



US006917963B1

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

(10) **Patent No.:** **US 6,917,963 B1**
(45) **Date of Patent:** **Jul. 12, 2005**

(54) **SNAPSHOT IMAGE FOR THE APPLICATION STATE OF UNSHAREABLE AND SHAREABLE DATA**

(75) Inventors: **Burton A. Hipp**, Elk Grove, CA (US);
Rajeev Bharadhwaj, Los Altos, CA (US)

(73) Assignee: **VERITAS Operating Corporation**,
Mountain View, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 693 days.

(21) Appl. No.: **09/684,373**

(22) Filed: **Oct. 5, 2000**

Related U.S. Application Data

(60) Provisional application No. 60/157,728, filed on Oct. 5, 1999, provisional application No. 60/157,729, filed on Oct. 5, 1999, provisional application No. 60/157,833, filed on Oct. 5, 1999, provisional application No. 60/157,727, filed on Oct. 5, 1999, and provisional application No. 60/157,834, filed on Oct. 15, 1999.

(51) **Int. Cl.**⁷ **G06F 15/16**

(52) **U.S. Cl.** **709/204; 709/205; 709/229; 719/328**

(58) **Field of Search** 719/328, 315-319, 719/312, 313; 714/37-40, 15-21, 6; 707/200-203, 9, 10; 713/163-165; 709/204, 205, 201, 203, 225, 227, 229, 245, 215, 216; 345/330; 715/516; 711/6, 100, 155, 163, 200

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,067,072 A	*	11/1991	Talati et al.	717/148
5,088,031 A	*	2/1992	Takasaki et al.	718/100
5,109,510 A	*	4/1992	Baker et al.	718/104
5,365,606 A	*	11/1994	Brocker et al.	719/331
5,403,639 A	*	4/1995	Belsan et al.	707/204
5,530,795 A		6/1996	Wan	
5,608,720 A	*	3/1997	Biegel et al.	370/249
5,649,152 A	*	7/1997	Ohran et al.	711/114

5,678,042 A	*	10/1997	Pisello et al.	714/47
5,734,865 A	*	3/1998	Yu	709/250
5,758,355 A	*	5/1998	Buchanan	707/201
5,790,114 A	*	8/1998	Geaghan et al.	345/763
5,822,523 A	*	10/1998	Rothschild et al.	709/236
5,889,945 A		3/1999	Porter et al.	
5,896,500 A		4/1999	Ludwig et al.	
5,909,545 A	*	6/1999	Frese et al.	709/208
6,131,148 A	*	10/2000	West et al.	711/162
6,173,332 B1	*	1/2001	Hickman	709/235

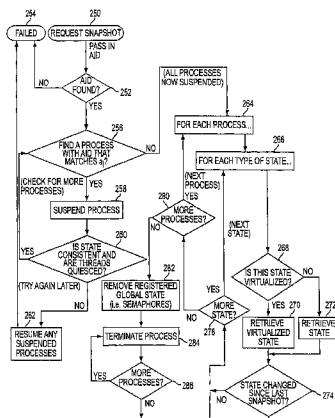
(Continued)

Primary Examiner—William C. Vaughn, Jr.
(74) *Attorney, Agent, or Firm*—Lawrence J. Merkel; Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C.

(57) **ABSTRACT**

A system, methods, and computer program products are disclosed for creating virtual application templates for the purpose of propagating a single application snapshot into multiple, distinct images. Snapshot virtual templates allow multiple application instances to use the same fixed resource identifier by making the resource identifier virtual, privatizing it, and dynamically mapping it to a unique system resource identifier. When a snapshot is cloned from a virtual template, the common or shared data is used exactly as is, whereas the non-sharable data is either copied-on-write, multiplexed, virtualized, or customized-on-duplication. The present invention notes access to modified resources, fixed system IDs/keys and unique process-related identifies and automatically inserts a level of abstraction between these resources and the application. The resources contained in a snapshot virtual template can be dynamically redirected at restore time. Access to memory and storage is managed in a copy-on-write fashion. System resource handles are managed in a virtualize-on-allocate fashion or by a multiplex-on-access mechanism. Process-unique resources are managed in a redirect-on-duplicate fashion. Rules may be defined through an application configurator that allows some degree of control over the creation of non-sharable data. The snapshot virtual template is constructed by dividing the snapshot image into sharable and non-sharable data. Knowledge of which system resources can be shared is encoded in the application snapshot/restore framework.

16 Claims, 15 Drawing Sheets



VEEAM 1011

IPR of U.S. Patent No. 7,093,086

US 6,917,963 B1

Page 2

U.S. PATENT DOCUMENTS

6,205,450 B1 *	3/2001	Kanome	707/203	6,363,421 B2 *	3/2002	Barker et al.	709/223
6,212,531 B1 *	4/2001	Blea et al.	707/204	6,385,613 B1 *	5/2002	Grewell et al.	707/8
6,269,431 B1 *	7/2001	Dunham	711/162	6,442,663 B1 *	8/2002	Sun et al.	711/202
6,324,690 B1 *	11/2001	Luu	717/177	6,567,849 B2 *	5/2003	Ludovici et al.	709/223

* cited by examiner

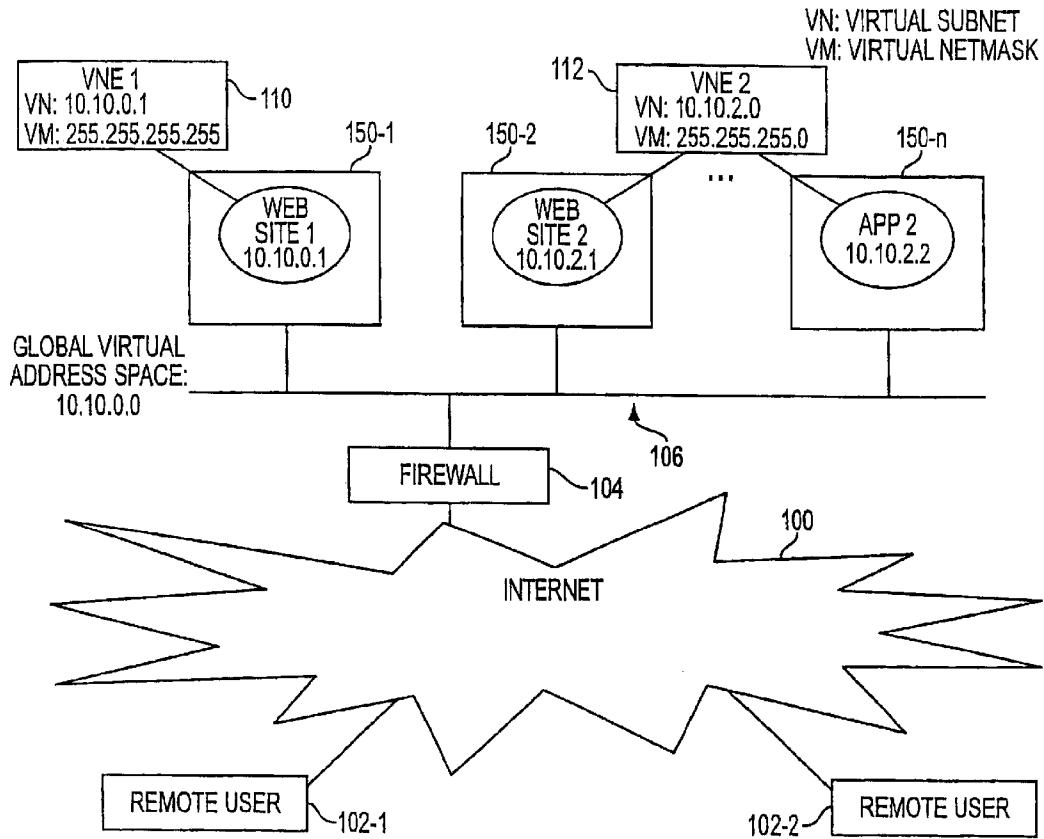


FIG. 1

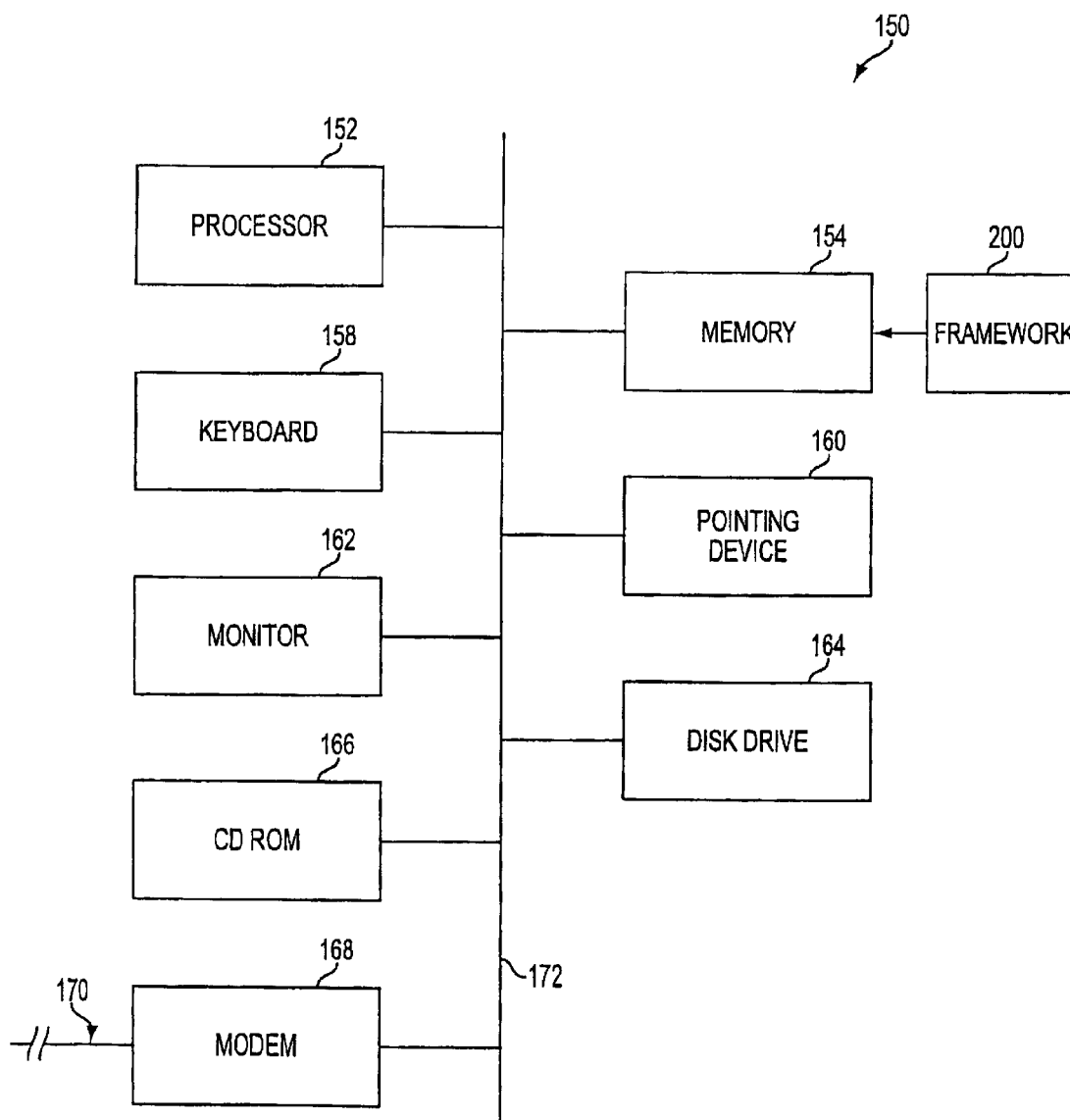


FIG. 2

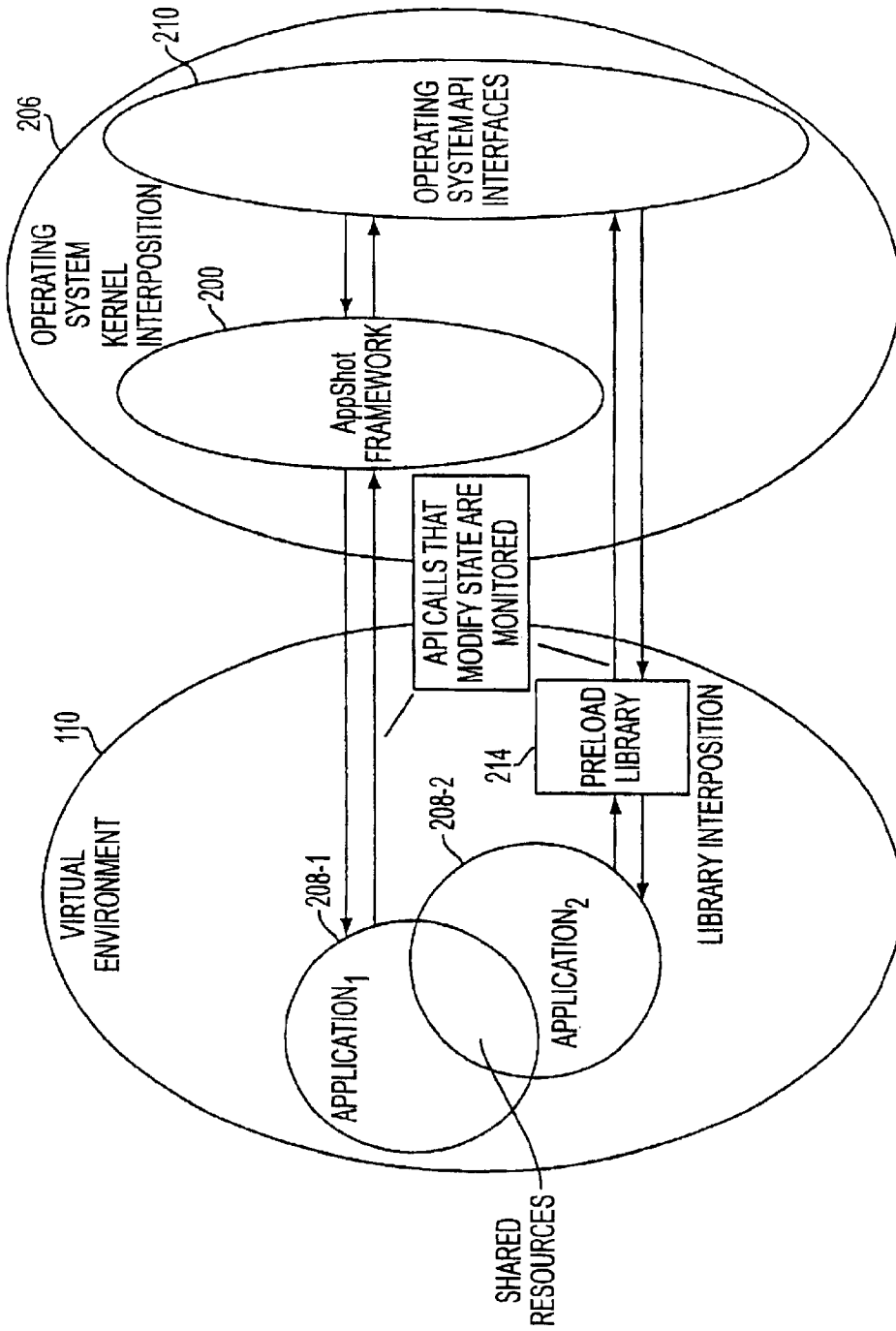


FIG. 3

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.