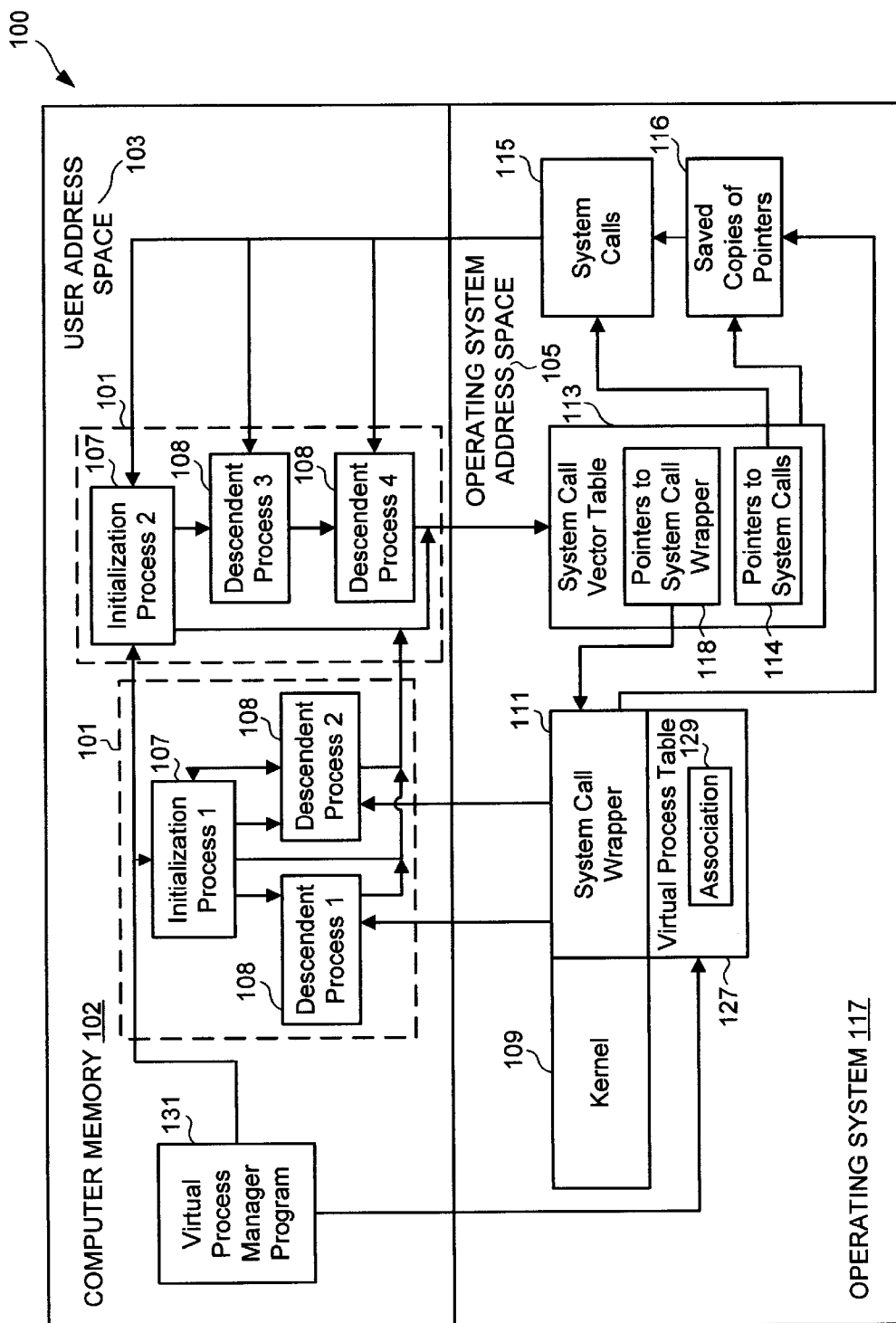


FIG. 1

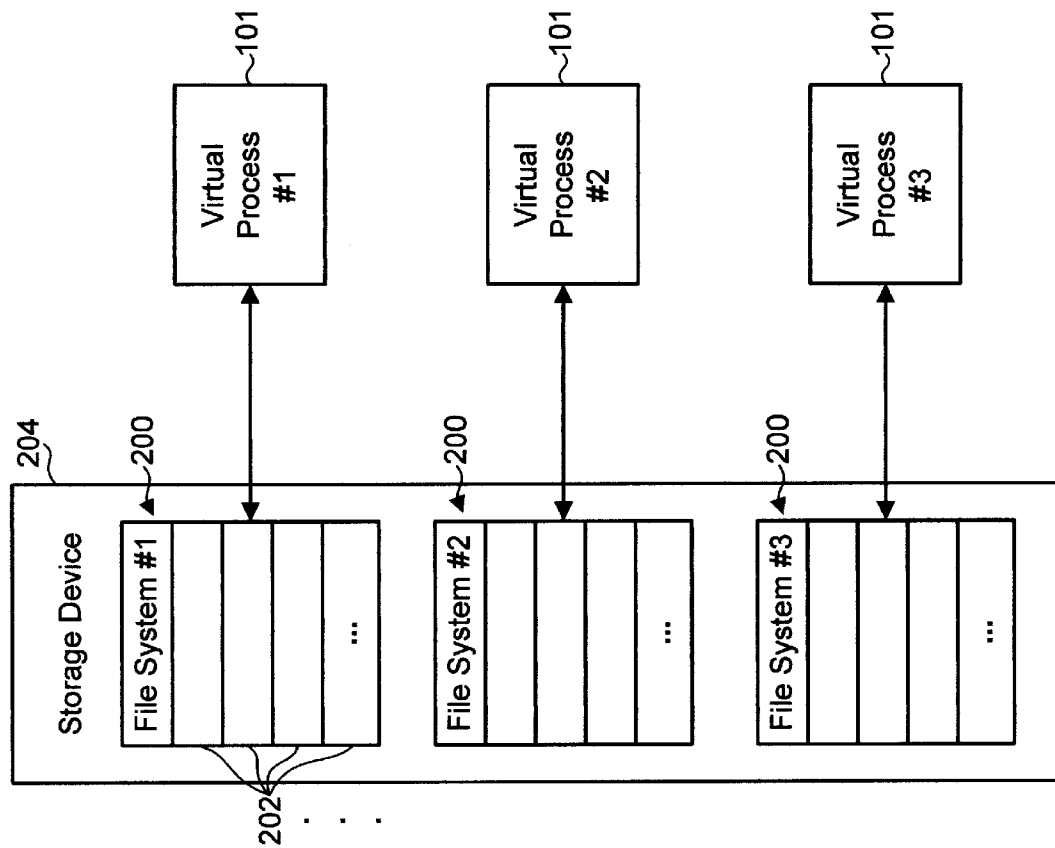


FIG. 2



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.