

Patent Owner Symantec Corporation

Case No. IPR2013-00150
U.S. Patent No. 7,093,086

Hearing: May 5, 2014

'086 Patent - Challenged Claim

Claim 1: A computer readable medium storing a plurality of instructions which, when executed:

- (i) capture a state of a first **virtual machine *executing*** on a first computer system, wherein the state of the first virtual machine corresponding to a point in time of execution of the first virtual machine, wherein the first virtual machine comprises at least one virtual disk storing at least one file used by an **application *executing*** in the first virtual machine, and wherein the first virtual machine comprises the at least one file; and
- (ii) copy at least a portion of the state to a destination separate from the first computer system to which the first virtual machine is suspendable, wherein the first virtual machine is performed responsive to a suspend command.

Claim 11: The computer readable medium as recited in claim 1 wherein the instructions further comprise: creating a new log of uncommitted updates for each virtual disk in the first virtual machine and creating a memory area to capture writes to a memory area of the first virtual machine, such that **the first virtual machine can continue executing**.

“Capture A State Of A First Virtual Machine Executing On A First Computer System”



(12) **United States Patent**
van Rietschote
(10) **Patent No.:** US 7,093,086 B1
(45) **Date of Patent:** *Aug. 15, 2006

(54) **DISASTER RECOVERY AND BACKUP USING VIRTUAL MACHINES**
(75) **Inventor:** Hans F. van Rietschote, Sunnyvale, 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 234 days.

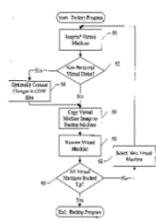
This patent is subject to a terminal disclaimer.
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(22) **Filed:** Mar. 28, 2002
(51) **Int. Cl. Class.:** G06F 12/00 (2006.01)
(52) **U.S. Cl. Class.:** 711/161, 714/8, 714/13, 714/15, 714/16, 714/20
(58) **Field of Classification Search:** 709/104, 709/106, 711/6, 156, 161, 165, 714/6, 13, 714/15, 16, 20
See application file for complete search history.

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Primary Examiner: Christian P. Chere
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(57) **ABSTRACT**

One or more computer systems, a carrier medium, and a method are provided for backing up virtual machines. The backup may occur, e.g., in a backup medium or to a disaster recovery site, in various embodiments. In one embodiment, an apparatus includes a computer system configured to execute at least a first virtual machine, wherein the computer system is configured to: (i) capture a state of the first virtual machine; the state corresponding to a point in time in the execution of the first virtual machine; and (ii) copy or store a portion of the state to a destination separate from a storage device to which the first virtual machine is suspendable. A carrier medium may include instructions which, when executed, cause the above operation on the computer system. The method may comprise the above highlighted operations.

30 Claims, 8 Drawing Sheets



“To create a backup ... computer system may the state in cooperation virtual machine kernel controls execution of the machines, while the machine continues to execute”
Resp., p. 9)

“Capture A State Of A First Virtual Machine Executing On A First Computer System”

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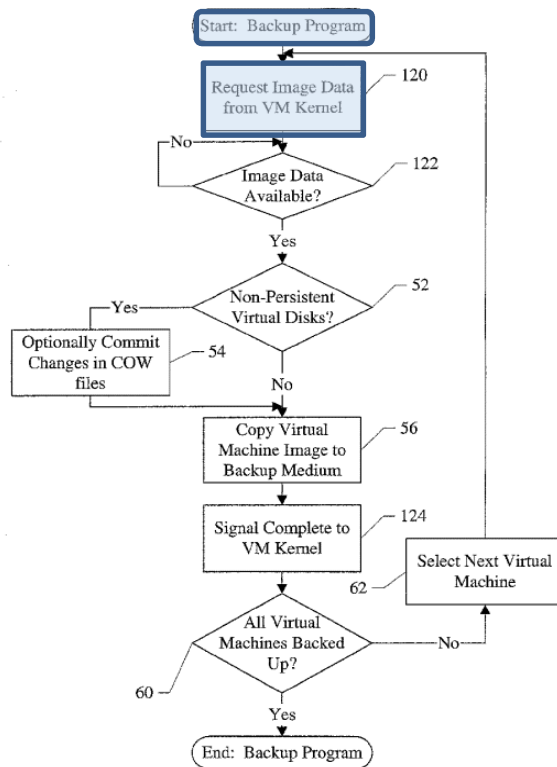


Fig. 7

Backup program
“request for the
state of the virt
as would be pro
virtual machine
suspended, wit
suspending the
machine” (Col. 11:1

“Capture A State Of A First Virtual Machine Executing On A First Computer System”

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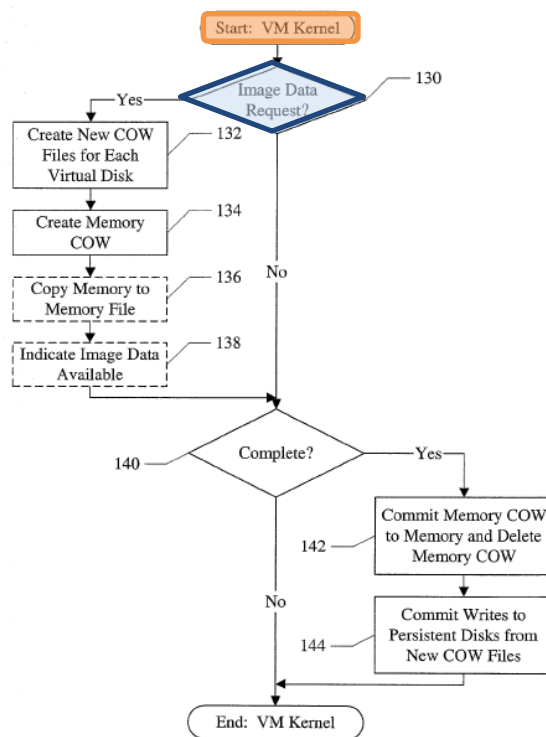


Fig. 8

In response to the image data request, the VM kernel 18 may create the "new" COW files for each virtual disk (whether persistent or non-persistent) in the virtual machine. The new COW file 74A may be used for subsequent updates to the corresponding virtual disk in this manner, **the state of the COW files 74A** (which contain the updates prior to the image data request, back to at least the time of the image data request or suspension of the virtual machine) **and the virtual disk files 72 remain constant even if the virtual machine 16A continues to execute**, since subsequent updates are directed to the new COW files ... Therefore, the COW files 74A and the disk files 72 may be backed up by the backup program 42 without the files being updated during the backup. (Col. 11:42-57; R.

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