

# **VERITAS Volume Manager™ 4.0**

## **Installation Guide**

**Solaris**

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# Contents

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<b>Preface</b> .....	<b>ix</b>
Audience .....	ix
Organization .....	ix
Conventions .....	x
Getting Help .....	xi
Downloading and Running VRTSexplorer .....	xi
 <b>Chapter 1. Introduction</b> .....	<b>1</b>
VxVM Components .....	1
Installation and Upgrade Roadmaps .....	3
Installing VxVM .....	3
Upgrading VxVM .....	4
Licensing and Product Distribution .....	5
Product Licensing .....	5
Obtain a License from the VERITAS vLicense Website .....	6
Add or Upgrade Licenses .....	6
Preinstallation Requirements .....	8
Disk Space Requirements .....	8
Set the PATH and MANPATH Variables .....	9
/opt directory .....	10
Take a Disk Inventory .....	10
Including and Excluding Disks .....	12
Required Solaris Software Patches .....	14
Partitioning Disks on Sun StorEdge 6120/6320 Arrays .....	17



---

DMP and Alternate Pathing .....	17
Array Support Libraries (ASL) .....	17
VERITAS Enterprise Administrator (VEA) .....	18
Cluster Environment Requirements .....	18
Set up your SAN Configuration .....	19
Installing Using the VERITAS Installation Menu .....	20
Installing Using the Product Installation Scripts .....	21

## **Chapter 2. Installing VERITAS Volume Manager ..... 25**

Installation Overview .....	25
The Packages .....	26
Packaging Differences in the Sun Microsystems Distribution of VERITAS Products .....	27
Installing VxVM using pkgadd .....	28
Mounting the CD-ROM .....	28
Installing VxVM Using the installvm Script .....	32
VEA Installation .....	35
VMSA and VEA Co-existence .....	36
VEA Client Installation .....	36
Installing Language Versions .....	38
Installing Language Versions using the VERITAS Installation Menu .....	38
Installing Language Versions using the Product Installation Scripts .....	39
Installing Language Versions using the pkgadd command .....	39

## **Chapter 3. Setting Up VERITAS Volume Manager ..... 41**

Set Up Overview .....	41
Setting Up VxVM .....	41
Enabling Enclosure-based Naming .....	42
Preventing Multipathing/Suppress Devices from VxVM's View .....	44
Checking the Installation .....	46
Starting and Enabling the Configuration Daemon .....	46
Starting the Volume I/O Daemon .....	47



---

Starting the VEA Server .....	48
Starting the VEA Client .....	48
Cluster Support in VxVM .....	49
<b>Chapter 4. Preparing to Upgrade VERITAS Volume Manager .....</b>	<b>51</b>
Upgrading Overview .....	51
DMP Considerations .....	51
Licensing .....	52
Upgrading VxVM with Alternate Pathing Enabled .....	52
Pre-Upgrade Requirements .....	52
Planning the Upgrade .....	53
Preparing for the Upgrade .....	54
Before Upgrading to VxVM Release 4.0 .....	55
VxVM and Solaris Release Support Matrix .....	57
VxVM and Solaris Operating System Upgrade Paths .....	57
<b>Chapter 5. Upgrading VERITAS Volume Manager .....</b>	<b>59</b>
Packaging Differences in the Sun Microsystems Distribution of VERITAS Products ..	59
Upgrading VxVM Only .....	60
Upgrading VxVM with the installvm Script .....	61
Upgrading VxVM When the Root Disk is Encapsulated .....	64
Upgrading VxVM when the Root Disk is not Encapsulated .....	68
Upgrading VxVM and the Solaris Operating System .....	77
Upgrading VxVM and the Solaris Operating System from VxVM 3.5 (Non -Encap- sulated Root Disk) .....	77
Upgrading VxVM and the Solaris Operating System from VxVM 3.5 (Encapsulated Root Disk) or from VxVM 3.2 or Earlier Release .....	82
Upgrading the Solaris Operating System Only .....	87
Completing the Upgrade .....	89
Verifying the Upgrade .....	89
Upgrading Language Versions .....	90



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Upgrading Language Version Software .....	90
Upgrading CVM Protocol and Disk Group Version .....	92
Updating Variables .....	92
Default Disk Group .....	92
<b>Chapter 6. Removing VERITAS Volume Manager .....</b>	<b>93</b>
Moving Volumes From an Encapsulated Root Disk .....	93
Moving Volumes To Disk Partitions .....	94
Shutting Down VxVM .....	95
Removing VxVM Packages using the uninstallvm and uninstallinfr Scripts .....	96
Removing VxVM Packages using pkgrm .....	96
Removing Language Packs .....	97
Removing VERITAS Volume Manager .....	97
Removing the VERITAS Provider Packages .....	97
Removing the VERITAS Enterprise Administrator .....	97
Removing the Windows Client Software Package .....	98
Removing VRTSvxvm .....	98
Verifying Removal .....	98
Removing Patches .....	98
Restoring VERITAS Volume Manager 4.0 Configuration .....	99
<b>Chapter 7. Getting Started with VERITAS Volume Manager .....</b>	<b>101</b>
System Setup Guidelines .....	101
Setup Sequence .....	101
Guidelines .....	102
Enable Cluster Support in VxVM (Optional) .....	107
Configure Shared Disks .....	107
Reserve Shared Disks .....	110
Add New Array Support .....	111
Hot-Relocation .....	111
Place Disks in another Disk Group .....	111



---

Add Disks After Initialization .....	111
Protect Your System and Data .....	112
<b>Chapter 8. Move Volumes onto Partitions - Example .....</b>	<b>115</b>
<b>Index .....</b>	<b>121</b>





# Preface

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This guide provides information on installing and initializing the VERITAS Volume Manager™ (VxVM) and the VERITAS Enterprise Administrator™ (VEA) graphical user interface. This document also contains information on how to upgrade to the current release of VxVM.

Please refer to the *VERITAS Volume Manager Release Notes* and the *VERITAS Volume Manager Hardware Notes* before proceeding with installation.

## Audience

This guide is for system administrators who configure and maintain Solaris systems with VxVM, and assumes that you have:

- ◆ An understanding of system administration.
- ◆ A working knowledge of the Solaris operating system.
- ◆ A general understanding of file systems.
- ◆ A basic understanding of storage management.

## Organization

This guide is organized with the following chapters:

- ◆ [Introduction](#)
- ◆ [Installing VERITAS Volume Manager](#)
- ◆ [Setting Up VERITAS Volume Manager](#)
- ◆ [Preparing to Upgrade VERITAS Volume Manager](#)
- ◆ [Upgrading VERITAS Volume Manager](#)
- ◆ [Removing VERITAS Volume Manager](#)
- ◆ [Getting Started with VERITAS Volume Manager](#)
- ◆ [Move Volumes onto Partitions - Example](#)



For information about technical support, product licensing, software updates, and other useful links, see “[Getting Help](#)” on page xi.

## Conventions

The following table describes the typographic conventions used in this guide.

Typeface	Usage	Examples
monospace	Computer output, file contents, files, directories, software elements such as command options, function names, and parameters	Read tunables from the <code>/etc/vx/tunefstab</code> file. See the <code>ls(1)</code> manual page for more information.
<i>italic</i>	New terms, book titles, emphasis, variables to be replaced by a name or value	See the <i>User’s Guide</i> for details. The variable <i>ncsize</i> determines the value of...
<b>monospace (bold)</b>	User input; the “#” symbol indicates a command prompt	<b>#mount -F vxfs /h/filesys</b>
<b><i>monospace (bold and italic)</i></b>	Variables to be replaced by a name or value in user input	<b>#mount -F fstype mount_point</b>

Symbol	Usage	Examples
%	C shell prompt	
\$	Bourne/Korn/Bash shell prompt	
#	Superuser prompt (all shells)	
\	Continued input on the following line	<b>#mount -F vxfs \ /h/filesys</b>
[]	In a command synopsis, brackets indicates an optional argument	<code>ls [ -a ]</code>
	In a command synopsis, a vertical bar separates mutually exclusive arguments	<code>mount [suid   nosuid ]</code>

## Getting Help

If you have any comments or problems with VERITAS products, contact VERITAS Technical Support:

- ◆ U.S. and Canadian Customers: 1-800-342-0652
- ◆ International Customers: +1 (650) 527-8555
- ◆ Email: [support@veritas.com](mailto:support@veritas.com)

For license information (U.S. and Canadian Customers):

- ◆ Phone: 1-650-527-0300
- ◆ Email: [license@veritas.com](mailto:license@veritas.com)
- ◆ Fax: 1-650-527-0952

For software updates:

- ◆ Email: [swupdate@veritas.com](mailto:swupdate@veritas.com)

For information on purchasing VERITAS products:

- ◆ Phone: 1-800-327-2232
- ◆ Email: [sales.mail@veritas.com](mailto:sales.mail@veritas.com)

For additional technical support information, such as TechNotes, product alerts, and hardware compatibility lists, visit the VERITAS Technical Support Web site at:

- ◆ <http://support.veritas.com>

For additional information about VERITAS and VERITAS products, visit the Web site at:

- ◆ <http://www.veritas.com>

## Downloading and Running VRTSexplorer

The VRTSexplorer program can help Technical Support engineers diagnose the cause of technical problems associated with VERITAS products. You can download the program from the VERITAS FTP site or install it from the VERITAS Installation CD. For more information, consult the *VERITAS Volume Manager Release Notes* in the support directory on the VERITAS Installation CD.





# Introduction

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1

This guide explains how to install or upgrade VERITAS Volume Manager (VxVM). Although terms and basic concepts are introduced in this guide, refer to the *VERITAS Volume Manager Administrator's Guide* for more details.

After completing the installation, you can use three different utilities to administer VxVM: the Command Line Interface (CLI), the `vxdiskadm` menu, and the VERITAS Enterprise Administrator (VEA) interface. The *VERITAS Volume Manager Administrator's Guide* explains each utility in more detail.

If you are doing a new installation of VERITAS Volume Manager, refer to “[Preinstallation Requirements](#)” on page 8.

If you are upgrading VxVM, go to “[Preparing to Upgrade VERITAS Volume Manager](#)” on page 51.

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**Note** You should review the *VERITAS Volume Manager Release Notes*, *VERITAS Volume Manager Hardware Notes* and the *VERITAS Volume Replicator (VVR) Release Notes* before installing VxVM. Installation instructions for *VERITAS Volume Replicator* are in the *VERITAS Volume Replicator Installation Guide*

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## VxVM Components

The VxVM product includes a number of packages (see “[The Packages](#)” on page 26 for details). However, VxVM installation is by component. Install the following components, using the appropriate procedure for each component:

- ◆ **VxVM** The VERITAS Volume Manager software. You have the choice of using the `pkgadd` command for installation or you can use the VERITAS Installation Menu or the `installvm` script from the command line. See “[Check that the upgrade was successful. See “Completing the Upgrade” on page 89.](#)” on page 5.
- ◆ **VEA Server** The software that connects the VERITAS Enterprise Administrator user interface to VxVM. Always install VEA server on the VxVM host at the same time that you install VxVM. See “[VEA Installation](#)” on page 35 for VEA server installation.



- ◆ **VEA Client** The VERITAS Enterprise Administrator user interface. Install VEA client on the VEA server host or on one or more remote machines. The required packages for the VEA client are listed in “[VEA Installation](#)” on page 35.

The VxVM component includes an *optional* cluster feature that enables VxVM in a cluster environment. The cluster functionality in VxVM allows multiple hosts to simultaneously access and manage a set of disks under VxVM control. See “[Enable Cluster Support in VxVM \(Optional\)](#)” on page 107 for details.

VERITAS Enterprise Administrator is installed through a number of packages:

- ◆ VRTSob—VERITAS Enterprise Administrator Service.
- ◆ VRTSobadmin—Variable settings used in installation of VERITAS Enterprise Administrator.
- ◆ VRTSobgui—VERITAS Enterprise Administrator.
- ◆ VRTSvmpro—VERITAS Virtual Disk Management Services Provider (required if you install VRTSob and VRTSobgui).
- ◆ VRTSfspro—VERITAS File System Management Services Provider (required if you install VRTSob and VRTSobgui).
- ◆ VRTSmuob—VERITAS Enterprise Administrator Localized package.

Installation and upgrade procedures for VERITAS Enterprise Administrator are fully documented in this manual.

This release of VxVM includes a number of new packages:

- ◆ VRTSalloc—VERITAS Intelligent Storage Provider.
- ◆ VRTScpi—VERITAS Installation Technology
- ◆ VRTSddlpr—VERITAS Device Discovery Layer Provider.
- ◆ VRTSperl—Perl used by the VERITAS Installation menu and installvm script..

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**Note** The VxVM cluster feature requires a license, which can be obtained from your Customer Support channel. (The presence of a SPARCstorage™ Array may serve as a license, but it limits what can be done to private disk groups.)

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# Installation and Upgrade Roadmaps

This release of VERITAS Volume Manager provides two methods of installing and upgrading the product. The traditional command line method:

- ◆ `pkgadd`

VERITAS products now have an automated installation and licensing procedure that lets you install packages using an installation menu, or invoke installation scripts from the command line.

- ◆ VERITAS Installation Menu and Installation scripts

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**Note** The VERITAS Installation Menu and scripts are not available if you purchased VERITAS Volume Manager from Sun Microsystems.

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## Installing VxVM

If you are doing a fresh installation of VxVM:

1. Read this introductory chapter.
2. Go to Chapter [“Installing VERITAS Volume Manager”](#) on page 25.
3. Decide whether you want to install VxVM using the new interactive `installvm` script or the traditional command-line based `pkgadd` installation procedure.
4. When you have decided on your installation method, follow instructions in one of these two sections:
  - ◆ [“Installing VxVM Using the installvm Script”](#) on page 32
  - ◆ [“Installing VxVM using pkgadd”](#) on page 28.
5. After installing VxVM, go to [“Setting Up VERITAS Volume Manager”](#) on page 41 which includes instructions on completing some configuration tasks:
  - ◆ Enabling Enclosure-Based Naming
  - ◆ Setting up a system-wide default disk group
  - ◆ Preventing multipathing

If you install VxVM using the `installvm` script, the script includes steps for enabling enclosure based naming and setting up a system-wide default disk group, so in chapter 3, you can ignore those steps.

6. Continue to the section headed [“Checking the Installation”](#) on page 46



## Upgrading VxVM

For an upgrade to VxVM 4.0:

1. Read this introductory chapter.
2. Read [“Preparing to Upgrade VERITAS Volume Manager”](#) on page 51.
3. Go to [“Upgrading VERITAS Volume Manager”](#) on page 59.
4. Decide which of the following top-level upgrade paths you need to follow:
  - ◆ Upgrading VxVM only; go to [step 5](#).
  - ◆ Upgrading VxVM and the Solaris Operating System; go to [step 6](#)
  - ◆ Upgrading the Solaris Operating System only; go to [step 7](#).
5. If you are upgrading VxVM only, you must decide whether to use the `installvm` interactive method or the command-line based `pkgadd` method.

To use the `installvm` script, follow instructions in the section headed [“Upgrading VxVM with the installvm Script”](#) on page 61.

To use the `pkgadd` method, there are a number of possible upgrade paths depending on whether your root disk is encapsulated, and from which version of VxVM, you are upgrading. These are the possible upgrade paths:

- ◆ Upgrading VxVM when the root disk is encapsulated; see [“Upgrading VxVM When the Root Disk is Encapsulated”](#) on page 64.
- ◆ Upgrading VxVM when the root disk is not encapsulated and you are upgrading from VxVM 3.5; see [“Upgrading from VxVM 3.5 with the pkgadd command”](#) on page 68.
- ◆ Upgrading VxVM when the root disk is not encapsulated and you are upgrading from VxVM 3.2 or earlier; see [“Upgrading from VxVM 3.2 or earlier”](#) on page 72.

The final stage in this upgrade procedure is to check that the upgrade was successful. See [“Completing the Upgrade”](#) on page 89.

6. If you are upgrading VxVM and the Solaris Operating System, there are a number of possible upgrade paths depending on whether your root disk is encapsulated, and from which version of VxVM, you are upgrading. These are the possible upgrade paths:

- ◆ Upgrading VxVM and the Solaris Operating System, when the root disk is not encapsulated and you are upgrading from VxVM 3.5; see [“Upgrading VxVM and the Solaris Operating System from VxVM 3.5 \(Non -Encapsulated Root Disk\)”](#) on page 77.
- ◆ There are three other possible upgrade procedures when upgrading VxVM and the Solaris Operating System:
  - ◆ Upgrading from VxVM 3.2 or earlier and your root disk is encapsulated.
  - ◆ Upgrading from VxVM 3.5 and your root disk is encapsulated.
  - ◆ Upgrading from VxVM 3.2 or earlier and your root disk is not encapsulated.

For all of these procedures, see [“Upgrading VxVM and the Solaris Operating System from VxVM 3.5 \(Encapsulated Root Disk\) or from VxVM 3.2 or Earlier Release”](#) on page 82.

7. Before upgrading the Solaris Operating System only, see [“Upgrading the Solaris Operating System Only”](#) on page 87.
8. Check that the upgrade was successful. See [“Completing the Upgrade”](#) on page 89.

## Licensing and Product Distribution

The VERITAS products CD-ROM has an automated installation and licensing procedure that allows you to install packages using an Installation Menu rather than installing from the command line. VERITAS also has a website from which you can quickly and easily obtain a license key. See [“Obtain a License from the VERITAS vLicense Website”](#) on page 6 for website details, and see the *VERITAS Storage Solutions 4.0 Product License and Installation Guide* liner notes with the VERITAS product CD-ROM.

### Product Licensing

VERITAS Volume Manager is a licensed product. Before you install VxVM, obtain a license key from VERITAS. If you have a temporary license key, you must obtain a permanent license key when you purchase the product. A License Key Request Form (LKRF) is included in the product package. The LKRF has all the information required to establish a user account on the VERITAS vLicense™ website and generate your license key. If you do not receive a License Key Request Form, contact your sales representative or send an email with your sales order number to [license@veritas.com](mailto:license@veritas.com).



To obtain a product license, use the vLicense website (see below) or complete the License Key Request Form, including your system's host ID and model type. Sign and date the completed form and fax it to VERITAS. You will receive a license key by email within a few business days. Retain the License Key Request Form for your records.

## Obtain a License from the VERITAS vLicense Website

You can access the vLicense website at:

<http://www.veritas.com/buy/vLicense/vLicenseHome.jhtml>

To obtain a license from the website, provide the following information shown on the License Key Request Form:

- ◆ Your customer number
- ◆ Your order number
- ◆ Your serial number

To determine the host ID of your system, enter:

```
# hostid
```

To determine the machine type, enter:

```
# uname -i
```

After receiving a license key, record the number somewhere other than on the system where the license is installed so that you can access the license if the system becomes inoperable or the product requires reinstallation.

During the installation procedure, you must enter a license key. If you are replacing a temporary license with a permanent license, follow the instructions that accompany the license key to replace the old license with the new one.

The VERITAS licensing commands are provided in the software package `VRTSvlic`. The `VRTSvlic` package must be installed for the licensing process to work.

If you have any questions concerning licensing, contact VERITAS at the license information numbers listed under “[Getting Help](#)” on page xi.

## Add or Upgrade Licenses

If you are upgrading from VxVM 3.2 or earlier, you will have used ELM licensing and installed the `VRTSlic` package. Recent releases of VxVM, including this release, use a new licensing method that involves installing the `VRTSvlic` package.

VxVM 4.0 includes the licensing package, `VRTSvlic`, that is common to all new VERITAS products. The `VRTSvlic` package replaces the functionality of the `VRTSlic` package used in VxVM 3.2 and earlier releases. The following table lists equivalency between licensing commands in `VRTSlic` and `VRTSvlic`:

VRTSlic command	VRTSvlic command	Description
<code>vxlicense -c</code>	<code>vxlicinst</code>	Installs a license.
<code>vxlicense -p</code>	<code>vxlicrep</code>	Reports installed licenses.
<code>vxlicense -t</code>	<code>vxlictest</code>	Tests a license.

Any existing valid VxVM license keys are accepted for backward compatibility when upgrading to VxVM 4.0. The new licensing package silently converts the old key to a new value. However, you may need to obtain additional licenses for features that are new in VxVM 4.0 or later. You should retain the old `VRTSlic` package on your system if it is required by VERITAS products other than VxVM. If you choose to remove the `VRTSlic` package to free up disk space, this does not delete the existing license key files.

If you are upgrading to VxVM 4.0 from VxVM 3.2 or earlier, you can use the following commands to view the currently installed licenses:

```
# vxlicense -p
# /usr/lib/vxvm/bin/vxliccheck -pv
```

If you need to add new licenses to support features in VxVM 4.0, you must add the new licensing package, `VRTSvlic`, as described in the chapter on upgrading VxVM.

If you are upgrading from VxVM 3.5, you can view the currently installed licenses (for both `VRTSlic` and `VRTSvlic`) with the following command:

```
# vxlicrep
```

To add new licenses to VxVM and to other VERITAS products that use the `VRTSvlic` package for licensing, enter the following command:

```
# vxlicinst
```

For any installed VERITAS products that use the `VRTSlic` package for licensing, use the following command to add new licenses:

```
# vxlicense -c
```

For more information about commands in the `VRTSvlic` package, refer to the `vxlicinst(1)`, `vxlicrep(1)` and `vxlictest(1)` manual pages.



## Deploying Licenses with the installvm Script

VERITAS products have an automated installation and licensing procedure that lets you install packages using an installation menu, or invoke installation scripts from the command line.

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**Note** The VERITAS Installation Menu and scripts are not available if you purchased VERITAS Volume Manager from Sun Microsystems.

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You can use the `installvm` script to deploy licenses. Use the `-license` option and follow instructions:

```
# installvm -license
```

## Preinstallation Requirements

To be able to prepare systems for a VxVM installation, verify that:

- ◆ The administrator performing the installation has root access and a working knowledge of Solaris Operating System administration.
- ◆ All terminal emulation issues are worked out prior to starting the installation. The terminal selected should be fully functional during OpenBoot prompts and single-user and multi-user run levels.
- ◆ Sufficient outage time exists for the installation, which may require several reboots.

## Disk Space Requirements

The following table shows the minimum space requirements for each package against each file system (assuming the packages are installed in their default locations).

Package	/	/usr	/opt	Total
VRTSvxvm	42 MB	71 MB	18 MB	131 MB
VRTSvlic		1MB	1MB	2 MB
VRTSvmman			1 MB	1 MB
VRTSvm doc			8 MB	30 MB
VRTSvmpro			8 MB	5 MB

Package	/	/usr	/opt	Total
VRTSfspro			6 MB	6 MB
VRTSob, VRTSobgui			80 MB	80 MB
VRTSalloc			22MB	22MB
VRTSddlpr			10MB	10MB
VRTScpi			1MB	1MB
VRTSperl			33 MB	33MB
VRTSmuob			2 MB	2 MB

## Set the PATH and MANPATH Variables

Most of the commands used in the installation are in the `/usr/sbin`, `/sbin`, `/opt/VRTS/bin`, `/opt/VRTSob/bin` and `/etc/vx/bin` directories. You should add these directories to your PATH environment variable, making sure that `/usr/sbin` precedes `/sbin` in the path.

Similarly, set the path of your MANPATH environment variable to include `/opt/VRTS/man`.

Examples:

If you are using a shell such as `sh` or `ksh`, use the following commands:

```
$ PATH=/usr/sbin:/sbin:/opt/VRTS/bin:/opt/VRTSob/bin:/etc/vx/bin:\
/opt/VRTS/lib/vxvm/bin:$PATH
$ export PATH
$ MANPATH=/opt/VRTS/man:$MANPATH
$ export MANPATH
```

If you are using a shell such as `csh` or `tcsh`, use the following commands:

```
% setenv PATH /usr/sbin:/sbin:/opt/VRTS/bin:/etc/vx/bin:\
/opt/VRTSob/bin:/usr/lib/vxvm/bin:$PATH
% setenv MANPATH /opt/VRTS/man:$MANPATH
```



## /opt directory

The directory `/opt` must exist and be writable. Also, `/opt` must not be a symbolic link. This is because the volumes not temporarily converted by the `upgrade_start` will be unavailable during the upgrade process. If you have a symbolic link from `/opt` to one of the unconverted volumes, the symbolic link will not function during the upgrade and items in `/opt` will not be installed.

## Take a Disk Inventory

### Select Disks

Decide which disks you want to place under VxVM control. The other disks in your configuration are not affected. Disks may be brought under VxVM control in two ways:

- ◆ Encapsulated disks—Data in all existing file systems and partitions on the disk are preserved.
- ◆ Initialized disks—Data on the disks is removed.

### Verifying Disk Contents

Verify the disk contents. Answer the following questions and list the data for your convenience.

1. Make sure you are aware of the contents of each disk. Determine which disks can be encapsulated (data is preserved) or initialized (data is removed).
2. Do you want to place the system root disk under VxVM control?  
\_\_\_\_\_
3. Do you want to either encapsulate or initialize *all* disks on a controller together? Identify the controllers (for example `c0t0d0` etc.).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Identify the disks to be encapsulated, initialized, or excluded, in a table similar to the following.

Disk ID	Encapsulate, Initialize, Exclude

5. If you are encapsulating disks, verify that the disks to be encapsulated by VxVM have two free partitions and a small amount of free space (2048 sectors).

The free space must be at the beginning or end of the disk and must not belong to a partition. This space is used for storing disk group configurations and a disk label that ensures VxVM can identify the disk, even if it is moved to a different address or controller. It is also used to keep track of disk configuration and to ensure correct recovery. VxVM allocates approximately 2048 sectors from each disk for the disk group configurations and the disk label. This space is sufficient to handle normal disk group configurations for up to approximately 100 disks.

The boot disk is a special case. If no other space is available, VxVM attempts to allocate space usually reserved for swap by shrinking the swap partition. This process is known as *swap relocation* and, if necessary, happens automatically during root disk encapsulation.

---

**Note** Although it is possible to put disks with no free space under VxVM control, this is only used as a migration strategy. Many VxVM capabilities based on disk identity are available only for disks with the required free space. See the `vxdisk(1M)` manual page for information on the `nopriv` disk type.

---

6. If you are encapsulating the boot (root) disk:
  - a. Before encapsulating your boot disk, set the EEPROM variable `use-nvramrc?` to **true**. This will enable VxVM to take advantage of boot disk aliases to identify the mirror of the boot disk if a replacement is needed. If this variable is set to **false**, you must determine which disks are bootable yourself. Set this variable to **true** as follows:

```
eeeprom "use-nvramrc?=true"
```



- b. Use the `prtvtoc(1M)` command to record the layout of the partitions on the unencapsulated boot disk (`/dev/rdisk/c0t0d0s2` in this example):

```
# prtvtoc /dev/rdisk/c0t0d0s2
```

Record the output from this command for future reference.

- c. To encapsulate the boot disk, tag the swap partition as `swap` so that it is possible to dump to that partition later. See `format(1M)` for information on tagging the swap partition.

---

**Note** If the path to an aliased boot device is different from the path in the `/devices` directory, aliases may not function correctly. This might happen if the pathname is incorrectly entered at the command line, or if the device's pathname changes at a later date.

---

7. A DMP consideration is that if your system uses Sun's AP software, this release of VxVM requires an AP upgrade and a Solaris Operating System patch. See "[DMP and Alternate Pathing](#)" on page 17.

---

**Note** As Sun Microsystems no longer supports AP software on Solaris 9, step 7 of this procedure does not apply if you have Solaris 9.

---

## Including and Excluding Disks

Declare what will be managed by VxVM and what will not.

1. Log in as superuser.
2. Identify controllers, disks and enclosures that are to be excluded from being configured as VxVM devices by the `vxdiskadm` utility.
3. To exclude devices from VxVM control, create the `/etc/vx/cntrls.exclude`, `/etc/vx/disks.exclude` and `/etc/vx/enclr.exclude` files. You can:
  - ◆ exclude one or more disks from VxVM control.
  - ◆ exclude all disks on certain controllers from VxVM control.
  - ◆ exclude all disks in specific enclosures from VxVM control.

**Note** The `vxinstall` uses the `exclude` files to avoid configuring the specified disks as VxVM devices. These files do not exclude disks from use by any other VxVM commands.

---

Here are examples of each `exclude` file.

- ❖ To exclude one or more disks from VxVM control, create the `/etc/vx/disks.exclude` file, and add disk names to the file. The file contents would be similar to the following:  

```
c0t1d0  
c0t1d1
```
- ❖ To exclude all disks on certain controllers from VxVM control, create or edit the `/etc/vx/cntrlr.exclude` file, and add the names of the controllers to the file. The file contents would be similar to the following:  

```
c0  
c1
```
- ❖ To exclude all disks in specific enclosures from VxVM control, create or edit the `/etc/vx/enclr.exclude` file, and add the names of the enclosures to the file. The file contents would be similar to the following:  

```
sena0  
emc1
```



## Required Solaris Software Patches

Please read this section completely *before you install* VERITAS Volume Manager 4.0. You must reboot your system after installing the patches.

---

**Caution** Do not install VxVM until you have installed the following mandatory patches. The patches must be installed on your system for VxVM to work properly.

---

### Check for Existing Patches

Some required system patches may already be present in your operating system. To display a list of current patches on your system, enter:

```
# showrev -p
```

For more information, see `showrev(1M)`.

### Download Required Patches

If the patches shown in the required list are not already installed, go to <http://sunsolve.Sun.com> to download the patches. You need to install the appropriate patches and then reboot.

DISCLAIMER: Patch version and information is determined at the time of product release. For the most current patch version and information, please contact your vendor.

The `SUNWscpu` package should be shipped as part of the OS. Solaris patches are available from <http://www.sun.com/storage/san/index.html>.

#### Required Solaris Patches

For Solaris Version	Sun Patch ID Number and Required Package	Notes
Solaris 9	SUNWscpu package	Note that SUNWscpu is a package and should be installed using <code>pkgadd</code> .
	113277-08	You must install this patch if you intend to employ SCSI-3 fencing ( <code>vx fencing</code> ) on Solaris 9.

## Required Solaris Patches

For Solaris Version	Sun Patch ID Number and Required Package	Notes
Solaris 8	<ol style="list-style-type: none"> <li>1. SUNWsan package.</li> <li>2. SUNWscpu package (available on the Solaris 8 CD)</li> <li>3. 109529 (-06 or higher)</li> <li>4. 111413 (-06 or higher)</li> </ol>	Regardless of whether you have an A5k drive connected, you must install the A5k patches for VxVM to function. You must install the SUNWsan package and patch 109529 before installing patch 111413. You can then install VxVM. This order of these steps is important. Note that SUNWsan and SUNWscpu are packages and should be installed using pkgadd.
	108827 (-19 or higher) or 108993 (-18 or higher)	
	108528 (-18 or higher)	
	110722 (-01 or higher)	If you have Sun's Alternate Pathing (AP), you must install Solaris patch 110722-01 for VxVM 4.0 to co-exist with the AP driver version 2.3.1. However, you must also upgrade AP. Please see <a href="#">"DMP and Alternate Pathing"</a> on page 17 before installing VxVM.
Solaris 7	107473 (-07 or higher)	Regardless of whether you have an A5k drive connected, you must install an A5k patch for VxVM to function.
	110722 (-01 or higher)	If you have Sun's Alternate Pathing (AP), you must install Solaris patch 110722-01 for VxVM 4.0 to co-exist with the AP driver version 2.3.1. However, you must also upgrade AP. Please see <a href="#">"DMP and Alternate Pathing"</a> on page 17 before installing VxVM.
	106541 (-19 or higher)	If you are running Solaris 7, you must install Sun patch ID 106541.
	106327 (-5 or higher)	If you are running Solaris 7, you must install Sun patch ID 106327.

**Note** To install the VEA client on Solaris 7 or 8, you must pick up the appropriate java 1.4.1 patches for Solaris 7 or 8. See <http://support.veritas.com/docs/264714> for further information.



**Note** If 'patchadd -p' gives an error as in the following example:

```
# patchadd -p | grep 111413
/usr/sbin/patchadd[193]: PatchArrElem: subscript out of range.
then you should install the patch 108987-08 (or later).
```

---

## Solaris Patches 110934-10 and 113713-01

If you are running Solaris 8, you should not install Solaris patch 110934-10. If you are running Solaris 9, you should not install Solaris patch 113713-01. Installation of these patches will prevent the installation of VxVM, VERITAS Cluster Server and GLM patches.

You can display the currently installed patches and their levels by entering, for example, the command:

```
# showrev -p | grep 110934
```

If you have installed 110934-10 on Solaris 8 or patch 113713-01 on Solaris 9, you must remove them using the `patchrm` command, for example:

```
# patchrm 110934-10
```

For Solaris 8, you can install patch 110934-08 or lower. If you do not have or cannot obtain patch 110934-08, do not install patch 110934-10.

You can successfully install VxVM without either patch.

You can see the latest status of patches 110934-10 and 113713-01 by going to the VERITAS support web site at: <http://support.veritas.com>.

## A5x00 Devices

Whether or not you have A5x00 devices connected to your system, you must add the Solaris patches, shown in the table in “[Download Required Patches](#)” on page 14, to this release of VxVM. If you have A5x00 devices attached to your system, you need this patch to use them; if you don't have A5x00 devices attached to your system, VxVM uses the patches to discover whether such devices exist.

### Claiming Devices in the SENA Category

The A5x00 disk arrays are claimed by DMP under the SENA category only if the required libraries are present on the system at the time of VxVM installation.

The libraries are present by default on Solaris 2.8 and Solaris 2.9. For Solaris 2.7, see the table in “[Download Required Patches](#)” on page 14 to find the appropriate patch. The patches must be installed before installing VxVM.

## Partitioning Disks on Sun StorEdge 6120/6320 Arrays

If you are planning to install VxVM with Sun StorEdge 6120/6320 arrays, please see the section in the VERITAS Volume Manager Hardware Notes entitled: “Partitioning disks on Sun StorEdge 6120/6320 Arrays”.

## DMP and Alternate Pathing

VxVM 4.0 allows Dynamic Multipathing (DMP) to co-exist with Sun’s Alternate Pathing (AP) software. For VxVM to co-exist with AP successfully, you must upgrade AP before installing VxVM 4.0. This release of VxVM requires AP version 2.3.1 and Sun patch 110722 (latest version).

If you do not know which version of AP is installed, run the following command:

```
#pkginfo -l SUNWapdv | grep VERSION
```

Upgrade AP to 2.3.1, and then install the patch before installing this release of VxVM.

DMP is described in more detail in the *VERITAS Volume Manager Administrator’s Guide*.

Use the new interfaces provided through `vxdiskadm` to prevent DMP from multipathing certain or all devices connected to the system. These interfaces can also suppress devices from VxVM.

---

**Note** Sun Microsystems no longer supports AP software on Solaris 9.

---

## Array Support Libraries (ASL)

VxVM provides support for new disk arrays in the form of Array Support Library (ASL) software packages. You can obtain ASL packages from:

- ◆ The VxVM release package
- ◆ The disk array provided by the vendor
- ◆ The VERITAS Technical Support site, <http://support.veritas.com>

For further information on supported ASLs and installing ASLs, see the *VERITAS Volume Manager Hardware Notes*.



## VERITAS Enterprise Administrator (VEA)

For a machine to be administered by VEA, the following software must be installed and running:

---

**Note** To install VEA on Solaris 7, or 8, you must pick up the appropriate java 1.4.1 patches for Solaris 7 or 8. See <http://support.veritas.com/docs/264714> for further information.

---

- ◆ VERITAS Volume Manager Release 4.0. The `vxconfigd` and VEA service (`vxsvc`) must be running on the machine to be administered.
- ◆ The VEA server. See “[VEA Installation](#)” on page 35 for information on how to install the server.
- ◆ If a VERITAS Storage Administrator (VMSA) package is installed on the machine, refer to “[VMSA and VEA Co-existence](#)” on page 36 before installing the new GUI.

## Cluster Environment Requirements

If your configuration has a cluster, which is a set of hosts that share a set of disks, follow these steps:

1. Obtain a license for the *optional* VxVM cluster feature from your Customer Support channel.
2. If you plan to encapsulate the root disk group, decide where you want to place it for each node in the cluster. The root disk group, usually aliased as **bootdg**, contains the volumes that are used to boot the system. VxVM sets **bootdg** to the appropriate disk group if it takes control of the root disk. Otherwise **bootdg** is set to **nodg**. To check the name of the disk group, enter the command:  
  
**# vxddg bootdg**
3. Decide on the layout of shared disk groups. There may be one or more shared disk groups. Determine how many you wish to use.
4. If you plan to use Dirty Region Logging (DRL) with VxVM in a cluster, leave a small amount of space on the disk for these logs. The log size is proportional to the volume size and the number of nodes. Refer to the *VERITAS Volume Manager Administrator's Guide* and the *VERITAS Volume Manager Cross-Platform Data Sharing Administrator's Guide* for more information on DRL.
5. Installation of license on every node in the cluster. For more information on enabling clustering, see “[Enable Cluster Support in VxVM \(Optional\)](#)” on page 107.

## Set up your SAN Configuration

If you have a SAN configuration and if some disks in your SAN will not be under VxVM control, create a file called `/etc/vx/cntrl.exclude` or `/etc/vx/disks.exclude`. (See “[Including and Excluding Disks](#)” on page 12 for more information.)



## Installing Using the VERITAS Installation Menu

---

**Note** The VERITAS Installation Menu is not available if you purchased VERITAS Volume manager from Sun Microsystems.

---

The Installation Menu simplifies the process of installing VERITAS software and is the recommended method of installation. To begin installing, do the following:

1. Locate the software disc that contains the product to be installed and insert the disc into a CD-ROM drive attached to your system.
2. To invoke the common installer, run the `install` command on the CD as shown in this example:

```
# /cdrom/CD_NAME/installer
```

3. The `VRTSvlic` licensing package will be installed automatically, and the Product Status page will display the following:
  - ◆ Products available for installation
  - ◆ Products currently installed
  - ◆ Products that are licensed
  - ◆ Options for operations you can initiate

---

**Note** You can use the `/opt/VRTS/bin/vxlicrep` command to view a report of the license type for each product.

---

4. At the prompt on the Product Status page, type **1** to add a license key and press Return to begin.
5. At the next prompt, enter the license key and press **Return**.
6. At the Product Status page, enter **2** for the VERITAS Installation Menu and press Return. The VERITAS Installation Menu is displayed.
7. At the VERITAS Installation Menu, enter the number of the product you want to install and press **Return**.

The product installation begins automatically. When the operation finishes, the VERITAS Installation Menu is displayed again.

## Installing Using the Product Installation Scripts

You can install VERITAS Volume Manager by running the `installvm` product installation script from the command line. This allows you to specify various options that are unavailable from the VERITAS Installation Menu.

### Command-Line Options

The following options are available when using the VERITAS product installation scripts. For an initial install or upgrade, options are not usually required.

Command Line Option	Function
<code>-configure system1 system2...</code>	Configures the product after installing using the <code>-installonly</code> option.
<code>-installonly system1 system2...</code>	Installs packages, but does not configure the product.
<code>-license system1 system2...</code>	Updates or installs a product license.
<code>-nolic system1 system2...</code>	Installs product packages without licensing or configuring. Licensed features are not installed when using this option.
<code>-pkgpath package_path</code>	Designates a path to VERITAS packages. Used for cluster installations. This option enables the installation of packages without having to copy them to all systems in a cluster. <i>package_path</i> must be a full path name, typically to an NFS-mounted location, that contains the packages to be installed on all systems by any cluster product installation script.
<code>-precheck system1 system2...</code>	Performs a preinstallation check to determine if systems meet all installation requirements.
<code>-responsefile response_file</code>	Automates installation and configuration by using system and configuration information stored in a specified file instead of prompting for information. The <i>response_file</i> must be a full path name.



Command Line Option	Function
<code>-tmppath <i>tmp_path</i></code>	Selects a directory other than <code>/var/tmp</code> as the working directory for the installation scripts. This destination is where initial logging is performed and where packages are copied on remote systems before installation.
<code>-usessh</code>	Specifies when the secure shell ( <code>ssh</code> ) or secure copy ( <code>scp</code> ) programs are used for communication between systems instead of <code>rsh</code> and <code>rcp</code> . The <code>-usessh</code> option requires that systems be preconfigured to allow execution of secure commands without prompting for passwords or confirmations.

---

**Note** `installvm` cannot be used to reconfigure an existing installation. This means that you cannot run the following two commands after completing an installation using `installvm`:

```
# installvm -configure
```

```
# installvm -responsefile
```

For the installation to be complete, you must either have fully run `installvm` or you must have run `installvm -installonly` followed by `installvm -configure`.

---

## System Setup and Multiple Host Configuration

The VERITAS installation scripts install VERITAS products under the `/opt` directory on the specified host systems. It is advisable that `/opt` be an independently mounted volume, not a subdirectory.

---

**Note** Do not make `/opt` a VxFS file system.

---

Installation on multiple hosts can be streamlined by copying the contents of the appropriate `product_name/pkgs` directory from the VERITAS software disc to an NFS mounted file system. Use the `-pkgpath` option when invoking the VERITAS installation scripts. For installation to remote hosts, the VERITAS installation scripts require a secure client (`ssh`) or remote shell (`rsh`). If you are installing VERITAS products on a single host, `ssh` or `rsh` is not required.

## Configuring rsh

Edit the `.rhosts` file on each remote system where you want to install VERITAS packages. See the operating system administration guide or the `rsh(1)` online manual page for configuration information.

## Configuring SSH

VERITAS installation scripts can perform remote installations using `ssh` as their communication mechanism if it is configured to operate without prompting for passwords, pass phrases, or confirmations. See the operating system administration guide or the `ssh(1)` online manual page for configuration information.

---

**Note** The VERITAS installation scripts cannot be used with versions of `ssh` that do not use the `PubkeyAuthentication` keyword.

---

## Error Recovery

At most points during an installation, you can use the “**b**” button (“**back**”) to return to a previous section of an installation procedure. The **back** feature of the product installation scripts is context-sensitive, so it returns to the beginning of a grouped section of questions. If an installation procedure hangs, use Control-C to stop and exit the program. There is a short delay before the script exits. If the installation procedure does hang, you should inspect the temporary log file which is in `/var/tmp/install*` where “\*” is a timestamp. To see which subdirectory is appropriate, run the command:

```
# ls -ltr | tail
```

If you use the `installvm` script, the logs are located at `/opt/VRTS/install/logs`.

## Using Log Files

After every product installation, the VERITAS Installer creates three text files:

- ◆ Installation log file
- ◆ Response file
- ◆ Summary file

The names and locations of each file are displayed at the end of each product installation, and are always located in the `/opt/VRTS/install/logs` directory. It is advisable to keep the files for auditing, debugging, and future use.



### **Installation Log File**

The installation log file contains all commands executed during the procedure, their output, and any errors generated by the commands themselves. This file is for debugging installation problems and can be used for analysis by VERITAS Technical Support.

### **Response File**

The response file contains the configuration information entered during the procedure. The response file can be used for future installation procedures by invoking an installation script with the `-responsefile` option. The response file passes arguments to the script to automate the installation of that product. The file can be edited to automate installation of additional systems.

### **Summary File**

The summary file contains the output of the VERITAS product installation scripts. This file shows the products that were installed, where the log and response files related to this particular installation are located, and any messages displayed at the end of installation. The summary file can be used in preparing to run VERITAS software following installation.

# Installing VERITAS Volume Manager

## 2

This chapter describes how to carry out a fresh installation of VERITAS Volume Manager (VxVM) and VERITAS Enterprise Administrator (VEA), including the VRTSvmpro and VRTSfspro provider packages.

---

**Note** Only users with superuser privileges can install VxVM and VEA.

---

## Installation Overview

VERITAS provides two methods of installing VxVM:

- ◆ The traditional method uses the `pkgadd` command. To use `pkgadd` to install VxVM, see [“Installing VxVM using pkgadd”](#) on page 28.
- ◆ The new method uses the VERITAS Installation Menu or the `installvm` script. To use the `installvm` script, see [“Installing VxVM Using the installvm Script”](#) on page 32.

Follow this sequence of steps to install VxVM:

1. Complete all the tasks and checks detailed in [“Preinstallation Requirements”](#) on page 8.
2. Install the required Solaris patches. Refer to [“Required Solaris Software Patches”](#) on page 14.
3. You may need to upgrade Sun’s Alternate Pathing (AP) driver to version 2.3.1. Refer to [“DMP and Alternate Pathing”](#) on page 17.
4. Load the software packages onto the system to be administered as described in the section [“Installing VxVM using pkgadd”](#) on page 28 or if you want to use the `installvm` script, see [“Installing VxVM Using the installvm Script”](#) on page 32.
5. Install VEA as described in [“VEA Installation”](#) on page 35.
6. Set up and start VEA as described in [“VEA Installation”](#) on page 35.



7. If you are planning to use VxVM in a cluster environment, follow the instructions in [“Enable Cluster Support in VxVM \(Optional\)”](#) on page 107.
8. After installation, add any disk arrays that are in the JBOD category as described in the section [“Hot-Relocation Guidelines”](#) on page 103. You should also refer to the *VERITAS Volume Manager Hardware Notes*.

## The Packages

The VERITAS packages are found on the CD-ROM in the `volume_manager/pkgs` directory:

- ◆ `VRTSvxvm`—VERITAS Volume Manager and Volume Replicator software.
- ◆ `VRTSvlic`—VERITAS Licensing Utilities.
- ◆ `VRTSvmDOC`—online copies of VERITAS Volume Manager guides.
- ◆ `VRTSvmman`—VxVM manual pages.
- ◆ `VRTSob`—VERITAS Enterprise Administrator Service.
- ◆ `VRTSobadmin`—Variable settings used in installation of VERITAS Enterprise Administrator.
- ◆ `VRTSobgui`—VERITAS Enterprise Administrator.
- ◆ `VRTSvmpro`—VERITAS Virtual Disk Management Services Provider (required if you install `VRTSob` and `VRTSobgui`).
- ◆ `VRTSfspro`—VERITAS File System Provider (required even if you are not installing the VERITAS File System software).
- ◆ `VRTSalloc`—VERITAS Storage Allocator Provider.
- ◆ `VRTSddlpr`—VERITAS Device Discovery Layer Provider.
- ◆ `VRTScpi`—VERITAS Installation Technology
- ◆ `VRTSperl`—Perl used by VERITAS Installation Technology
- ◆ `VRTSmuob`—VERITAS Enterprise Administrator Localized package.

---

**Note** The VxVM and VVR Release Notes are also contained on the CD-ROM.

---

## Packaging Differences in the Sun Microsystems Distribution of VERITAS Products

When you purchase the VERITAS File System or VERITAS Volume Manager through Sun Microsystems, there are differences in the product CD that affect the installation.

- ◆ The VERITAS Installation Menu and the install and uninstall scripts are not available.
- ◆ Packages and patches are not compressed
- ◆ There is no `file_system` or `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. Procedures that specify the `file_system` or `volume_manager` directory must be modified. for example, change:

```
# cd /cdrom/cdrom0/volume_manager/pkgs
```

To:

```
# cd /cdrom/cdrom0/pkgs
```

File locations are also different. For example, the file `vxfs_notes.pdf` is under the `release_notes` directory, not the `file_system/release_notes` directory.

- ◆ The following VERITAS Enterprise Administrator patches are available and must be installed:

115209-xx (for the VRTSob VEA package)

115210-xx (for the VRTSobgui VEA GUI client package)

115212-xx (for the VRTSmuob VEA Service Localized package)

The following VxVM patch is only required for Storage Foundation customers:

115217-xx (for the VRTSvxvm package)



## Installing VxVM using pkgadd

A VxVM installation uses the Solaris `pkgadd` utility and, as documented below, includes the packages for the VEA server and VEA client. The VEA server is an integral part of VxVM and usually resides on the VxVM host; it must reside on the VxVM host to be administered. The VEA client can also reside on machines other than the VxVM host. See [“VEA Installation”](#) on page 35 for VEA client information.

### Mounting the CD-ROM

To mount the CD-ROM with Solaris Volume Management, the following notes apply:

- ◆ If you add the `VRTSvlic` package and see a message that says no changes were made to the system, follow the instructions in [“Removing Previous Licensing Packages”](#) on page 31.
- ◆ The system prints a series of status messages as the installation progresses. No errors should be reported, and the process takes about five minutes.
- ◆ If the installed version of AP is earlier than 2.3.1, a warning appears and installation is aborted. See [“DMP and Alternate Pathing”](#) on page 17 for details.
- ◆ If AP 2.3.1 is installed on the system, but the Solaris patch 110722-01 is not installed, a warning appears and installation is aborted.

---

**Note** In the following procedure, the order in which the packages are listed is significant. The `VRTSvlic` package must be listed first, followed by the `VRTSvxvm` package, then the remaining packages. Also, `VRTSob` must already be listed before `VRTSvmp` and `VRTSalloc`. Once installed, you cannot remove `VRTSob` before removing `VRTSvmp` and `VRTSalloc`.

---

### Mounting the CD-ROM with Solaris Volume Management

To mount the CD-ROM with Solaris Volume Management, you should follow these steps. When a default response is displayed in parentheses, press **Return** to accept that default.

1. Log in as superuser.
2. Insert the CD-ROM into a CD-ROM drive connected to your system.

Once the CD-ROM is inserted, the Solaris volume management software should automatically mount the CD-ROM. If the automatic mount fails, you should use the following command to mount the CD-ROM:

```
# mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom
```

where `c0t6d0s2` is the default address for the CD-ROM.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems.

---

3. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `pkgs`, which will be the target path, and enter the commands:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* pkgs
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin pkgs
```

4. Uncompress the packages using the `gunzip` command, and place the uncompressed packages in the `pkgs` directory that you created:

```
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip \
pkgs/*.gz
```

5. Change to the `pkgs` directory that now contains the VxVM packages:

```
# cd pkgs
```

and use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

6. Install the packages:

```
# pkgadd -d . VRTSvlic VRTSvxvm VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpro
# pkgadd -d . VRTScpi VRTSperl VRTSmuob
```

After you have installed VxVM using `pkgadd`, you should proceed to Chapter 2 to set up and configure VxVM.



## Installing the Patches for VxVM and VEA

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Use the following procedure to install VxVM and VEA patches:

1. Create a temporary directory that will contain the patches:

```
# mkdir -p /40/patches
```

2. Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

3. Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to 115209-##.tar.gz

4. Uncompress the patches:

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the gunzip command for all patches.

5. Extract the patches:

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

6. Install the patches:

```
# patchadd 115209-xx
```

Repeat the command for all patches.

7. Verify that the patch is installed:

```
# showrev -p 115209-xx
```

Repeat the command for all patches.

8. Reboot the system:

```
# sync; sync; reboot
```

## Removing Previous Licensing Packages

If you add the VRTSvlic package and see the following message, you must first remove the existing VRTSvlic package:

```
Current administration requires that a unique instance of the
<VRTSvlic> package be created. However, the maximum number of
instances of the package which may be supported at one time on the
same system has already been met.
```

1. To de-install the old package, enter the following command:

```
# pkgrm VRTSvlic
```

2. During de-install, if you see the following message, enter **y**:

```
WARNING: The VRTSvxvm package depends on the package currently
being removed. Dependency checking failed.
Do you want to continue with the removal of this package [y,n,?,q]
```

3. Use pkgadd to install the latest VRTSvlic package.

---

**Note** VRTSvxvm package dependency requires that a single instance of the VRTSvlic package be installed for proper operation.

---

The system prints out a series of status messages as the installation progresses. No errors should be reported, and the process takes about five minutes.

If the installed version of AP is earlier than 2.3.1, a warning appears and installation is aborted.

If AP 2.3.1 is installed on the system but Solaris patch 110722-01 or later is not installed, a warning appears and installation is aborted.



## Installing VxVM Using the installvm Script

---

**Note** The VERITAS Installation Menu is not available if you purchased VERITAS Volume manager from Sun Microsystems.

---

If you intend to install VxVM on a remote host, you should ensure that `rsh` or `ssh` are set up. See “[System Setup and Multiple Host Configuration](#)” on page 22 for further information.

---

**Note** If you are carrying out a multi-host installation, you should note that the `installvm` script does not support a mixture of new installations and upgrades. you should either install on all hosts or upgrade all hosts.

---

1. Insert the CD-ROM in the CD-ROM drive.

Once the CD-ROM is inserted, the Solaris volume management software automatically mounts the CD-ROM. Change directory:

```
# cd /cdrom/CD_NAME/volume_manager
```

2. If you are installing VxVM on the local system or on multiple systems, which may or may not include the local system, you have two choices:
  - ◆ Run the simple form of the `installvm` command
  - ◆ Invoke `installvm` with some command line options. You might do this if you want to avoid the performance penalty of the installation scripts copying packages from the CDROM to a disk attached to each system. To avoid this performance penalty, you can copy the VxVM packages and patches to a network-shared file system that is connected to all of the systems on which you want to install the software.

To use the simple form of the command, enter:

```
# ./installvm
```

and proceed to step 3.

To avoid the performance penalty, enter the following commands, which assume that your NFS mountable file system is `$NFS_FS`:

```
a. # cd /cdrom/CD_NAME
```

```
b. # cp -r * $NFS_FS
```

```
c. # cd volume_manager
```

```
d. # ./installvm -pkgpath $NFS_FS/volume_manager/pkgs -patchpath  
$NFS_FS/volume_manager/patches
```

3. At the prompt, enter the name of the system or systems on which you want to install VxVM.

Enter the system names separated by spaces on which to install VxVM:

4. The installation script performs an initial system check, and confirms success by displaying information regarding the OS version, whether the VRTSvxvm package is installed and whether the necessary patches are installed.

The initial system check might tell you that you need to obtain SunOS patches. If this happens, you need to see [“Required Solaris Software Patches”](#) on page 14.

When the `installvm` script completes its initial check, you will see the following message:

```
Initial system check completed successfully.
```

Continue by pressing **Return** at the prompt.

5. The `installvm` script proceeds to install the Infrastructure packages, VRTScpi and VRTSvlic. When this is completed, the `installvm` script tells you:

```
VERITAS Infrastructure packages installed successfully.
```

Press **Return** to continue.

6. At the prompt, confirm that you are given the option to install the optional packages. Make your decision and enter your option at the prompt:

```
Select the optional packages to be installed on all systems?
[1-3,q,?] (1)
```

7. At the prompt, press **Return** to confirm that you want to install the VxVM packages.
8. The Installation script will then confirm that the Installation Requirements checks have been successfully completed. At the prompt, press **Return** to continue with the installation:

```
Installation requirement checks completed successfully.
```

9. At this stage of the installation, if you have previously a VxVM 3.5 or VxVM 4.0 version of the VRTSvxvm, you will see a message stating, for example,

```
A copy of a previous VxVM configuration is present on the system
techmac
```

You will be asked if you want to restore and rerun the previous VxVM configuration.



10. The VxVM packages are then installed. At this stage, you will see a display similar to this:

```
Installing VRTSperl 4.0 on techmac ..... Done 1 of 10 steps
Installing VRTSob 4.0 on techmac ..... Done 2 of 10 steps
Installing VRTSobgui 4.0 on techmac ..... Done 3 of 10 steps
Installing VRTSvxvm 4.0 on techmac ..... Done 4 of 10 steps
Installing VRTSvmman 4.0 on techmac ..... Done 5 of 10 steps
Installing VRTSvmdoc 4.0 on techmac ..... Done 6 of 10 steps
Installing VRTSvmpro 4.0 on techmac ..... Done 7 of 10 steps
Installing VRTSfspro 4.0 on techmac ..... Done 8 of 10 steps
Installing VRTSalloc 1.0 on techmac ..... Done 9 of 10 steps
Installing VRTSddlpr 1.0 on techmac ..... .. Done 10 of 10 steps
Volume Manager Installation completed successfully.
Press [Return] to continue:
```

11. The script then checks whether you have a license installed. Enter a license if required and press **Return** to continue. You can also install additional licenses if required.
12. At this stage, you can choose to configure VxVM now or later. If you choose to configure now, answer 'Y' to the question and continue. You will be shown on-screen instructions on how to proceed. If you answer 'N', you must configure VxVM at a later stage by using the `installvm -configure` command.
13. You will be asked whether you want to use enclosure-based naming. If you reply 'Y' to the enclosure-based naming question, the `installvm` script decides whether the system is eligible for enclosure-based naming. If it is eligible, you will be asked to confirm that you want to go ahead.
14. At the next prompt, confirm that you want to start VxVM.
15. At the next prompt, confirm whether you want to name a default disk group; this is optional. The `installvm` script determines whether the system is eligible.
16. If you answered 'Y' to the disk groups question, specify a disk group for the system.
17. Confirm the name of the default disk group. This step only registers a default disk group with VxVM. You will need to create the default disk group as a separate task after installation is complete.

VxVM will now be started up. If you chose to restore a previous VxVM configuration, you will need to reboot the system.

---

**Note** `installvm` cannot be used to reconfigure an existing installation. This means that you cannot run the following two commands after completing an installation using `installvm`

```
# installvm -configure
# installvm -responsefile
```

---

## VEA Installation

The graphical user interface to VxVM is the VERITAS Enterprise Administrator (VEA), which has two components:

- ◆ **VEA server** The VEA server must be installed on a Solaris machine running VxVM 4.0. The VEA server is never installed by itself. See “[Installing VxVM using pkgadd](#)” on page 28 for the installation procedure that includes the VEA server packages.
- ◆ **VEA client** The VEA client is installed on a Solaris or Microsoft Windows machine that supports the Java 1.1 Runtime Environment. The VEA client can be installed as a stand-alone application on machines that do not host VxVM.

The VEA server packages are:

- ◆ VERITAS Enterprise Administrator Service (VRTSob)
- ◆ VERITAS Volume Manager Service Provider (VRTSvmpro)
- ◆ VERITAS File System Service Provider (VRTSfspro)
- ◆ VERITAS Intelligent Storage Provider (VRTSalloc).
- ◆ VERITAS Device Discovery Layer Provider (VRTSddlpr).
- ◆ VRTSobadmin—Variable settings used in installation of VERITAS Enterprise Administrator.

The VEA client packages are:

- ◆ For the Solaris Operating System, the VERITAS Enterprise Administrator (VRTSobgui)
- ◆ For Windows, the VERITAS Enterprise Administrator (windows/VRTSobgui.msi)

The following are minimum system recommendations for the VEA client:

<b>Solaris:</b>	SPARCstation 5 with 64M memory
-----------------	--------------------------------



<b>Windows:</b>	100MHz Pentium with 32M memory
-----------------	--------------------------------

---

**Note** To install the VEA client on Solaris 7, 8, or 9 you must pick up the appropriate java 1.4.1 patches for Solaris 7, or 8. See <http://support.veritas.com/docs/264714> for further information.

---

## VMsa and VEA Co-existence

If you do not plan to use VMsa to administer other (pre-VxVM 4.0) machines, then you should uninstall VMsa before installing VEA. You can later do a client-only install if you want to run the VMsa client on your machine.

---

**Note** The release of VEA that ships with VxVM 4.0 is not compatible with VMsa, the previous VERITAS Volume Manager GUI. You cannot run VMsa with VxVM version 4.0.

---

If you do not remove VMsa, the following warning appears during a reboot:

```
VERITAS VM Storage Administrator Server terminated.  
Stopping VERITAS VM Storage Administrator Server  
### Terminated
```

The message informs you that the `vm_sa_server` is unable to start. You can safely ignore this message.

You can avoid the message by removing the boot-time start up of the `vm_sa_server`. Use the following command:

```
# /opt/VRTSvm_sa/bin/autostart on
```

Alternatively, you can remove the files `/etc/init.d/vm_sa-server` and `/etc/rc2.d/S96vm_sa-server`.

## VEA Client Installation

---

**Note** This release of VEA requires VxVM Release 4.0.

---

The VEA client packages can be installed on the VxVM host at the same time as the VxVM packages (see “[Installing VxVM using pkgadd](#)” on page 28) or you can install VEA client packages on remote machines.

## Installing the VEA Client on the Solaris Operating System

To install the VEA client on the Solaris machine that hosts VxVM or on other Solaris machines that can access the VxVM host:

1. Log in as superuser.
2. Mount the VERITAS Volume Manager CD-ROM.
3. Before using `pkgadd` to install VxVM, you will need to use the `gunzip` command on the packages to uncompress them. When you have done that, install the package.
4. Use the `pkgadd` utility to install the Solaris VEA client package:

```
# pkgadd -d /cdrom/CD_NAME/volume_manager/pkgs VRTSobgui
```

## Installing the VEA Client on Windows

The VEA client runs on Windows NT, Windows XP, Windows 2000, Windows ME, Windows 98, and Windows 95 machines. If you plan to run VEA from a Windows machine, install the optional Windows package after you have installed the VEA server on a Solaris machine.

Before you install VEA on a Windows machine, you must uninstall any existing VERITAS Volume Manager Storage Administrator™ (VMSA) packages and remove the old `setup.exe` from that machine. Only one VEA package can be installed on a Windows machine at any given time.

---

**Note** If you plan to install the VEA client on Windows NT 4.0, Windows Installer must be upgraded to version 2.0. For more information about upgrading Windows Installer, visit <http://www.microsoft.com>. If you are using Windows NT 4.0, it is also recommended that you use Windows NT 4.0 Service Pack 6.

---

To install the VEA client on a Windows machine:

1. Log in as administrator.
2. Insert the VERITAS CD-ROM containing the VEA software.
3. Using Windows Explorer or a DOS Command window, go to the **windows** directory and execute the `vrtsobgui.msi` script with Windows installer.
4. Follow the instructions presented by the Windows installer program.
5. After installation is complete, ensure environment changes made during installation take effect by performing one of the following procedures:



- ◆ For Windows NT, Windows 2000 or Windows XP, log out and then log back in.
- ◆ For Windows ME, Windows 98 or Windows 95, restart the computer.

## Installing Language Versions

This section applies if you have purchased a localized version of VxVM. Language CDs enable you to use the VxVM software in a supported languages other than English.

VERITAS Storage Solutions includes three software CDs, and if you purchase a language version, other than English, the product includes an additional CD containing software and documentation.

### Installing Language Versions using the VERITAS Installation Menu

The Installation Menu simplifies the process of installing VERITAS software, and is the recommended installation method. To install a language version, there are two main steps:

- ◆ Install the base package (CD1 and CD2)
- ◆ Install the language pack

After you have installed CD1 and CD2, follow this procedure to install the language pack:

1. Verify that the VERITAS Cluster Server Cluster Manager is not running. Consult your cluster server documentation for instructions on how to determine whether the cluster manager is running and how to stop it.
2. Verify that the VERITAS Enterprise Administrator server is not running.
3. Insert the Language CD into a CD-ROM drive.

4. Invoke the language CD common installer:

```
# /cdrom/cdrom0/install_lp
```

This will install language packages that are required by the products installed with the base CD common installer.

## Installing Language Versions using the Product Installation Scripts

Although you can use product installation scripts, for example `installvm`, to install VERITAS products from the command line, product installation scripts are not provided for installing the language packs.

## Installing Language Versions using the `pkgadd` command

Use this procedure to install the language packs:

1. Determine if the VEA server is running by entering the command `vxsvc -m`, and if the VEA server is running, stop it by entering:

```
# /etc/init.d/isisd stop
```

2. Insert the language CD into the CD-ROM drive.
3. Go to the directory containing the packages required for the language version of VxVM. for example to install the Japanese version, enter the command:

```
# cd /cdrom/cdrom0/ja/volume_manager/pkgs
```

4. Install the packages using the `pkgadd` command:

```
# pkgadd -d . VRTSmulic VRTSmufsp VRTSmuob VRTSmuobg VRTSmuvmp  
VRTSmualc VRTSmuddl VRTSvmjavmc VRTSvmjavmd VRTSvmjavmm
```

5. Restart the VEA server by entering the command:

```
# /etc/init.d/isisd start
```

## VEA Windows Client Package Installation

To install the Windows Client Package, follow this procedure:

1. Install the base English package for the VEA client (`VRTSobgui.msi`)
  - a. If the CD-ROM drive is drive D:\, navigate to D:\Windows
  - b. Double click on `VRTSobgui.msi`
  - c. Follow the instructions from the installer
2. Install the multi language pack for the VEA Client (`VRTSmuobg.msi`)



- a.** If the CD-ROM is drive D:\, and, for example, you want to install the Japanese version, navigate to D:\ja\windows.
- b.** Double click on `VRTSmuobg.msi`
- c.** Follow the instructions from the installer.



# Setting Up VERITAS Volume Manager

3

This section describes how to set up VERITAS Volume Manager (VxVM) and VERITAS Enterprise Administrator (VEA). Setup consists of the following procedures:

- ◆ VxVM configuration and setup
- ◆ Starting VEA
- ◆ Shared disk setup (for cluster environments only)

---

**Note** Only users with superuser privileges can initialize VxVM and VEA.

---

## Set Up Overview

1. Set up VxVM as described in [“Setting Up VxVM”](#) on page 41.
2. Start VEA as described in [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48.
3. If you are planning to use VxVM in a cluster environment, follow the instructions in [“Cluster Support in VxVM”](#) on page 49.

This section allows you to initialize and configure VxVM. Refer to the decisions you made in [“Take a Disk Inventory”](#) on page 10 when running the commands described in this chapter.

## Setting Up VxVM

This section explains how to set up VxVM. Topics covered are:

- ◆ Licensing VxVM
- ◆ Using Enclosure-based Naming
- ◆ Encapsulation and Initialization



**Note** In releases of VxVM (Volume Manager) prior to 4.0, a system installed with Volume Manager was configured with a default disk group, `rootdg`, that had to contain at least one disk. By default, operations were directed to the `rootdg` disk group. From release 4.0 onward, Volume Manager can function without any disk group having been configured. Only when the first disk is placed under Volume Manager control must a disk group be configured. There is no longer a requirement that you name any disk group `rootdg`, and any disk group that is named `rootdg` has no special properties by having this name. During the setup procedures, you will be asked if you want to create a default disk group, and asked to specify its name.

---

## Enabling Enclosure-based Naming

**Note** If you used the VERITAS Installation Menu or the `installvm` script, you do not need to carry out the instructions in this section. Licensing, configuration of enclosure based naming and creation of a default disk group are managed by the menu installer and the `installvm` script.

---

Because you are no longer required to configure VxVM disks straightaway, `vxinstall` no longer invokes the `vxdiskadm` program, so it is much simpler than in previous versions, and will cover the following three functions:

- ◆ Licensing VxVM
- ◆ Enabling Enclosure-based naming
- ◆ Setting up a system-wide default group

To run the command, enter

```
# vxinstall
```

which will prompt you to enter a license key:

```
VxVM INFO V-5-2-1310 Are you prepared to enter a license key
[y,n,q,?] (default: y) y
```

- ◆ If you don't have a license key, see [“Obtain a License from the VERITAS vLicense Website”](#) on page 6.

---

**Note** The presence of certain hardware arrays (for example, A5000) automatically generates a key.

---

The `vxinstall` program then asks if you want to use enclosure-based naming:

```
VxVM INFO V-5-2-1341 Do you want to use enclosure based names for
all disks ?
[y,n,q,?] (default: n)
```

After installation, disks use the traditional naming format, usually `c#t#d#s#`. Enclosure based naming provides an alternative that allows disk devices to be named for enclosures rather than for the controllers through which they are accessed. In a Storage Area Network (SAN) that uses Fibre Channel hubs or fabric switches, information about disk location provided by the operating system may not correctly indicate the physical location of the disks. Enclosure-based naming allows Volume Manager to access enclosures as separate physical entities. By configuring redundant copies of your data on separate enclosures, you can safeguard against failure of one or more enclosures. If you want to use enclosure-based naming, enter 'y' and `vxinstall` asks you whether you want to set up a systemwide default disk group:

```
Do you want to setup a system wide default disk group ?
```

```
[y,n,q,?] (default: y)
```

VxVM will continue with the question:

```
Which disk group ?
```

If you know the name of the disk group that you want to use as the default disk group, enter it at the prompt, or use the `list` option and make a selection.

In releases prior to Volume Manager 4.0, the default disk group was `rootdg` (the *root disk group*). For Volume Manager to function, the `rootdg` disk group had to exist and it had to contain at least one disk. This requirement no longer exists, however you may find it convenient to create a system wide default disk group. For operations that require a disk group, the system wide default disk group will be used if the VxVM command is not specified with the `-g` option. The main benefit of creating a default disk group is that VxVM commands default to the default disk group and you will not need to use the `-g` option. To verify the default disk group after it has been created, enter the command:

```
# vx dg defaultdg
```

---

**Note** VxVM does not allow you use the following names for the default disk group because they are reserved words: `bootdg`, `defaultdg` and `nodg`.

---

At this stage, the installation of VxVM is complete. To carry out further tasks such as disk encapsulation or initialization, please refer to the *VERITAS Volume Manager System Administrator's Guide*.



## Preventing Multipathing/Suppress Devices from VxVM's View

This section describes how to exclude a device that is under VxVM or Dynamic Multipathing control. To prevent multipathing or suppress devices, enter the command

```
# vxdiskadm
```

1. Select menu item 17 (Prevent Multipathing/Suppress devices from VxVM's view) from the vxdiskadm main menu.

The following message displays:

```
VxVM INFO V-5-2-1239 This operation might lead to some devices
being suppressed from VxVM's view or prevent them from being
multipathed by vxdmp. (This operation can be reversed using the
vxdiskadm command).
```

```
Do you want to continue? [y,n,q,?] (default: n) y
```

2. Enter **y**.

3. Select an operation.

- ◆ Suppress all paths through a controller from VxVM's view:

Select Option 1.

Enter a controller name when prompted:

```
Enter a controller name:[ctrl_name,all,list,list-exclude,q,?]
```

- ◆ Suppress a path from VxVM's view:

Select Option 2.

Enter a path when prompted.

```
Enter a pathname or pattern:[<Pattern>,all,list,list-exclude,q,?]
```

- ◆ Suppress disks from VxVM's view by specifying a VID:PID combination:

Select Option 3 and read the messages displayed on the screen.

Enter a VID:PID combination when prompted.

```
Enter a VID:PID combination:[<Pattern>,all,list,exclude,q,?]
```

The disks that match the VID:PID combination are excluded from VxVM. Obtain the Vendor ID and Product ID from the Standard SCSI inquiry data returned by the disk.

For example, the VID:PID combination for Sun's T3 disk array can be specified as SUN:T3. Obtain the Vendor ID and Product ID of the disk by the command `/usr/lib/vxvm/diag.d/vxdmping`.

- ◆ Suppress all but one path to a disk:

Select Option 4 and read the messages displayed on the screen before specifying a path.

Enter a path when prompted:

```
Enter pathgroup: [<pattern>,list,list-exclude,q,?]
```

The next three options allow you to exclude devices from `vxdmp`.

- ◆ Prevent multipathing of all disks on a controller by VxVM.

Select Option 5 and read the messages displayed on the screen before specifying a controller.

Enter a controller name when prompted. The controller entered is excluded from DMP control.

```
Enter a controller name:[<ctrl-name>,all,list,list-exclude,q,?]
```

- ◆ Prevent multipathing of a disk by VxVM.

Select Option 6 to exclude the specified path from multipathing. The corresponding disks are claimed in the OTHER\_DISKS category and are not multipathed. Read the messages displayed on the screen before specifying a path.

Enter a path at the prompt:

```
Enter a pathname or pattern:[<pattern>,all,list,list-exclude,q,?]
```

- ◆ Prevent multipathing of disks by specifying a VID:PID combination.

Select Option 7 to exclude disks by a VIP:PID combination. All disks returning a VID:PID combination are claimed in the OTHER\_DISKS category and are not multipathed. Read the messages displayed on the screen before specifying a VIP:PID.

Enter the VID:PID combination at the prompt.

```
Enter a VID:PID combination:[<pattern>,all,list,list-exclude,q,?]
```

---

**Note** If you selected any of the options, reboot the system for device exclusion to take effect and re-run `vxdiskadm`. After the reboot for menu item #17 (Prevent Multipathing/Suppress devices) run `vxdiskadm` again to complete the installation.

---



## Rebooting After Initializing VxVM

After using `vxdiskadm` to process the disks attached to the system, you may have to reboot the system to make changes to the disks. The way in which you chose to handle your disks during the `vxdiskadm` session determines whether a reboot is required. If you chose to encapsulate any disks, a reboot is necessary. You should reboot as soon as possible.

---

**Note** The setup you choose can require several reboots.

---

To reboot the system, enter:

```
# shutdown -g0 -y -i6
```

The installation is now complete.

## Checking the Installation

After VxVM is successfully initialized and you have rebooted the system, confirm that key VxVM processes (`vxconfigd`, `vxnotify`, and `vxrelocd`) are running.

Use the following command to get output similar to the following:

```
# ps -ef | grep vx
root 458 180 10:23:34? 0:00 vxrelocd root
root 414 180 10:23:06? 0:03 vxconfigd
root 478 414 10:23:37? 0:00 vxrelocd root
root 479 478 5 10:23:37? 0:00 vxnotify -f -w 15
```

You can also use the `pkginfo` command to check that all of the packages have been installed. For example, the following command checks that the `VRTSvxvm` package is installed:

```
# pkginfo -l VRTSvxvm.*
```

## Starting and Enabling the Configuration Daemon

The VxVM configuration daemon (`vxconfigd`) maintains VxVM disk and disk group configurations. The `vxconfigd` communicates configuration changes to the kernel and modifies configuration information stored on disk.

Startup scripts usually invoke `vxconfigd` at system boot time. The `vxconfigd` daemon must be running for VxVM to operate properly.

The following procedures describe how to check that `vxconfigd` is started, whether it is enabled or disabled, how to start it manually, or how to enable it as required.

To determine whether `vxconfigd` is enabled, use the following command:

```
# vxdctl mode
```

The following message indicates that the `vxconfigd` daemon is running and enabled:

```
mode: enabled
```

This message indicates that `vxconfigd` is not running:

```
mode: not-running
```

To start the `vxconfigd` daemon, enter the following command:

```
# vxconfigd
```

This message indicates that `vxconfigd` is running, but not enabled:

```
mode: disabled
```

To enable the volume daemon, enter the following command:

```
# vxdctl enable
```

Once started, `vxconfigd` automatically becomes a background process.

By default, `vxconfigd` writes error messages to the console. However, you can configure it to write errors to a log file. For more information, see the `vxconfigd(1M)` and `vxdctl(1M)` manual pages.

## Starting the Volume I/O Daemon

The volume I/O daemon (`vxiod`) provides extended I/O operations without blocking calling processes. Several `vxiod` daemons are usually started at system boot time after initial installation, and they should be running at all times. The procedure below describes how to verify that the `vxiod` daemons are running, and how to start them if necessary.

To verify that `vxiod` daemons are running, enter the following command:

```
# vxiod
```

---

**Note** The `vxiod` daemon is a kernel thread and is not visible using the `ps` command.

---

If, for example, 10 `vxiod` daemons are running, the following message displays:

```
10 volume I/O daemons running
```

where 10 is the number of `vxiod` daemons currently running. If no `vxiod` daemons are currently running, start some by entering this command:

```
# vxiod set 10
```

where 10 is the desired number of `vxiod` daemons. It is recommended that at least one `vxiod` daemon should be run for each CPU in the system.

For more information, see the `vxiod(1M)` manual page.



## Starting the VEA Server

After installing the VEA packages, the VEA server needs to be stopped and restarted. To check the state of the VEA server, enter:

```
# /opt/VRTSob/bin/vxsvc -m
```

To stop the VEA server, enter:

```
# /opt/VRTSob/bin/vxsvc -k
```

You can also stop the VEA server manually by killing the `vxsvc` process.

---

**Note** The VEA server is automatically started on a reboot.

---

To start the VEA server, enter:

```
# /opt/VRTSob/bin/vxsvc
```

## Starting the VEA Client

Only users with appropriate privileges can run VEA. VEA can administer the local machine or a remote machine. However, VxVM and the VEA server must be installed on the machine to be administered. The VxVM `vxconfigd` daemon and the VEA server must be running on the machine to be administered.

After installing VxVM and VEA and starting the server, start the VEA client in one of the following ways.

### Solaris Operating system

To administer the Solaris machine, use the following command:

```
# /opt/VRTSob/bin/vea
```

### Windows Operating System

To administer a *remote* Solaris machine from a Windows machine, select **Start > Programs > VERITAS Enterprise Administrator > VERITAS Enterprise Administrator**.

### Modifying Connection Access (optional)

To allow users other than `root` to access VEA, set up a group called `vrtsadm` in `/etc/group`, and add the users to this group. For example, adding the following entry:

```
vrtsadm::600:root,ed
```

will allow the two users, *root* and *ed*, to access VEA.

To specify a group other than *vrtsadm*, you should add the group to */etc/group*, modify the Security key in the registry, and restart the ISIS server daemon, as in the following example.

1. Add a new group:

```
# groupadd -g gid veagr
```

2. Edit */etc/group* to add users to the group.

3. Modify the Security key in the registry:

```
# /opt/VRTSob/bin/vxregctl /etc/vx/isis/Registry setvalue \
Software/VERITAS/VxSvc/Current/Version/Security AccessGroups \
REG_SZ veagr
```

4. Restart the ISIS server daemon

```
# /opt/VRTSob/bin/vxsvcctl restart
```

## Cluster Support in VxVM

This release includes an *optional* cluster feature that enables VxVM in a cluster environment. The cluster functionality in VxVM allows multiple hosts to simultaneously access and manage a set of disks under VxVM control. A *cluster* is a set of hosts sharing a set of disks; each host is referred to as a *node* in the cluster.

See “[Enable Cluster Support in VxVM \(Optional\)](#)” on page 107 for details.





# Preparing to Upgrade VERITAS Volume Manager

---

This chapter explains what you need to do to prepare to upgrade VERITAS Volume Manager (VxVM) and VERITAS Enterprise Administrator (VEA) to release 4.0.

## Upgrading Overview

1. Do all the tasks listed in the section “[Pre-Upgrade Requirements](#)” on page 52.
2. You may need to upgrade Sun’s Alternate Pathing (AP) driver to version 2.3.1. Refer to “[Upgrading VxVM with Alternate Pathing Enabled](#)” on page 52.
3. Determine if your root disk is encapsulated because there are separate upgrade paths depending on whether the root disk is encapsulated. See “[Before Upgrading to VxVM Release 4.0](#)” on page 55 for more information.

---

**Note** For information on upgrading your system with VERITAS Volume Replicator, see the *VERITAS Volume Replicator Release Notes*. For information on upgrading in a Cluster Volume Manager (CVM) environment, see “[Enable Cluster Support in VxVM \(Optional\)](#)” on page 107.

---

## DMP Considerations

- ◆ If you are upgrading from VxVM 3.1 or an older version, DMP is automatically enabled in VxVM 4.0. You can use `vxdiskadm` to prevent DMP, if you choose.
- ◆ If you are upgrading from VxVM 3.1.1, and you had prevented or suppressed DMP, VxVM 4.0 retains your DMP setting. Your new installation will have DMP prevented or suppressed.



## Licensing

If you add the `VRTSvlic` package and see the following message, you must first remove the existing `VRTSvlic` package:

```
Current administration requires that a unique instance of the
<VRTSvlic> package be created. However, the maximum number of
instances of the package which may be supported at one time on the
same system has already been met.
```

See “[Preinstallation Requirements](#)” on page 8 to remove the licensing package.

---

**Note** `VRTSvxvm` requires that a single instance of the `VRTSvlic` package be installed for correct operation.

---

## Upgrading VxVM with Alternate Pathing Enabled

Dynamic Multipathing (DMP) on VxVM 4.0 co-exists with Sun’s Alternate Pathing (AP) driver 2.3.1. For VxVM 4.0 to function, the DMP driver (`vxddmp`) must always be present on the system. Upgrading to this version of VxVM automatically enables the DMP driver.

If you do not know which version of AP is installed, run the following command:

```
#pkginfo -l SUNWapdv | grep VERSION
```

For VxVM to co-exist with AP successfully, you must upgrade AP before installing or upgrading to VxVM 4.0.

If AP is installed and the AP version is prior to 2.3.1, the installation is aborted and you are instructed to upgrade your AP package to version 2.3.1.

## Pre-Upgrade Requirements

You can prepare for VxVM 4.0 upgrade requirements in two phases:

- ◆ Tasks that can be done well ahead of starting the upgrade (see “[Planning the Upgrade](#)” on page 53).
- ◆ Tasks that need to be done just before starting the upgrade (see “[Preparing for the Upgrade](#)” on page 54).

## Planning the Upgrade

Do the following tasks:

1. Be sure that the administrator doing the upgrade has root access and a working knowledge of Solaris Operating System administration.
2. Check that all terminal emulation issues are worked out. The terminal selected should be fully functional during OpenBoot prompts and single-user and multi-user run levels.
3. Check “[Required Solaris Software Patches](#)” on page 14 and the latest Release Notes to verify that the system has all required Solaris patches.
4. Schedule sufficient outage time for the upgrade and possibly several system reboots.
5. If using EMC PowerPath, ensure that you are using at least mandatory patch level 2.0.3. See VERITAS TechNote 234374. The patch level makes changes to `/etc/system` that prevent panics and failure of `vxconfigd`. Upgrading PowerPath may require a system reboot.
6. To reliably save information on a mirrored disk, shut down the system and physically remove the mirrored disk. (This may not be practical, but if done, offers a fallback point.)
7. Make a directory on the root filesystem to save vital information. Use the root filesystem so that if root is the only filesystem that can be mounted, the information is available.

```
# mkdir /VXVM4.0-UPGRADE-CHECK
```

8. Save important files. The `vxprint` commands in the examples below save information in two formats. One format is easily readable and the other is suitable for the `vxmake` command.

```
# cp /etc/vfstab.prevm /VXVM4.0-UPGRADE-CHECK
```

```
# df -k > /VXVM4.0-UPGRADE-CHECK/df-k.sav
```

```
# mount > /VXVM4.0-UPGRADE-CHECK/mount.sav
```

```
# vxprint -ht > /VXVM4.0-UPGRADE-CHECK/vxprint-ht.sav
```

```
# vxprint -m > /VXVM4.0-UPGRADE-CHECK/vxprint-m.sav
```

```
# vxdisk list > /VXVM4.0-UPGRADE-CHECK/vxdisk-list.sav
```

```
# vxdg list > /VXVM4.0-UPGRADE-CHECK/vxdg-list.sav
```



```
# prtvtoc /dev/rdisk/c?t?d?s2 > /VXVM4.0-UPGRADE-CHECK/vtoc.sav
```

Substitute the appropriate root disk in the `prtvtoc` command, and use the command to collect a partition table (or `vtoc`) from your root disk and any other bootable mirror.

```
# cp /etc/vfstab /VXVM4.0-UPGRADE-CHECK/vfstab.sav
```

```
# cp /etc/system /VXVM4.0-UPGRADE-CHECK/system.sav
```

9. Document the current VERITAS software version:

```
# pkginfo -l > /VXVM4.0-UPGRADE-CHECK/pkginfo-l.sav
```

```
# showrev -p > /VXVM4.0-UPGRADE-CHECK/showrev-p.sav
```

10. Make sure that all applicable license information is available and copy the contents of `/etc/vx/licenses` to a safe directory. If it exists, you should also copy the contents of `/etc/vx/elm` to a safe directory.

## Preparing for the Upgrade

Do the following tasks just before starting the upgrade;

1. Ensure that you have created a valid backup.
2. Ensure that you have enough file system space to upgrade VERITAS Volume Manager. Also, identify where you will be copying the distribution and patch tar files. The usual place is `/patches/VERITAS` when the root file system has enough space or `/var/tmp/patches` if the `/var` file system has enough space.  
  
Do not put the files under `/tmp`, which is erased during a system reboot. Do not put the files on a filesystem that is inaccessible prior to running the upgrade script.
3. Obtain the latest Solaris patches. See [“Required Solaris Software Patches”](#) on page 14 for more information.

---

**Note** You may use a VERITAS-supplied CD-ROM for the upgrade as long as modifications to the upgrade script are not required. If `/usr/local` was originally created as a slice, modifications are required. See Step 9 below for details.

---

4. Untar VERITAS Volume Manager and patch files (preferably into separate sub-directories). Within the untarred Volume Manager files is a script directory. Note the location of the script directory.
5. For any startup scripts in `/etc/rcS.d`, you should comment out any application commands or processes that are known to hang if their file systems are not present.

6. Make sure that all users are logged off and that all major user applications are properly shut down.
7. Copy `vfstab` to `vfstab.orig`:
 

```
# cp /etc/vfstab /etc/vfstab.orig
# cp /etc/vfstab VXVM4.0-UPGRADE-CHECK/vfstab.orig
```
8. VERITAS recommends that all file systems not in `root disk` (therefore not required for booting) be unmounted, their entries commented out in `/etc/vfstab`, the associated volumes stopped, and the associated disk groups deported. Any file systems that the Solaris Operating System or VERITAS assumes should be in `rootdg` but are not, *must* be unmounted and the associated entry in `/etc/vfstab` commented out.
9. Any swap partitions not in `rootdg` must be commented out of `/etc/vfstab`. If possible, swap partitions other than those on the root disk should be commented out of `/etc/vfstab` and not mounted during the upgrade. Active swap partitions that are not in `rootdg` cause `upgrade_start` to fail.
10. Copy the modified `/etc/vfstab` file to the save directory and to alternate machine locations:
 

```
# cp /etc/vfstab /VXVM4.0-UPGRADE-CHECK/vfstab.modified.sav
```
11. Copy to another system all the information saved in `/VXVM4.0-UPGRADE-CHECK`. Leave the original files on the machine being upgraded.

## Before Upgrading to VxVM Release 4.0

If you are running a release earlier than 4.0, you can upgrade your system and retain your existing VxVM configuration. After upgrading, you can resume using VxVM as before. Unless your license has expired, no new license is required for upgrading. However, you must install the new licensing package, which uses the existing license information.

Before you upgrade, do the following:

1. Log in as superuser.
2. Install required patches.
3. Determine if the root disk is encapsulated by running the following command:

```
# mount | grep "/" on"
```



If the output from this command includes a pathname containing `vx` and `rootvol`, as in `/dev/vx/dsk/<diskgroup>/rootvol`, then your root disk is encapsulated. For example the output will begin with words similar to:

```
/ on /dev/vx/dsk/rootvol read/write/setuid/intr/largefiles
```

---

**Caution** Do not run `vxinstall` during or after the upgrade.

---

To upgrade, you can use one of the following processes:

To upgrade	Where	See
VxVM only	On an encapsulated or unencapsulated root disk	<a href="#">“Upgrading VxVM Only”</a> on page 60
VxVM and Solaris	On an encapsulated or unencapsulated root disk	<a href="#">“Upgrading VxVM and the Solaris Operating System”</a> on page 77.
Solaris only	On an encapsulated or unencapsulated root disk	<a href="#">“Upgrading the Solaris Operating System Only”</a> on page 87.

---

**Note** Importing a pre-4.0 VxVM disk group does not automatically upgrade the disk group version to the VxVM 4.0 or above level. If you want to take advantage of the new features that are shipped with this release, see “Upgrading a Disk Group” in the *VERITAS Volume Manager Administrator’s Guide* for information on how to upgrade a disk group.

---

## VxVM and Solaris Release Support Matrix

The table below indicates which VxVM releases support which Solaris Operating System releases. If you are running a release earlier than VxVM 3.2, you should first upgrade to VxVM 3.5 before upgrading to VxVM 4.0.

	Solaris 2.5.1	Solaris 2.6	Solaris 7	Solaris 8	Solaris 9
<b>VxVM 4.0</b>			Supported	Supported	Supported
<b>VxVM 3.5</b>		Supported	Supported	Supported	Supported
<b>VxVM 3.2</b>		Supported	Supported	Supported	Supported
<b>VxVM 3.1.1</b>		Supported	Supported	Supported	
<b>VxVM 3.1</b>		Supported	Supported	Supported	

## VxVM and Solaris Operating System Upgrade Paths

### Possible Upgrade Paths for VxVM and Solaris Upgrades

The following table shows possible VxVM/Solaris upgrade paths.

**Note** If you are upgrading from a release earlier than VxVM 3.2, you should upgrade to VxVM 3.5 before upgrading to VxVM 4.0.

#### Upgrade Paths

You can upgrade VxVM and Solaris versions:	To VxVM and Solaris versions:	
VxVM 3.0.x & Solaris 2.6, 7, 8	VxVM 4.0 & Solaris 7, 8, 9	You must first upgrade to VxVM 3.5.
VxVM 3.1, 3.1.1, 3.2, 3.5 & Solaris 2.6, 7, 8, 9	VxVM 4.0 & Solaris 7, 8, 9	See “ <a href="#">Upgrading VxVM and the Solaris Operating System</a> ” on page 77



## Upgrade Paths

<b>You can upgrade Solaris OS only:</b>	<b>To Solaris OS versions:</b>	
VxVM 4.0 & Solaris 7,8	VxVM 4.0 & Solaris 8, 9	<a href="#">“Upgrading the Solaris Operating System Only”</a> on page 87

---

**Note** If the `upgrade_start` script fails for any reason, run the `upgrade_finish` script to undo any changes already made. Verify that the system is restored by comparing `/etc/system`, `/etc/vfstab`, and the output of the `format` command. Then determine and correct the cause of the `upgrade_start` failure. If you cannot correct the problem in a timely manner, restore the `vfstab` file to the version saved in [“Preparing for the Upgrade”](#) on page 54, restore any other applications, and perform an `init 6` to completely restore the system.

---



# Upgrading VERITAS Volume Manager

5

This chapter describes how to upgrade VERITAS Volume Manager (VxVM) and VERITAS Enterprise Administrator (VEA) to release 4.0. There are a number of upgrade scenarios and paths, and you need to make some decisions. The first decision is which of these top level paths are you planning to follow:

- ◆ Upgrading VxVM Only; see “[Upgrading VxVM Only](#)” on page 60
- ◆ Upgrading VxVM and the Solaris Operating System; see “[Upgrading VxVM and the Solaris Operating System](#)” on page 77
- ◆ Upgrading the Solaris Operating System Only; see “[Upgrading the Solaris Operating System Only](#)” on page 87

Within these scenarios, there are other different upgrade paths depending on whether you have an encapsulated disk and whether you are upgrading from VxVM 3.5 or earlier.

---

**Note** If you are planning to use VxVM in a cluster environment, follow the instructions in “[Enable Cluster Support in VxVM \(Optional\)](#)” on page 107.

---

## Packaging Differences in the Sun Microsystems Distribution of VERITAS Products

When you purchase the VERITAS File System or VERITAS Volume Manager through Sun Microsystems, there are differences in the product CD that affect the installation.

- ◆ The VERITAS Installation Menu and the install and uninstall scripts are not available.
- ◆ Packages and patches are not compressed
- ◆ There is no `file_system` or `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. Procedures that specify the `file_system` or `volume_manager` directory must be modified. for example, change:

```
# cd /cdrom/cdrom0/volume_manager/pkgs
```

To:



```
# cd /cdrom/cdrom0/pkgs
```

File locations are also different. For example, the file `vxfs_notes.pdf` is under the `release_notes` directory, not the `file_system/release_notes` directory.

- ◆ The following VERITAS Enterprise Administrator patches are available and must be installed:

115209-xx (for the VRTSob VEA package)

115210-xx (for the VRTSobgui VEA GUI client package)

115212-xx (for the VRTSmuob VEA Service Localized package)

The following VxVM patch is only required for Storage Foundation customers:

115217-xx (for the VRTSvxvm package)

## Upgrading VxVM Only

This section explains how to upgrade VxVM. Refer to the [“VxVM and Solaris Release Support Matrix”](#) on page 57 to determine if upgrading the operating system is required.

If you are planning to use the `installvm` script to upgrade VxVM, go to [“Upgrading VxVM with the installvm Script”](#) on page 61.

---

**Note** If you purchase your copy of VERITAS Volume Manager from Sun Microsystems, the `installvm` script program is not available.

---

If you are planning to use the traditional `pkgadd` method to upgrade VxVM, you have two choices:

- ◆ If your root disk is encapsulated, go to [“Upgrading VxVM When the Root Disk is Encapsulated”](#) on page 64.
- ◆ If your root disk is not encapsulated, go to [“Upgrading VxVM when the Root Disk is not Encapsulated”](#) on page 68.

## Upgrading VxVM with the installvm Script

You can use the `installvm` script to upgrade VxVM with an encapsulated or unencapsulated boot disk.

If you intend to upgrade VxVM on a remote host, you should ensure that `rsh` or `ssh` are set up. See “[System Setup and Multiple Host Configuration](#)” on page 22 for further information.

---

**Note** If you are carrying out a multi-host installation, you should note that the `installvm` script does not support a mixture of new installations and upgrades. You should either install on all hosts or upgrade all hosts. In addition, every host to be upgraded in a multi-host installation must be running the same older version of VxVM.

---



---

**Note** If you use this `installvm` script to upgrade, you will not use the `upgrade_start` and `upgrade_finish` scripts.

---

Before you start upgrading, please remove the older VRTS packages using the `pkgrm` command:

```
# pkgrm VRTSvras VRTSlic VRTSvmsa
```

---

**Note** Some of the above packages may not exist on your system.

---

1. Insert the CD-ROM in the CD-ROM drive.

Once the CD-ROM is inserted, the Solaris volume management software automatically mounts the CD-ROM. Change directory:

```
# cd /cdrom/CD_NAME/volume_manager
```

2. If you are installing VxVM on the local system or on multiple systems, which may or may not include the local system, you have two choices:
  - ◆ Run the simple form of the `installvm` command
  - ◆ Run a more complex version of the `installvm` command. You might do this if you want to avoid the performance penalty of the installation scripts copying packages from the CDROM to a disk attached to each system. To avoid this performance penalty, you can copy the VxVM packages and patches to a network-shared file system that is connected to all of the systems on which you want to install the software.

To use the simple form of the command, enter:

```
# ./installvm
```



and proceed to step 3.

To avoid the performance penalty, enter the following commands, which assume that your NFS mountable file system is `$NFS_FS`:

a. `# cd /cdrom/CD_NAME`

b. `# cp -r * $NFS_FS`

c. `# cd volume_manager`

d. `# ./installvm -pkgpath $NFS_FS/volume_manager/pkgs -patchpath $NFS_FS/volume_manager/patches`

3. At the prompt, enter the name of the system or systems on which you want to install VxVM:

Enter the system names separated by spaces on which to install VxVM:

The `installvm` script will carry out an initial system check, and will confirm success by displaying information regarding the OS version, whether the `VRTSvxvm` package is installed and whether the necessary patches are installed.

The initial system check might tell you that you need to obtain SunOS patches. If this happens, you need to see [“Required Solaris Software Patches”](#) on page 14.

When the system check is complete, the `installvm` script displays this message:

```
Initial system check completed successfully.
```

and tells you to press **Return** to continue.

4. The Infrastructure packages, `VRTSvlic` and `VRTScpi`, are now installed. When this step is complete, you will see this message:

```
VERITAS Infrastructure packages installed successfully.
```

and you should press **Return** to continue.

5. The `installvm` script then checks the system upgrade requirements, and displays this message:

```
Upgrade requirement checks completed successfully.
```

and asks you to press **Return** to continue.

6. Existing VxVM packages will now be removed prior to replacement by the VxVM 4.0 packages.

7. The VxVM packages are then installed. At this stage, you will see a display similar to the following:

```
Installing VRTSvxvm 4.0 on techmac ..... Done 1 of 7 steps
Installing VRTSvmman 4.0 on techmac ..... Done 2 of 7 steps
Installing VRTSvmdoc 4.0 on techmac ..... Done 3 of 7 steps
Installing VRTSvmpro 4.0 on techmac ..... Done 4 of 7 steps
Installing VRTSfspro 4.0 on techmac ..... Done 5 of 7 steps
Installing VRTSalloc 1.0 on techmac ..... Done 6 of 7 steps
Installing VRTSddlpr 1.0 on techmac ..... Done 7 of 7 steps
```

8. The program then checks whether you have a license installed. If required, enter a license key and press **Return** to continue.

```
Do you want to start Volume Manager processes now [y,n,q] (y)
```

---

**Note** If you reply “yes” to these prompts, you may see a message advising you that an upgrade is in process, and that you should reboot later.

---

9. VxVM is now upgraded, and you should see a message stating that VxVM 4.0 has been successfully installed. You will see a message advising you to reboot.

10. Reboot your system by entering:

```
# reboot -- -r
```

11. To take advantage of the new features in this release, you should upgrade to the latest disk group version. To confirm that the VxVM upgrade has been successful, and to upgrade your disk group version, see “[Completing the Upgrade](#)” on page 89.

---

**Note** `installvm` cannot be used to reconfigure an existing installation. This means that you cannot run the following two commands after completing an installation using `installvm`

```
# installvm -configure
# installvm -responsefile
```

For the installation to be complete, you must either have fully run `installvm` or you must have run `installvm -installonly` followed by `installvm -configure`.

---



## Upgrading VxVM When the Root Disk is Encapsulated

This section describes the procedure for upgrading using the `pkgadd` command.

### Upgrading with the `pkgadd` command

1. If you have not already obtained and installed a VxVM 4.0 license key, do so now. See [“Product Licensing”](#) on page 5 for details.
2. Verify that the root disk is encapsulated. Bring the system down to single-user mode using the following command:

```
# init s
```

3. Stop the `vxiod` daemon:

```
# vxiod -f set 0
```

4. You might have the VMSA or VEA software installed. To remove the VMSA software, enter:

```
# pkgrm VRTSvmsa
```

To remove the VEA software, enter:

```
# pkgrm VRTSvmpro VRTSfspro  
# pkgrm VRTSob VRTSobgui
```

5. Remove the other old VxVM packages by entering:

```
# pkgrm VRTSman VRTSvmdoc VRTSvmdev VRTSvmman VRTSvras VRTSvrdoc
```

---

**Note** `VRTSvras` will only exist on your system if you are running VxvM 3.2.

---

6. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

---

**Note** If you still have clients running previous versions of VxVM, refer to [“VMSA and VEA Co-existence”](#) on page 36.

---

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD.

---

7. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `volume_manager`, which will be the target path, and enter the command:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* volume_manager
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin \
volume_manager
```

---

**Note** You can copy the packages to any directory and call it by any name.

---

8. Change to the `volume_manager` directory that now contains the VxVM packages, and uncompress the packages:

```
# cd volume_manager
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip *.gz
```

9. Use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

10. Remove the old VRTSvlic licensing package

```
# pkgrm VRTSvlic
```

11. Install the new VxVM 4.0 licensing package:

```
# pkgadd -d . VRTSvlic
```

---

**Note** VxVM 4.0 requires the 4.0 licensing package, `VRTSvlic`. You do not need to remove the previous versions of `VRTSlic`.

---

12. Restart the `vxconfigd` daemon.

```
# vxconfigd -k
```

13. Make a copy of the default admin file, `/var/sadm/install/admin/default`

```
# cp /var/sadm/install/admin/default \
/var/sadm/install/admin/vxvm_admin
```



14. In the file `vxvm_admin`, find the line, “instance=unique”, and replace it with “instance=overwrite”. Resetting the value of *instance* is important because, in the event of a system outage, setting the value and running the next step will prevent the system from being unbootable.

15. Install the `VRTSvxvm` package with the command:

```
# pkgadd -a /var/sadm/install/admin/vxvm_admin -d . VRTSvxvm
```

If warnings are displayed that include the string `/etc/vx`, ignore them and continue.

16. Using the `pkgadd` command, install the additional packages:

```
# pkgadd -d . VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpro
# pkgadd -d . VRTScpi VRTSperl VRTSmuob
```

---

**Note** It is recommended that you install both `VRTSvmpro` and `VRTSfspro` if you intend to use the VEA GUI.

---

17. The following steps contain instructions on Installing the VxVM and VEA patches.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Create a temporary directory:

```
# mkdir -p /40/patches
```

18. Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

19. Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to `115209-##.tar.gz`

**20. Uncompress the patches:**

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the gunzip command for all patches.

**21. Extract the patches:**

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

**22. Install the patches:**

```
# patchadd 115209-xx
```

Repeat the command for all patches.

**23. Verify that the patch is installed:**

```
# showrev -p 115209-xx
```

Repeat the command for all patches.

**24. Perform a system reboot:**

```
# cd /; shutdown -g0 -y -i6
```

or if adding new hardware that needs to be probed and detected by the operating system, perform a reconfiguration reboot:

```
# reboot -- -r
```

**25. To take advantage of the new features in this release, you should upgrade to the latest disk group version. To confirm that the VxVM upgrade has been successful, and to upgrade your disk group version, see [“Completing the Upgrade”](#) on page 89.****26. See [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48 to start VEA.**

## Upgrading VxVM when the Root Disk is not Encapsulated

If you are upgrading VxVM from VxVM 3.5, go to [“Upgrading from VxVM 3.5 with the pkgadd command”](#) on page 68.

If you are upgrading VxVM from VxVM 3.2 or earlier, go to [“Upgrading from VxVM 3.2 or earlier”](#) on page 72.

### Upgrading from VxVM 3.5 with the pkgadd command

This section explains how to upgrade VxVM if you are upgrading from VxVM 3.5 and the root disk is not encapsulated.

1. If you have not already obtained and installed a VxVM 4.0 license key, do so now. See [“Product Licensing”](#) on page 5 for details.
2. Verify that the root disk is not encapsulated. Bring the system down to single-user mode using the following command:

```
# init s
```

3. Stop the vxiod daemon:

```
# vxiod -f set 0
```

4. Stop the vxconfigd daemon;

```
# vxdctl stop
```

5. You might have the VMSA or VEA software installed. To remove the VMSA software, enter:

```
# pkgrm VRTSvmsa
```

To remove the VEA software, enter:

```
# pkgrm VRTSvmpro VRTSfspro
```

```
# pkgrm VRTSob VRTSobgui
```

6. Remove the other old VxVM packages by entering:

```
# pkgrm VRTSman VRTSvmdoc VRTSvmdev VRTSvmman VRTSvxvm VRTSvras
```

---

**Note** The VRTSvras package may not exist on your system.

---

7. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

---

**Note** If you still have clients running previous versions of VxVM, refer to “[VMSA and VEA Co-existence](#)” on page 36.

---



---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD.

---

8. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `volume_manager`, which will be the target path, and enter the command:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* volume_manager
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin \
volume_manager
```

---

**Note** You can copy the packages to any directory and call it by any name.

---

9. Change to the `volume_manager` directory that now contains the VxVM packages, and uncompress the packages:

```
# cd volume_manager
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip *.gz
```

10. Use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

11. Remove the old VRTSvlic licensing package

```
# pkgrm VRTSvlic
```

12. Install the new VxVM 4.0 licensing package if it is not already installed:

```
# pkgadd -d . VRTSvlic
```



Enter “yes” when prompted by `pkgadd` to restore configuration.

---

**Note** VxVM 4.0 requires the 4.0 licensing package, `VRTSvlic`. You do not need to remove the previous versions of `VRTSlic`.

---

**13.** Install the `VRTSvxvm` package with the command:

```
# pkgadd -d . VRTSvxvm
```

Enter “yes” when prompted by `pkgadd` to restore the configuration.

---

**Note** If warnings are displayed that include the string `/etc/vx`, ignore them and continue.

---

**14.** Using the `pkgadd` command, install the additional packages:

```
# pkgadd -d . VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpro VRTSmuob
```

---

**Note** It is recommended that you install both `VRTSvmpro` and `VRTSfspro` if you intend to use the VEA GUI.

---

**15.** The following steps contain instructions on Installing the VxVM and VEA patches.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Create a temporary directory:

```
# mkdir -p /40/patches
```

**16.** Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

**17.** Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to `115209-##.tar.gz`

**18. Uncompress the patches:**

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the gunzip command for all patches.

**19. Extract the patches:**

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

**20. Install the patches:**

```
# patchadd 115209-xx
```

Repeat the command for all patches.

**21. Verify that the patch is installed:**

```
# showrev -p 115209-xx
```

Repeat the command for all patches.

**22. Perform a system reboot:**

```
# cd /; shutdown -g0 -y -i6
```

or if adding new hardware that needs to be probed and detected by the operating system, perform a reconfiguration reboot:

```
# reboot -- -r
```

**23. To take advantage of the new features in this release, you should upgrade to the latest disk group version. To confirm that the VxVM upgrade has been successful, and to upgrade your disk group version, see [“Completing the Upgrade”](#) on page 89.****24. See [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48 to start VEA.**

## Upgrading from VxVM 3.2 or earlier

This section explains how to upgrade VxVM if you are upgrading from VxVM 3.2 or earlier and the root disk is not encapsulated.

1. If you have not already obtained and installed a VxVM 4.0 license key, do so now. See [“Product Licensing”](#) on page 5 for details.

---

**Note** The directory `/opt` must exist, be writable, and must not be a symbolic link. This is because the volumes not temporarily converted by `upgrade_start` are unavailable during the upgrade process. If you have a symbolic link from `/opt` to one of the unconverted volumes, the symbolic link will not function during the upgrade and items in `/opt` are not installed.

---

2. Bring the system down to single-user mode using the following command:

```
# init s
```

3. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

4. Run the `upgrade_start` with the `-check` argument to detect any problems that exist which could prevent a successful upgrade. (Be sure to run the `upgrade_start` and `upgrade_finish` scripts that are supplied with the VxVM 4.0 release.) If this command reports success, you can proceed with running the `upgrade_start` script, but if it reports errors, correct the problem(s) and rerun `upgrade_start -check`.

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_start -check
```

5. Run the `upgrade_start` script so that the system can come up with partitions. (Be sure to run the `upgrade_start` and `upgrade_finish` scripts that are supplied with the VxVM 4.0 release.) The `upgrade_start` script searches for volumes containing file systems, and if any are found, converts them to partitions:

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_start
```

6. Reboot to single-user mode.

```
# reboot -- -s
```

---

**Note** You need to mount `/opt` manually before you can run `pkgrm` to remove VxVM packages if `/opt` is on its own partition.

---

7. Remove the old VxVM packages by entering:

```
# pkgrm VRTSvmdoc VRTSvmdev VRTSvmman VRTSvxvm VRTSlic VRTSvrdoc \
VRTSvras
```

---

**Note** VRTSvras may not exist on your system.

---



---

**Note** If you still have clients running previous versions of VxVM, refer to “[VMSA and VEA Co-existence](#)” on page 36.

---



---

**Note** Licensing in VxVM 4.0 requires the new VRTSvlic package. You do not need to remove the existing VRTSlic package.

---

8. You might have the VMSA or VEA software installed. To remove the VMSA software, enter:

```
# pkgrm VRTSvmsa
```

To remove the VEA software, enter:

```
# pkgrm VRTSvmpro VRTSfspro
# pkgrm VRTSob VRTSobgui
```

9. If Sun Volume Manager is installed:

- ◆ Remove any SUNWvxvm related patches.  
Refer to the Sun documentation for the procedure.
- ◆ Remove SUNWvxvm:

```
# pkgrm SUNWvxvm SUNWvmdoc SUNWvmdev
```

10. Load and mount the CD-ROM by starting the volmgt daemon.

```
# /etc/init.d/volmgt start
```

---

**Note** If you have made any additional modifications or have applied any patches, they must be removed before removing the SUNvxvm package.

---



---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no volume\_manager directory. The pkgs, patches, docs, release\_notes and other directories are at the top level of the CD.

---



11. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `volume_manager`, which will be the target path, and enter the command:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* volume_manager
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin \
volume_manager
```

---

**Note** You can copy the packages to any directory and call it by any name.

---

12. Change to the `volume_manager` directory that now contains the VxVM packages, and uncompress the packages:

```
# cd volume_manager
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip *.gz
```

13. Use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

14. Add the VxVM 4.0 licensing package using the following command:

```
# pkgadd -d . VRTSvlic
```

15. Add the VxVM 4.0 package using the following command:

```
# pkgadd -d . VRTSvxvm
```

If warnings are displayed that include the string `/etc/vx`, ignore them and continue.

16. Complete the upgrade using the following command:

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_finish
```

17. Using the `pkgadd` command, install the additional packages:

```
# pkgadd -d . VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpo
# pkgadd -d . VRTScpi VRTSperl VRTSmuob
```

18. The following steps contain instructions on Installing the VxVM and VEA patches.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Create a temporary directory:

```
# mkdir -p /40/patches
```

19. Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

20. Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to 115209-##.tar.gz

21. Uncompress the patches:

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the gunzip command for all patches.

22. Extract the patches:

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

23. Install the patches:

```
# patchadd 115209-xx
```

Repeat the command for all patches.

24. Verify that the patch is installed:

```
# showrev -p 115209-xx
```

Repeat the command for all patches.



- 25.** To disable the hot-relocation feature, comment out the `vxrelocd` line in the startup file `/etc/rc2.d/S95vxvm-recover`:

```
# vxrelocd root & # commented out to disable hot-relocation
```

- 26.** Perform reconfiguration reboot:

```
# reboot -- -r
```

- 27.** See “[Starting the VEA Server](#)” on page 48 and “[Starting the VEA Client](#)” on page 48 to start VEA.

## Upgrading VxVM and the Solaris Operating System

If you are upgrading from VxVM 3.5 and your root disk is not encapsulated, go to [“Upgrading VxVM and the Solaris Operating System from VxVM 3.5 \(Non -Encapsulated Root Disk\)”](#) on page 77.

If any of the following scenarios are true, go to [“Upgrading VxVM and the Solaris Operating System from VxVM 3.5 \(Encapsulated Root Disk\) or from VxVM 3.2 or Earlier Release”](#) on page 82.

- ◆ You are upgrading from VxVM 3.5 and your root disk is encapsulated
- ◆ You are upgrading from VxVM 3.2 or earlier and your root disk is encapsulated
- ◆ You are upgrading from VxVM 3.2 or earlier and your root disk is not encapsulated.

### Upgrading VxVM and the Solaris Operating System from VxVM 3.5 (Non -Encapsulated Root Disk)

This section explains how to upgrade both the Solaris Operating System and VxVM if you are upgrading from VxVM 3.5. (Refer to the [“VxVM and Solaris Release Support Matrix”](#) on page 57 to determine if an operating system upgrade is required.)

Follow these steps:

1. If you have not already obtained and installed a VxVM 4.0 license key, do so now. See [“Product Licensing”](#) on page 5 for details.

---

**Note** The directory `/opt` must exist, be writable, and must not be a symbolic link. This is because the volumes not temporarily converted by `upgrade_start` are unavailable during the upgrade process. If you have a symbolic link from `/opt` to one of the unconverted volumes, the symbolic link will not function during the upgrade and items in `/opt` are not installed.

---

2. Verify that the root disk is not encapsulated. Bring the system down to single-user mode using the following command:

```
# init s
```

3. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

4. Stop the `vxiod` daemon

```
# vxiod -f set 0
```



5. Stop the vxconfigd daemon

```
# vxctl stop
```

6. Remove the old VxVM packages by entering:

```
# pkgrm VRTSvmdoc VRTSvmdev VRTSvmmman VRTSvxvm VRTSlic VRTSvras \
VRTSvrdoc
```

---

**Note** If you still have clients running previous versions of VxVM, refer to “[VMSA and VEA Co-existence](#)” on page 36.

---

---

**Note** Licensing in VxVM 4.0 requires the new VRTSvlic package. You do not need to remove the existing VRTSlic package.

---

7. You might have the VMSA or VEA software installed. To remove the VMSA software, enter:

```
# pkgrm VRTSvmsa
```

To remove the VEA software, enter:

```
# pkgrm VRTSvmpo VRTSfspro
# pkgrm VRTSob VRTSobgui
```

8. Bring the system down to run level 0.

```
# init 0
```

9. Now upgrade the operating system to Solaris 7, 8 or 9.

---

**Note** You should boot up the system from run level 0 depending on the Solaris upgrade procedure that you want to follow. Refer to the Solaris installation documentation for instructions on how to upgrade the Solaris Operating System. After installing the Solaris Operating System, install the required patches that are listed in “[Required Solaris Software Patches](#)” on page 14.

---

10. Once the system is up with the upgrade the Solaris Operating System, bring the system down to single-user mode by entering:

```
# init s
```

11. Load and mount the CD-ROM by starting the volmgt daemon.

```
# /etc/init.d/volmgt start
```

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD.

---

12. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `volume_manager`, which will be the target path, and enter the command:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* volume_manager
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin \
volume_manager
```

---

**Note** You can copy the packages to any directory and call it by any name.

---

13. Change to the `volume_manager` directory that now contains the VxVM packages, and uncompress the packages:

```
# cd volume_manager
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip *.gz
```

14. Use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

15. Remove the old VRTSvlic licensing package

```
# pkgrm VRTSvlic
```

16. Add the new VxVM 4.0 licensing package using the following command:

```
# pkgadd -d . VRTSvlic
```

---

**Note** VxVM 4.0 requires the 4.0 licensing package, VRTSvlic. You do not need to remove the previous version of VRTSlic.

---



17. Add the VxVM 4.0 package using the following command:

```
# pkgadd -d . VRTSvxvm
```

You will then see a prompt asking you to confirm which version of the Solaris Operating System is required, and then you will be asked if you want to use the existing VxVM configuration

Restore and reuse the old VxVM configuration [y,n,q] (default: y):

It is important to answer 'Y' to the question, otherwise you will remove the existing configuration and will have to run vxinstall.

If warnings are displayed that include the string `/etc/vx`, ignore them and continue.

18. Using the `pkgadd` command, install the additional packages:

```
# pkgadd -d . VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpro
# pkgadd -d . VRTScpi VRTSperl VRTSmuob
```

19. The following steps contain instructions on Installing the VxVM and VEA patches.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Create a temporary directory:

```
# mkdir -p /40/patches
```

20. Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

21. Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to `115209-##.tar.gz`

22. Uncompress the patches:

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the `gunzip` command for all patches.

- 23.** Extract the patches:

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

- 24.** Install the patches:

```
# patchadd 115209-xx
```

Repeat the command for all patches.

- 25.** Verify that the patch is installed:

```
# showrev -p 115209-xx
```

Repeat the command for all patches.

- 26.** Perform a system reboot:

```
# cd /; shutdown -g0 -y -i6
```

or if adding new hardware that needs to be probed and detected by the operating system, perform a reconfiguration reboot:

```
# reboot -- -r
```

- 27.** To take advantage of the new features in this release, you should upgrade to the latest disk group version. To confirm that the VxVM upgrade has been successful, and to upgrade your disk group version, see [“Completing the Upgrade”](#) on page 89.

See [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48 to start VEA.



## Upgrading VxVM and the Solaris Operating System from VxVM 3.5 (Encapsulated Root Disk) or from VxVM 3.2 or Earlier Release

This section explains how to upgrade VxVM if any of the following are true:

- ◆ You are upgrading from VxVM 3.2 or earlier and your root disk is encapsulated
- ◆ You are upgrading from VxVM 3.5 and your root disk is encapsulated
- ◆ You are upgrading from VxVM 3.2 or earlier and your root disk is not encapsulated.

Follow these steps:

1. If you have not already obtained and installed a VxVM 4.0 license key, do so now. See [“Product Licensing”](#) on page 5 for details.

---

**Note** The directory `/opt` must exist, be writable, and must not be a symbolic link. This is because the volumes not temporarily converted by `upgrade_start` are unavailable during the upgrade process. If you have a symbolic link from `/opt` to one of the unconverted volumes, the symbolic link will not function during the upgrade and items in `/opt` are not installed.

---

2. Bring the system down to single-user mode using the following command:

```
# init s
```

3. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

4. Run the `upgrade_start` with the `-check` argument to detect any problems that exist which could prevent a successful upgrade. (Be sure to run the `upgrade_start` and `upgrade_finish` scripts that are supplied with the VxVM 4.0 release.) If this command reports success, you can proceed with running the `upgrade_start` script, but if it reports errors, correct the problem(s) and rerun `upgrade_start -check`.

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_start -check
```

5. Run the `upgrade_start` script so that the system can come up with partitions. The `upgrade_start` script searches for volumes containing file systems, and if any are found, converts them to partitions:

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_start
```

6. Reboot to single-user mode.

```
# reboot -- -s
```

---

**Note** You need to mount `/opt` manually before you can run `pkgrm` to remove VxVM packages if `/opt` is on its own partition.

---

7. Remove the old VxVM packages by entering:

```
# pkgrm VRTSvmdoc VRTSvmdev VRTSvmmman VRTSvxvm VRTSlic VRTSvras \
VRTSvrdoc
```

---

**Note** `VRTSvras` may not exist on your system.

---

---

**Note** If you still have clients running previous versions of VxVM, refer to “[VMSA and VEA Co-existence](#)” on page 36.

---

---

**Note** Licensing in VxVM 4.0 requires the new `VRTSvlic` package. You do not need to remove the existing `VRTSlic` package.

---

8. You might have the VMSA or VEA software installed. To remove the VMSA software, enter:

```
# pkgrm VRTSvmsa
```

To remove the VEA software, enter:

```
# pkgrm VRTSfsspro VRTSvmpro
# pkgrm VRTSob VRTSobgui
```

9. If Sun Volume Manager is installed:

- ◆ Remove any `SUNWvxvm` related patches.  
Refer to the Sun documentation for the procedure.
- ◆ Remove `SUNWvxvm`:

```
# pkgrm SUNWvxvm SUNWvmdoc SUNWvmdev
```

---

**Note** If you have made any additional modifications or have applied any patches, they must be removed before removing the `SUNWvxvm` package.

---

10. Bring the system down to run level 0.

```
# init 0
```



11. Now upgrade the operating system to Solaris 7, 8 or 9.

---

**Note** You should boot up the system from run level 0 depending on the Solaris upgrade procedure that you want to follow. Refer to the Solaris installation documentation for instructions on how to upgrade the Solaris Operating System. After installing the Solaris Operating System, install the required patches that are listed in “[Required Solaris Software Patches](#)” on page 14.

---

12. Once the system is up with the upgrade the Solaris Operating System, bring the system down to single-user mode by entering:

```
# init s
```

13. Load and mount the CD-ROM by starting the volmgt daemon.

```
# /etc/init.d/volmgt start
```

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD.

---

14. The VxVM packages are compressed using GNU compression, so you will need to uncompress them using the `gunzip` command. First, copy the packages from the directory containing the packages to a location to which you can write and then uncompress and untar the packages. If the current directory is your selected location, create a directory `volume_manager`, which will be the target path, and enter the command:

```
# cp -R /cdrom/CD_NAME/volume_manager/pkgs/* volume_manager
# cp /cdrom/CD_NAME/volume_manager/scripts/VRTSobadmin \
volume_manager
```

---

**Note** You can copy the packages to any directory and call it by any name.

---

15. Change to the `volume_manager` directory that now contains the VxVM packages, and uncompress the packages:

```
# cd volume_manager
# /cdrom/CD_NAME/volume_manager/scripts/install/gunzip *.gz
```

16. Use `tar` to extract the packages. You should extract each package individually using a command such as:

```
# tar xvf VRTSvxvm.tar
```

and then repeat the command for each package.

17. Remove the old VRTSvlic licensing package

```
# pkgrm VRTSvlic
```

18. Add the new VxVM 4.0 licensing package using the following command:

```
# pkgadd -d . VRTSvlic
```

19. Add the VxVM 4.0 package using the following command:

```
# pkgadd -d . VRTSvxvm
```

If warnings are displayed that include the string `/etc/vx`, ignore them and continue.

20. Complete the upgrade using the following command:

```
# /cdrom/CD_NAME/volume_manager/scripts/upgrade_finish
```

21. Using the `pkgadd` command, install the additional packages:

```
# pkgadd -d . VRTSvmdoc VRTSvmman
# pkgadd -a VRTSobadmin -d . VRTSob VRTSobgui
# pkgadd -d . VRTSalloc VRTSddlpr
# pkgadd -d . VRTSfspro VRTSvmpro
# pkgadd -d . VRTScpi VRTSperl VRTSmuob
```

22. The following steps contain instructions on Installing the VxVM and VEA patches.

---

**Note** The VERITAS packages and patches are not compressed when you purchase VERITAS Volume Manager through Sun Microsystems. In addition, there is no `volume_manager` directory. The `pkgs`, `patches`, `docs`, `release_notes` and other directories are at the top level of the CD. If you purchased the VERITAS packages and patches through Sun Microsystems, do not install patch 115217-xx.

---

Create a temporary directory:

```
# mkdir -p /40/patches
```

23. Copy the patches into the temporary directory:

```
# cd /cdrom/CD_NAME/volume_manager/patches
# cp *.* /40/patches
```

24. Verify that the patches have been copied:

```
# ls -la /40/patches
```

The output should display four patches with an id similar to `115209-##.tar.gz`



**25.** Uncompress the patches:

```
# cd /cdrom/CD_NAME/gnu
# ./gunzip /40/patches/115209-##.tar.gz
```

Repeat the gunzip command for all patches.

**26.** Extract the patches:

```
# cd /40/patches
# tar -xvf 115209-##.tar
```

Repeat the command for all patches.

**27.** Install the patches:

```
# patchadd 115209-xx
```

Repeat the command for all patches.

**28.** Verify that the patch is installed:

```
# showrev -p 115209-xx
```

Repeat the command for all patches.

**29.** To disable the hot-relocation feature, comment out the vxrelocd line in the startup file /etc/rc2.d/S95vxvm-recover:

```
# vxrelocd root & # commented out to disable hot-relocation
```

**30.** Perform reconfiguration reboot:

```
# reboot -- -r
```

**31.** See [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48 to start VEA.



## Upgrading the Solaris Operating System Only

If you are running VxVM 4.0 with an earlier release of the Solaris Operating System, you can upgrade the Solaris Operating System using the following procedure.

---

**Caution** You should only use this procedure to upgrade the Solaris Operating System if you are running VxVM 4.0.

---

---

**Note** The directory `/opt` must exist, be writable, and must not be a symbolic link. This is because the volumes not temporarily converted by the `upgrade_start` are unavailable during the upgrade process. If you have a symbolic link from `/opt` to one of the unconverted volumes, the symbolic link will not function during the upgrade and items in `/opt` will not be installed.

---

1. Bring the system down to single-user mode using the following command:

```
# init s
```

---

**Note** You need to mount `/opt` manually if `/opt` is on its own partition.

---

2. Load and mount the CD-ROM by starting the `volmgt` daemon.

```
# /etc/init.d/volmgt start
```

3. Change directory:

```
# cd /cdrom/CD_NAME/volume_manager/scripts
```

4. Run the `upgrade_start` with the `-check` argument to detect any problems that exist which could prevent a successful upgrade. (Be sure to run the `upgrade_start` and `upgrade_finish` scripts that are supplied with the VxVM 4.0 release.) If this command reports success, you can proceed with running the `upgrade_start` script, but if it reports errors, correct the problem(s) and rerun `upgrade_start -check`.

```
# ./upgrade_start -check
```

5. Run the `upgrade_start` script so that the system can come up with partitions. (Be sure to run the `upgrade_start` and `upgrade_finish` scripts that are supplied with the VxVM 4.0 release.) The `upgrade_start` script searches for volumes containing file systems, and if any are found, converts them to partitions:

```
# ./upgrade_start
```

6. Bring the system down to run level 0.

```
# init 0
```



7. Now upgrade the operating system to Solaris 7, 8 or 9.

---

**Note** You should boot up the system from run level 0 depending on the Solaris upgrade procedure that you want to follow. Refer to the Solaris installation documentation for instructions on how to upgrade the Solaris Operating System. After installing the Solaris operating System, install the required patches that are listed in [“Required Solaris Software Patches”](#) on page 14.

---

8. Once the system is up with the upgraded the Solaris Operating System, bring the system down to single-user mode by entering:

```
# init s
```

9. Load and mount the CD-ROM by starting the volmgt daemon.

```
# /etc/init.d/volmgt start
```

10. Change directory:

```
# cd /cdrom/CD_NAME/volume_manager/scripts
```

11. Complete the upgrade by entering:

```
# ./upgrade_finish
```

12. Perform the reconfiguration reboot:

```
# reboot -- -r
```

## Completing the Upgrade

This section contains tasks that complete the process of upgrading VxVM.

### Verifying the Upgrade

To verify that the upgrade was successful:

1. Check that Volume Manager and the file system, if upgraded, are the new version.

```
# pkginfo -l VRTSvxvm.*  
# pkginfo -l VRTSob.*  
# pkginfo -l VRTSalloc.*  
# pkginfo -l VRTddlpr.*  
# pkginfo -l VRTSvmpro.*  
# pkginfo -l VRTSfspro.*  
# pkginfo -l VRTSobgui.*  
# pkginfo -l VRTSvxfs.*
```

2. Verify that all the file systems that were under VxVM control prior to upgrade are now under VxVM control.

```
# df -k
```



## Upgrading Language Versions

This section applies if you have purchased a localized version of VxVM. Language CDs enable you to use the VxVM software in a supported languages other than English.

VERITAS Storage Solutions includes three software CDs, and if you purchase a language version, other than English, the product includes an additional CD with software and documentation.

### Upgrading Language Version Software

To upgrade a language version, there are four main steps:

- ◆ Prepare to remove old packages by stopping associated processes.
- ◆ Remove old language packages
- ◆ Upgrade the base VM software
- ◆ Install the new language packages

This section describes these steps in detail.

1. Verify that the VERITAS Cluster Server Cluster Manager is not running. Consult your cluster server documentation for instructions on how to determine whether the cluster manager is running and how to stop it.
2. Determine if the VEA server is running by entering the command `vxsvc -m`, and if the VEA server is running, stop it by entering:

```
# /etc/init.d/isisd stop
```

3. Remove the old language packages. For example, in the case of the Japanese packages, use a command similar to the following:

```
pkgrm VRTSjavms VRTSvmjac VRTSvmjad VRTSvmjam VRTSmulic  
VRTSmuobg VRTSmuob
```

Some of the packages listed in this command may not be installed, depending on the actual installation or the version of the VxVM software.

4. Upgrade the base VxVM software. Use one of the procedures described in the *VERITAS Volume Manager Installation Guide*.
5. Insert the language CD and install the language packages using one of the following two methods:
  - ◆ The language install script. See [“Upgrading Language Versions using the VERITAS Installation Script”](#) on page 91.

**Note** This method only applies to the Japanese version. For other languages use the `pkgadd` command.

- ◆ The `pkgadd` command. See “[Upgrading Language Versions using the pkgadd command](#)” on page 91.

## Upgrading Language Versions using the VERITAS Installation Script

Invoke the language installation script:

```
# /cdrom/cdrom0/install_lp
```

and follow instructions.

## Upgrading Language Versions using the pkgadd command

1. Go to the directory containing the packages required for the language version of VxVM. For example to install the Japanese version, enter the command:

```
# cd /cdrom/cdrom0/ja/volume_manager/pkgs
```

2. Install the packages using the `pkgadd` command:

```
# pkgadd -d . VRTSmulic VRTSmufsp VRTSmuob VRTSmuobg VRTSmuvmp  
VRTSmualc VRTSmuddl VRTSvmjavmc VRTSvmjavmd VRTSvmjavmm
```

## Upgrading VEA Windows Client Package

To upgrade the Windows Client Package, you need to uninstall the existing packages, and then install the new versions as follows:

1. Start the “Add/Remove programs” from “Control Panel” and select “VERITAS Enterprise Administrator language pack” for removal.
2. Uninstall the base VEA package in the same manner.
3. Install the base and language packages as described in the *VERITAS Volume Manager Installation Guide* in the section entitled “VEA Windows Client Package Installation”.



## Upgrading CVM Protocol and Disk Group Version

If you want to take advantage of the new features in this release, you must upgrade the *VERITAS Cluster Volume Manager* (CVM) protocol version (50), and upgrade to the latest disk group version (110).

To upgrade the CVM protocol version to version 50, enter the following command on the master node:

```
# vxdctl upgrade
```

To upgrade the disk group version to 110, enter the command:

```
# vxdg -T 110 upgrade dgname
```

---

**Note** After upgrading CVM in a VCS environment, you should run the command, `vxcmconfig upgrade`. If this command is not run, you will see a warning in the engine log file, `/opt/VRTSvcs/log/engine_A.log`.

---

---

**Note** Downgrading disk group versions is not supported. If VERITAS cluster is used, the disk group version should match the lowest Volume Manager version installed in the cluster.

---

## Updating Variables

In `/etc/profile`, update the `PATH` and `MANPATH` variables as needed.

## Default Disk Group

In releases prior to Volume Manager 4.0, the default disk group was `rootdg` (the *root disk group*). For Volume Manager to function, the `rootdg` disk group had to exist and it had to contain at least one disk. This requirement no longer exists, however you may find it convenient to create a system wide default disk group. This upgrade has created `rootdg` as the default disk group, however you can change it. For instructions on how to change the default disk group, see the *VERITAS Volume Manager System Administrator's Guide*.

The main benefit of creating a default disk group is that VxVM commands default to the default disk group and you will not need to use the `-g` option. If you want to confirm that the root disk is encapsulated, enter the command:

```
# vxdg bootdg
```

# Removing VERITAS Volume Manager

6

Before removing VERITAS Volume Manager software, you must move volumes from VxVM control. If the root volume is encapsulated, use the procedures in “[Moving Volumes From an Encapsulated Root Disk](#)” on page 93. If your root disk is not encapsulated, you can start with the procedures in “[Moving Volumes To Disk Partitions](#)” on page 94.

## Moving Volumes From an Encapsulated Root Disk

If `root` (`/`), `swap`, `usr`, or `var` is a volume under VxVM control, use the following procedure.

1. Ensure that the `rootvol`, `swapvol`, `usr`, and `var` volumes have only one associated plex each. The plex must be contiguous, non-striped, non-spanned, and non-sparse.

For information about the plex, use the following command:

```
# vxprint -ht rootvol swapvol usr var
```

If any of the volumes have more than one associated plex, remove the unnecessary plexes using the following command:

```
# vxplex -o rm dis plex_name
```

It is important that the plex remaining for the `rootvol` volume was created using the `vxrootmir` program, which guarantees that underlying subdisks start on cylinder boundaries and that partitions are created for them.

2. Run the `vxunroot` program using the following command:

```
# /etc/vx/bin/vxunroot
```

The command changes the volume entries in `/etc/vfstab` to the underlying disk partitions of the `rootvol`, `swapvol`, `usr`, `var`, `opt` and `home` volumes. The command also modifies `/etc/system` and prompts for a reboot so that disk partitions are mounted instead of volumes for the `rootvol`, `swapvol`, `usr`, `var`, `opt`



and `home` volumes. If `vxunroot` detects volumes other than those on the above list, it will print an error message and ask you to move those volumes, and comment out corresponding entries in `/etc/vfstab`.

Continue to “[Moving Volumes To Disk Partitions](#)” on page 94 to complete the removal.

## Moving Volumes To Disk Partitions

All volumes must be moved to disk partitions. Use one of the following procedures:

- ◆ Back up the system fully onto tape and then recover from tape.
- ◆ Back up each file system individually and then recover them all after creating new file systems on disk partitions.
- ◆ Use VxVM to move volumes incrementally onto disk partitions. Use the following instructions:

1. Evacuate disks using the `vxdiskadm` program, VEA, or the `vxevac` script. You should consider the amount of target disk space required for this before you begin.

Evacuation moves subdisks from the specified disks to target disks. The evacuated disks provide the initial free disk space for volumes to be moved to disk partitions.

2. Remove the evacuated disks from VxVM control using the following commands:

```
# vxdbg rmdisk disk_name
# vxdisk rm devname
```

3. Decide which volume to move first. If a volume is mounted, unmount it.
4. If a volume is used as a raw partition for database applications, make sure that the application is not updating the volume and that data on the volume is synchronized.
5. Create a partition on free disk space of the same size as the volume. If the volume is larger than the available free space, add a new disk to the system for the first volume removed. Subsequent volumes can use the free space generated by the removal of the first volume.
6. Copy the data on the volume onto the newly created disk partition using a command similar to the following:

```
# dd if=/dev/vx/dsk/lhome of=/dev/dsk/c2t2d2s7
```

where `c2t2d2` is the disk outside of VxVM and `s7` is the newly created partition.

7. Replace the entry for that volume (if present) in `/etc/vfstab` with an entry for the newly created partition.
8. Mount the disk partition if the corresponding volume was previously mounted.
9. Remove the volume from VxVM using the following command:

```
# vxedit -rf rm volume_name
```

10. Remove any disks that have become free (those having no subdisks defined on them) by removing the volumes from VERITAS Volume Manager control.

To check if there are still some subdisks remaining on a particular disk, use the command:

```
# vxprint -F '%sdnum' diskname
```

If the output is not 0, subdisks still exist on the disk that you need to remove. If the output is 0, remove the disk from VERITAS Volume Manager control as follows:

```
# vxdg rmdisk diskname
# vxdisk rm devname
```

Use the free space created for adding the data from the next volume you want to remove.

11. After you successfully convert all volumes into disk partitions, reboot the system.
12. After the reboot, make sure none of the volumes are open by using the following command:

```
# vxprint -Aht -e v_open
```

If any volumes remain open, repeat the steps 3 to 12, above.

[“Move Volumes onto Partitions - Example”](#) on page 115 is an example showing how to move the data on a volume to a disk partition.

## Shutting Down VxVM

To shut down VxVM, use the following commands:

```
# vxdctl stop
# vxiod -f set 0
```



## Removing VxVM Packages using the `uninstallvm` and `uninstallinfr` Scripts

If you want to use the `uninstallvm` script program to remove VxVM, you should insert the CD-ROM and mount it: and enter the following command:

```
# mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom
```

where `c0t6d0s2` is the default address for the CD-ROM, and then enter the following commands:

```
# cd /cdrom/<CD_NAME>/volume_manager
# ./uninstallvm
```

The program will ask you to confirm that you want to remove VxVM and will then remove all packages except the infrastructure packages. The `uninstallvm` script will also check for open volumes and boot disk encapsulation, and if either exists, you will be told to stop the open volumes and unmount the file systems, or run `vxunroot` before uninstalling can be completed. If you want to know which packages remain, you should go to [“Verifying Removal”](#) on page 98. To uninstall the infrastructure packages, run these commands:

```
# cd /opt/VRTS/install
# ./uninstallinfr
```

You would only perform this procedure if you don’t have any other Foundation products installed.

## Removing VxVM Packages using `pkgrm`

Before removing the packages, you determine if any other VERITAS products are installed on your system. Other products may depend on the `VRTSvlic` package license that you may be removing.

To check for other installed VERITAS products:

```
pkginfo | grep -i vrts
```

A warning appears when you try to remove `VRTSvlic` if other products are using that license.

---

**Note** If `/opt` is on its own partition, you need to mount `/opt` manually before you can run `pkgrm` to remove VxVM packages.

---

## Removing Language Packs

When using pkgrm to uninstall VxVM, remove the language packages before the base packages. For example, in the case of the Japanese packages, use a command similar to the following:

```
pkgrm VRTSjavmc VRTSjavmd VRTSjavmm VRTSmuvmp VRTSmufsp  
VRTSmuddl VRTSmualc VRTSmulic VRTSmulic VRTSmuobg VRTSmuob
```

Some of the packages listed in this command may not be installed, depending on the actual installation or the version of the VxVM software.

## Removing VERITAS Volume Manager

To remove the VxVM installed packages, use the following command:

```
# pkgrm VRTSvmddoc VRTSvmman VRTSalloc VRTSddlpr
```

You can also include VRTSvlic in the removal line if you have not installed any other packages that use VRTSvlic.

Do not remove VRTSvxvm yet because it is the final step of the removal procedure.

## Removing the VERITAS Provider Packages

To remove the VERITAS Virtual Disk Management Services Provider and VERITAS File System Provider packages, use the following commands:

```
# pkgrm VRTSvmpro  
# pkgrm VRTSfspro
```

## Removing the VERITAS Enterprise Administrator

To remove the VERITAS Enterprise Administrator packages, use the following commands:

```
# pkgrm VRTSob  
# pkgrm VRTSobgui
```



## Removing the Windows Client Software Package

To remove the Windows Client software:

1. Click **Start > Settings > Control Panel > Add/Remove Software**
2. Choose **VERITAS Enterprise Administrator** for removal.

## Removing VRTSvxvm

The final stage of the removal procedure is to remove VRTSvxvm.

If the VRTSvxvm.2 package is still installed and you want to remove VxVM 4.0, you must remove the VRTSvxvm.2 package first. To determine whether both packages are present, use the following command:

```
# pkginfo | grep vxvm
```

Output is displayed that may list more than one VRTSvxvm package (for example VRTSvxvm, VRTSvxvm.2, VRTSvxvm.3). To remove the VxVM 4.0 version, you should find out which version is the VxVM 4.0 version by entering the command:

```
# pkginfo -l -v 4.0 VRTSvxvm
```

then use pkgrm to remove the package as in the following example:

```
# pkgrm VRTSvxvm.2
```

## Verifying Removal

To verify the removal of the packages on the Solaris Operating System:

```
# pkginfo | grep VRTS
```

If you do not have any other VERITAS products installed on the system, you can remove the /etc/vx directory, the /usr/lib/vxvm directory and the /opt/VRTS\* directories.

## Removing Patches

To backout or remove a patch after it has been installed, enter the command:

```
# patchrm patch_id
```

To verify that the patch has been successfully removed, enter the command:

```
# pkgparam pkg_name PATCHLIST
```

The output should display nothing.

Reboot the system:

```
# sync;sync;reboot
```

## Restoring VERITAS Volume Manager 4.0 Configuration

You can restore VxVM configuration information from the backup directory /VXVM-CFG-BAK after VxVM 4.0 is removed by `pkgrm`.

---

**Note** This feature applies only to VxVM 3.5 and later. If you used `pkgrm` to remove versions prior to VxVM 3.5, `pkgrm` does not save configuration information.

---

---

**Note** This feature is available only when VxVM is removed using the stand-alone `pkgrm` command. That is, it is not available when `pkgrm` is used as part of the `upgrade_start` script.

---

The following files are available for restoration (using `pkgadd`) from the directory /VXVM-CFG-BAK:

- ◆ /etc/vx/volboot
- ◆ /etc/vx/array.info
- ◆ /kernel/drv/vxdmp.conf
- ◆ /kernel/drv/vxio.conf
- ◆ /etc/vx/jbod.info
- ◆ /etc/vx/ddl.support
- ◆ /etc/vx/vxddl.exclude
- ◆ /etc/vx/vxvm.exclude
- ◆ /etc/vx/vxdmp.exclude
- ◆ /etc/vx/vvrports





# Getting Started with VERITAS Volume Manager

---

7

This chapter describes:

- ◆ System setup guidelines
- ◆ Enabling cluster support in VxVM
- ◆ Reserving shared disks
- ◆ Adding new array support
- ◆ Disabling hot-relocation
- ◆ Placing disks in another disk group
- ◆ Adding disks after Initialization
- ◆ Protecting your system and data

## System Setup Guidelines

This section gives guidelines for setting up efficient storage management. For specific setup tasks, see the *VERITAS Volume Manager Storage Administrator Administrator's Guide*.

The “[Setup Sequence](#)” on page 101 is a typical example. Your system requirements may differ. The system setup guidelines, starting with “[Hot-Relocation Guidelines](#),” provide helpful information for specific setup configurations.

## Setup Sequence

### ▼ Initial Setup

1. Place disks under VxVM control.
2. Create new disk groups.
3. Create volumes.



4. Put file systems on volumes.

▼ **Options**

- ◆ Encapsulate the `root` disk and mirror it to create an alternate boot disk.
- ◆ Designate hot-relocation spare disks.
- ◆ Add mirrors to volumes.

▼ **Maintenance**

- ◆ Resize volumes and file systems.
- ◆ Add more disks or disk groups.
- ◆ Create snapshots.

## Guidelines

The following general guidelines help you understand and plan an efficient storage management system. See the cross-references in each section for more information about each guideline.

### Disabling Hot-Relocation

The hot-relocation feature detects disk failures automatically and notifies you of the nature of the failure, attempts to relocate any affected subdisks that are redundant, and initiates recovery procedures.

However, you can disable it by preventing the `vxrelocd` daemon from starting up during system startup. This should be done after the VxVM packages have been installed.

To disable hot-relocation, comment out the `vxrelocd` line in the startup file `/etc/rc2.d/S95vxvm-recover`, as follows:

```
# vxrelocd root &
```

## Hot-Relocation Guidelines

Refer to the following guidelines when using hot-relocation.

- ◆ The hot-relocation feature is enabled by default. Although it is possible to disable hot-relocation, it is advisable to leave it enabled.
- ◆ Although hot-relocation does not require you to designate disks as spares, designate at least one disk as a spare within each disk group. This gives you some control over which disks are used for relocation. If no spares exist, VxVM uses any available free space within the disk group. When free space is used for relocation purposes, it is possible to have performance degradation after the relocation.
- ◆ After hot-relocation occurs, designate one or more additional disks as spares to augment the spare space. Some of the original spare space may be occupied by relocated subdisks.
- ◆ If a given disk group spans multiple controllers and has more than one spare disk, set up the spare disks on different controllers (in case one of the controllers fails).
- ◆ For a mirrored volume, configure the disk group so that there is at least one disk that does not already contain a mirror of the volume. This disk should either be a spare disk with some available space or a regular disk with some free space and the disk is not excluded from hot-relocation use.
- ◆ For a mirrored and striped volume, configure the disk group so that at least one disk does not already contain one of the mirrors of the volume or another subdisk in the striped plex. This disk should either be a spare disk with some available space or a regular disk with some free space and the disk is not excluded from hot-relocation use.
- ◆ For a RAID-5 volume, configure the disk group so that at least one disk does not already contain the RAID-5 plex (or one of its log plexes) of the volume. This disk should either be a spare disk with some available space or a regular disk with some free space and the disk is not excluded from hot-relocation use.
- ◆ If a mirrored volume has a DRL log subdisk as part of its data plex, you cannot relocate the data plex. Instead, place log subdisks in log plexes that contain no data.
- ◆ Hot-relocation does not guarantee to preserve the original performance characteristics or data layout. Examine the locations of newly-relocated subdisks to determine whether they should be relocated to more suitable disks to regain the original performance benefits.
- ◆ Hot-relocation is capable of creating a new mirror of the root disk if the root disk is mirrored and it fails. The rootdg should contain sufficient contiguous spare or free space to accommodate the volumes on the root disk. (`rootvol` and `swapvol` require contiguous disk space.)



- ◆ Although it is possible to build VxVM objects on spare disks (using `vxmake` or the VEA interface), it is recommended that you use spare disks for hot-relocation only.

## Striping Guidelines

Refer to the following guidelines when using striping. See *VERITAS Volume Manager Administrator's Guide* for more information.

- ◆ Do not place more than one column of a striped plex on the same physical disk.
- ◆ Calculate stripe unit sizes carefully. In general, a moderate stripe unit size (for example, 64 kilobytes, which is also the default used by `vxassist`) is recommended.
- ◆ If it is not feasible to set the stripe unit size to the track size, and you do not know the application I/O pattern, use 64 kilobytes for the stripe unit size.

---

**Note** Many modern disk drives have *variable geometry*. This means that the track size differs between cylinders, so that outer disk tracks have more sectors than inner tracks. It is therefore not always appropriate to use the track size as the stripe unit size. For these drives, use a moderate stripe unit size (such as 64 kilobytes), unless you know the I/O pattern of the application.

---

- ◆ Volumes with small stripe unit sizes can exhibit poor sequential I/O latency if the disks do not have synchronized spindles. Generally, striping over disks without synchronized spindles yields better performance when used with larger stripe-unit sizes and multi-threaded, or largely asynchronous, random I/O streams.
- ◆ Typically, the greater the number of physical disks in the stripe, the greater the improvement in I/O performance; however, this reduces the effective mean time between failures of the volume. If this is an issue, combine striping with mirroring to combine high-performance with improved reliability.
- ◆ If only one plex of a mirrored volume is striped, set the policy of the volume to `prefer` for the striped plex. (The default read policy, `select`, does this automatically.)
- ◆ If more than one plex of a mirrored volume is striped, configure the same stripe-unit size for each striped plex.
- ◆ Where possible, distribute the subdisks of a striped volume across drives connected to different controllers and buses.
- ◆ Avoid the use of controllers that do not support overlapped seeks. (Such controllers are rare.)

The `vxassist` command automatically applies and enforces many of these rules when it allocates space for striped plexes in a volume.

## Mirroring Guidelines

Refer to the following guidelines when using mirroring. See *VERITAS Volume Manager Administrator's Guide* for more information.

- ◆ Do not place subdisks from different plexes of a mirrored volume on the same physical disk. This action compromises the availability benefits of mirroring and degrades performance. Using the `vxassist` or `vxdiskadm` commands precludes this from happening.
- ◆ To provide optimum performance improvements through the use of mirroring, at least 70 percent of physical I/O operations should be read operations. A higher percentage of read operations results in even better performance. Mirroring may not provide a performance increase or may even result in performance decrease in a write-intensive workload environment.

---

**Note** The Solaris operating system implements a file system cache. Read requests can frequently be satisfied from the cache. This can cause the read/write ratio for physical I/O operations through the file system to be biased toward writing (when compared to the read/write ratio at the application level).

---

- ◆ Where possible, use disks attached to different controllers when mirroring or striping. Most disk controllers support overlapped seeks. This allows seeks to begin on two disks at once. Do not configure two plexes of the same volume on disks that are attached to a controller that does not support overlapped seeks. This is important for older controllers or SCSI disks that do not cache on the drive. It is less important for modern SCSI disks and controllers. Mirroring across controllers allows the system to survive a failure of one of the controllers. Another controller can continue to provide data from a mirror.
- ◆ A plex exhibits superior performance when striped or concatenated across multiple disks, or when located on a much faster device. Set the read policy to prefer the faster plex. By default, a volume with one striped plex is configured to prefer reading from the striped plex.

## Dirty Region Logging (DRL) Guidelines

Dirty Region Logging (DRL) can speed up recovery of mirrored volumes following a system crash. When DRL is enabled, VxVM keeps track of the regions within a volume that have changed as a result of writes to a plex. VxVM maintains a bitmap and stores this information in the DCO volume. DCO Volumes are defined for and added to a volume to



provide DRL. DCO volumes are independent of plexes, are ignored by plex policies, and are only used to hold the DRL information. See the *VERITAS Volume Manager Administrator's Guide* for more details

---

**Note** Using Dirty Region Logging can impact system performance in a write-intensive environment.

---

Refer to the following guidelines when using mirroring and striping together. For more information, see the *VERITAS Volume Manager Administrator's Guide* for details.

- ◆ Make sure enough disks are available for the striped and mirrored configuration. At least two disks are required for the striped plex and one or more *additional* disks are needed for the mirror.
- ◆ Never place subdisks from one plex on the same physical disk as subdisks from the other plex.

## RAID-5 Guidelines

Refer to the following guidelines when using RAID-5. For more information, see *VERITAS Volume Manager Administrator's Guide*.

In general, the guidelines for mirroring and striping together also apply to RAID-5. The following guidelines should also be observed with RAID-5:

- ◆ Only one RAID-5 plex can exist per RAID-5 volume (but there can be multiple log plexes).
- ◆ The RAID-5 plex must be derived from at least two subdisks on two or more physical disks. If any log plexes exist, they must belong to disks other than those used for the RAID-5 plex.
- ◆ RAID-5 logs can be mirrored and striped.
- ◆ If the volume length is not explicitly specified, it is set to the length of any RAID-5 plex associated with the volume; otherwise, it is set to zero. If you specify the volume length, it must be a multiple of the stripe unit size of the associated RAID-5 plex, if any.
- ◆ If the log length is not explicitly specified, it is set to the length of the smallest RAID-5 log plex that is associated, if any. If no RAID-5 log plexes are associated, it is set to zero.
- ◆ Sparse RAID-5 log plexes are not valid.

## Enable Cluster Support in VxVM (Optional)

---

**Note** This section assumes that you are using SunCluster as the cluster monitor on your system.

---

This release includes an *optional* cluster feature that enables VxVM to be used in a cluster environment. The cluster functionality in VxVM allows multiple hosts to simultaneously access and manage a set of disks under VxVM control. A *cluster* is a set of hosts sharing a set of disks; each host is referred to as a *node* in the cluster.

---

**Note** The VxVM cluster feature requires a license, which can be obtained from your Customer Support channel. (The presence of a SPARCstorage™ Array may serve as a license, but it limits what can be done to private disk groups.)

---

To enable the cluster functionality in VxVM, use the following procedure

1. Obtain a license for the VxVM cluster feature.
2. Install the software packages onto each system (node) to be included in the cluster as described in [“Installing VxVM using pkgadd”](#) on page 28 and [“VEA Installation”](#) on page 35.
3. Initialize VxVM using the procedures described in [“Setting Up VERITAS Volume Manager”](#) on page 41.
4. Start VEA as described in [“Starting the VEA Server”](#) on page 48 and [“Starting the VEA Client”](#) on page 48.
5. Configure shared disks as described in [“Configure Shared Disks”](#) on page 107.

## Configure Shared Disks

This section describes how to configure shared disks. If you are installing VxVM for the first time or adding disks to an existing cluster, you need to configure new shared disks. If you are upgrading VxVM, verify that your shared disks still exist.

The shared disks should be configured from one node only. Since the VxVM software cannot tell whether a disk is shared or not, you must specify which are the shared disks.

Make sure that the shared disks are not being accessed from another node while you are performing the configuration. If you start the cluster on the node where you perform the configuration only, you can prevent disk accesses from other nodes because the quorum control reserves the disks for the single node (see [“Reserve Shared Disks”](#) on page 110).



## Configure New Disks

If you are installing and setting up VxVM for the first time, configure the shared disks using the following procedure:

1. Start the cluster on at least one node.
2. On one node, run the `vxdiskadm` program and choose option 1 to initialize new disks. When asked to add these disks to a disk group, choose `none` to leave the disks for future use.
3. On other nodes in the cluster, run `vxctl enable` to see the newly initialized disks.
4. From the master node, create disk groups on the shared disks. To determine if a node is a master or slave, run `vxctl -c mode`.

Use the `vxdbg` program or VEA to create disk groups. In the `vxdbg` program, use the `-s` option to create shared disk groups.

5. From the master node only, use `vxassist` or VEA to create volumes in the disk groups.

---

**Note** The volumes must be of type `gen`. Do not create RAID-5 volumes. Before creating any log subdisks, read the section on DRL in the *VERITAS Volume Manager Administrator's Guide*.

---

6. If the cluster is only running with one node, bring up the other cluster nodes. Enter the `vxdbg list` command on each node to display the shared disk groups.

## Verify Existing Shared Disks

If you are upgrading from a previous release of VxVM, verify that your shared disk groups still exist using the following procedure:

1. Start the cluster on all nodes.
2. Enter the following command on all nodes:

```
# vxdbg list
```

This displays the existing shared disk groups.

## Convert Existing VxVM Disk Groups to Shared Disk Groups

If you are upgrading from VxVM 3.x to VxVM 4.0 and you want to convert existing disk groups to shared disk groups, configure the shared disks as follows:

1. Start the cluster on at least one node.

For a two-node cluster, start the cluster on one node; for a four-node cluster, start the cluster on three nodes.

2. Configure the disk groups using the following procedure.

To list all disk groups, use the following command:

```
# vxdbg list
```

To deport disk groups to be shared, use the following command:

```
# vxdbg deport disk-group-name
```

To import disk groups to be shared, use the following command on the master node:

```
# vxdbg -s import disk-group-name
```

This procedure marks the disks in the shared disk groups as shared and stamps them with the ID of the cluster, enabling other nodes to recognize the shared disks.

If dirty region logs exist, ensure they are active. If not, replace them with larger ones.

To display the shared flag for all the shared disk groups, use the following command:

```
# vxdbg list
```

The disk groups are now ready to be shared.

3. If the cluster is only running with one node, bring up the other cluster nodes. Enter the `vxdbg list` command on each node to display the shared disk groups. This command displays the same list of shared disk groups displayed earlier.
4. For information on upgrading in a Cluster Volume Manager (CVM) environment, see the *VERITAS Cluster File System Installation and Configuration Guide*.

## Upgrading in a Clustered Environment and FastResync is Set

This procedure applies to two upgrade scenarios:

- ◆ Upgrading from VxVM 3.5 to VxVM 4.0
- ◆ Upgrading from VxVM 3.5 Maintenance Patch 3 or from VxVM 3.2 Maintenance Patch 5 to VxVM 4.0



If there are volumes in the shared disk groups with FastResync set (`fastresync=on`), before beginning the upgrade procedure, reattach each snapshot to its data volume, using this procedure:

1. You should run this procedure from the master node; to find out if you are on the master node, enter the command:

```
# vxdctl -c mode
```

2. On the master node, list which disk groups are shared by entering:

```
# vxdg -s list
```

3. Using the diskgroup names displayed by the previous command, list the disk groups that have volumes on which FastResync is set:

```
# vxprint -g diskgroup -F "%name" -e "v_fastresync"
```

4. Reattach each snapshot:

```
# vxassist -g diskgroup -o nofmr snapback snapshot_volume
```

5. If you are upgrading from VxVM 3.5 Maintenance Patch 3 or from VxVM 3.2 Maintenance Patch 5, set FastResync to off for each volume:

```
# vxvol -g diskgroup set fastresync=off volume
```

## Reserve Shared Disks

As part of its quorum control, the Sun Cluster cluster manager reserves shared disk controllers when only one node is active. This prevents “rogue” hosts from accessing the shared disks. When this happens, the `vxdisk list` command used on a node that has left the cluster may show all disks on such a controller as having an error status. The more detailed options of the `vxdisk` command show the flag `unavailable`. When a new node joins the cluster, the Sun Cluster software releases the controllers. VxVM attempts to access these disks, and if that is successful, the disks return to an `online` status. (See the Sun Cluster documentation for further details.) If one system boots while the other system has the disks reserved, the disks can be invisible to the booting system, and the `vxdisk` command may not display any of the shared disks. When the system joins the cluster, the shared disks become visible.

## Add New Array Support

After installation, add any disk arrays that are unsupported by VERITAS to the JBOD category as described in the section “[Hot-Relocation Guidelines](#)” on page 103.

## Hot-Relocation

Hot-relocation automatically restores redundancy and access to mirrored and RAID-5 volumes when a disk fails. This is done by relocating the affected subdisks to disks designated as spares and/or free space in the same disk group.

The hot-relocation feature is enabled by default. The associated daemon, `vxrelocd`, is automatically started during system startup.

Follow these recommendations:

1. Leave the VxVM hot-relocation feature enabled to detect disk failures automatically. It will notify you of the nature of the failure, attempt to relocate any affected subdisks that are redundant, and initiate recovery procedures.
2. Configure at least one hot-relocation spare disk in each disk group. This will allow sufficient space for relocation in the event of a failure.

If you decide to disable hot-relocation, prevent `vxrelocd` from running after you load the VxVM software, see the section “Modifying the behavior of Hot-Relocation” in Chapter 9 of the *VERITAS Volume Manager Administrator's Guide* for details.

## Place Disks in another Disk Group

To place disks in another disk group, use VEA or the `vxdiskadm` program after completing the `vxinstall` program. Refer to the *VERITAS Volume Manager Administrator's Guide* for information on how to create other disk groups for your disks.

## Add Disks After Initialization

Disks that are not initially placed under VxVM control by the `vxinstall` program can be added later using another VxVM interface (such as VEA or the `vxdiskadm` program). Refer to the *VERITAS Volume Manager Administrator's Guide* for details.



## Protect Your System and Data

A disk failure can cause loss of data on the failed disk and loss of access to your system. Loss of access is due to the failure of a key disk used for system operations. VxVM can protect your system from these problems.

To maintain system availability, data important to running and booting your system must be mirrored. The data must be preserved so it can be used in case of failure.

The following are suggestions for protecting your system and data:

- ◆ Place the disk containing the root file system (the root or boot disk) under VxVM control through encapsulation. Encapsulation converts the `root` and `swap` devices to volumes (`rootvol` and `swapvol`).
- ◆ Mirror the root disk so that an alternate root disk exists for booting purposes. By mirroring disks critical to booting, you ensure that no single disk failure leaves your system unbootable and unusable.

For maximum availability of the system, create mirrors for the `rootvol`, `swapvol`, `usr`, and `var` volumes. For more information, see the *VERITAS Volume Manager Troubleshooting Guide*.

- ◆ Use mirroring to protect data against loss from a disk failure. To preserve data, create and use mirrored volumes that have at least two data plexes. The plexes must be on different disks. If a disk failure causes a plex to fail, the data in the mirrored volume still exists on the other disk.
- ◆ Leave the VxVM hot-relocation feature enabled to detect disk failures automatically. It will notify you of the nature of the failure, attempt to relocate any affected subdisks that are redundant, and initiate recovery procedures. Configure at least one hot-relocation spare disk in each disk group. This will allow sufficient space for relocation in the event of a failure.

If the `root` disk is mirrored, hot-relocation can automatically create another mirror of the `root` disk if the original `root` disk fails. The `rootdg` must contain enough contiguous spare or free space for the volumes on the root disk (`rootvol` and `swapvol` volumes require contiguous disk space).

- ◆ Use the DRL feature to speed up recovery of mirrored volumes after a system crash. Make sure that each mirrored volume has at least one log subdisk.

---

**Note** `rootvol`, `swapvol`, and `usr` volumes cannot be DRL volumes.

---

- ◆ Use logging to prevent corruption of recovery data in RAID-5 volumes. Make sure that each RAID-5 volume has at least one log plex.

- ◆ Perform regular backups to protect your data. Backups are necessary if all copies of a volume are lost or corrupted. Power surges can damage several (or all) disks on your system. Also, typing a command in error can remove critical files or damage a file system directly. Performing regular backups ensures that lost or corrupted data is available to be retrieved.





## Move Volumes onto Partitions - Example

This example shows how to move the data on a volume to a disk partition. In the example, there are three disks: disk1 and disk2 are subdisks on volume vol01 and disk3 is a free disk. The data on vol01 is copied to disk3 using vxevac.

1. Diskgroup voldg content before the data on vol01 is copied to disk3.

```
# vxprint -g voldg -ht
DG NAME          NCONFIG      NLOG      MINORS    GROUP-ID
DM NAME          DEVICE       TYPE      PRIVLEN   PUBLEN    STATE
RV NAME          RLINK_CNT    KSTATE    STATE     PRIMARY   DATAVOLS  SRL
RL NAME          RVG          KSTATE    STATE     REM_HOST  REM_DG     REM_RLNK
V NAME          RVG          KSTATE    STATE     LENGTH    READPOL    PREFPLEX
UTYPE
PL NAME          VOLUME       KSTATE    STATE     LENGTH    LAYOUT     NCOL/WID
MODE
SD NAME          PLEX         DISK      DISKOFFS  LENGTH    [COL/]OFF  DEVICE
MODE
SV NAME          PLEX         VOLNAME   NVOLLAYR  LENGTH    [COL/]OFF  AM/NM
MODE
DC NAME          PARENTVOL    LOGVOL
SP NAME          SNAPVOL      DCO

dg voldg         default      default    115000
1017856044.1141.hostname.veritas.com

dm disk1         c1t12d0s2    sliced    2591      17900352  -
dm disk2         c1t14d0s2    sliced    2591      17899056  -
dm disk3         c1t3d0s2     sliced    2591      17899056  -

v vol1          -            ENABLED   ACTIVE    4196448   ROUND      -
fsgen
pl pl1          vol1         ENABLED   ACTIVE    4196448   CONCAT     -
RW
sd sd1          pl1          disk1     0          2098224   0          c1t12d0
ENA
sd sd2          pl1          disk2     0          2098224   2098224    c1t14d0
ENA
```

2. Evacuate disk1 to disk3.

```
# /etc/vx/bin/vxevac -g voldg disk1 disk3
```



---

```
# vxprint -g voldg -ht
```

```

DG NAME      NCONFIG      NLOG      MINORS      GROUP-ID
DM NAME      DEVICE      TYPE      PRIVLEN     PUBLEN     STATE
RV NAME      RLINK_CNT    KSTATE    STATE      PRIMARY    DATAVOLS  SRL
RL NAME      RVG         KSTATE    STATE      REM_HOST   REM_DG     REM_RLNK
V NAME      RVG         KSTATE    STATE      LENGTH     READPOL    PREFPLEX
UTYPE
PL NAME      VOLUME      KSTATE    STATE      LENGTH     LAYOUT     NCOL/WID
MODE
SD NAME      PLEX        DISK      DISKOFFS    LENGTH     [COL/]OFF  DEVICE
MODE
SV NAME      PLEX        VOLNAME   NVOLLAYR    LENGTH     [COL/]OFF  AM/NM
MODE
DC NAME      PARENTVOL   LOGVOL
SP NAME      SNAPVOL     DCO

dg voldg      default      default     115000
1017856044.1141.hostname.veritas.com

dm disk1      c1t12d0s2    sliced     2591        17900352   -
dm disk2      c1t14d0s2    sliced     2591        17899056   -
dm disk3      c1t3d0s2     sliced     2591        17899056   -

v vol1        -            ENABLED    ACTIVE      4196448    ROUND      -
fsgen
pl pl1        vol1         ENABLED    ACTIVE      4196448    CONCAT     -
RW
sd disk3-01   pl1          disk3      0           2098224    0          c1t3d0
ENA
sd sd2        pl1          disk2      0           2098224    2098224    c1t14d0
ENA

```

### 3. Evacuate disk2 to disk3.

```
# /etc/vx/bin/vxevac -g voldg disk2 disk3
```

```
# vxprint -g voldg -ht
```

```

DG NAME      NCONFIG      NLOG      MINORS      GROUP-ID
DM NAME      DEVICE      TYPE      PRIVLEN     PUBLEN     STATE
RV NAME      RLINK_CNT    KSTATE    STATE      PRIMARY    DATAVOLS  SRL
RL NAME      RVG         KSTATE    STATE      REM_HOST   REM_DG     REM_RLNK
V NAME      RVG         KSTATE    STATE      LENGTH     READPOL    PREFPLEX
UTYPE
PL NAME      VOLUME      KSTATE    STATE      LENGTH     LAYOUT     NCOL/WID
MODE
SD NAME      PLEX        DISK      DISKOFFS    LENGTH     [COL/]OFF  DEVICE
MODE
SV NAME      PLEX        VOLNAME   NVOLLAYR    LENGTH     [COL/]OFF  AM/NM
MODE
DC NAME      PARENTVOL   LOGVOL
SP NAME      SNAPVOL     DCO

dg voldg      default      default     115000

```



---

```
1017856044.1141.hostname.veritas.com
```

```
dm disk1      c1t12d0s2    sliced  2591    17900352 -
dm disk2      c1t14d0s2    sliced  2591    17899056 -
dm disk3      c1t3d0s2     sliced  2591    17899056 -

v  vol1       -                ENABLED ACTIVE  4196448  ROUND  -
fsgen
pl pl1        vol1            ENABLED ACTIVE  4196448  CONCAT -
RW
sd disk3-01   pl1            disk3    0        2098224  0        c1t3d0
ENA
sd disk3-02   pl1            disk3    2098224  2098224  2098224  c1t3d0
ENA
```

4. Remove the evacuated disks from VERITAS Volume Manager control.

```
# vxdisk -g voldg list
DEVICE      TYPE      DISK      GROUP      STATUS
c1t3d0s2    sliced    disk3     voldg      online
c1t12d0s2    sliced    disk1     voldg      online
c1t14d0s2    sliced    disk2     voldg      online

# vxdg rmdisk disk1
# vxdg rmdisk disk2
# vxdisk rm c1t12d0
# vxdisk rm c1t14d0
```

5. Verify that the evacuated disks have been removed from VERITAS Volume Manager control.

```
# vxdisk -g voldg list
DEVICE      TYPE      DISK      GROUP      STATUS
c1t3d0s2    sliced    disk3     voldg      online
```

6. Check to see whether the volume you want to move first is mounted.

```
# mount | grep vol1
/vol1 on /dev/vx/dsk/voldg/vol1
read/write/setuid/log/nolargefiles/dev=12dc138 on Wed Apr  3
10:13:11 2002
```

7. Create a partition on free disk space of the same size as the volume. In this example, a 2G partition is created on disk1 (c1t12d0s1).

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
```



```

0. c0t0d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
  /sbus@1f,0/SUNW,fas@e,8800000/sd@0,0
1. c1t3d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@3,0
2. c1t9d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@9,0
3. c1t10d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@a,0
4. c1t11d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@b,0
5. c1t12d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@c,0
6. c1t14d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@e,0
7. c1t15d0 <QUANTUM-ATLASIV9SCA-0808 cyl 13814 alt 2 hd 4 sec 324>
  /sbus@1f,0/SUNW,fas@2,8800000/sd@f,0
Specify disk (enter its number): 5
selecting c1t12d0
[disk formatted]

```

#### FORMAT MENU:

```

disk      - select a disk
type      - select (define) a disk type
partition - select (define) a partition table
current   - describe the current disk
format    - format and analyze the disk
repair    - repair a defective sector
label     - write label to the disk
analyze   - surface analysis
defect    - defect list management
backup    - search for backup labels
verify    - read and display labels
save      - save new disk/partition definitions
inquiry   - show vendor, product and revision
volname   - set 8-character volume name
!<cmd>    - execute <cmd>, then return
quit
format> p

```

#### PARTITION MENU:

```

0      - change `0' partition
1      - change `1' partition
2      - change `2' partition
3      - change `3' partition
4      - change `4' partition
5      - change `5' partition
6      - change `6' partition
7      - change `7' partition
select - select a predefined table
modify - modify a predefined partition table
name   - name the current table
print  - display the current table
label  - write partition map and label to the disk
!<cmd> - execute <cmd>, then return

```



```

quit
partition> l
Part      Tag      Flag      Cylinders      Size      Blocks
  1 unassigned    wm          0          0      (0/0/0)          0
Enter partition id tag[unassigned]:
Enter partition permission flags[wm]:
Enter new starting cyl[0]:
Enter partition size[0b, 0c, 0.00mb, 0.00gb]: 2.00gb
partition> l
Ready to label disk, continue? y

partition> p
Current partition table (unnamed):
Total disk cylinders available: 13814 + 2 (reserved cylinders)

Part      Tag      Flag      Cylinders      Size      Blocks
  0 unassigned    wm          0          0      (0/0/0)          0
  1 unassigned    wm      0 - 3236      2.00GB      (3237/0/0)    4195152
partition> q

```

8. Copy the data on vol01 to the newly created disk partition.

```
# dd if=/dev/vx/dsk/voldg/vol01 of=/dev/dsk/clt12d0s1
```

9. In the /etc/vfstab file, remove the following entry.

```
/dev/vx/dsk/voldg/vol1 /dev/vx/rdisk/voldg/vol1 /vol1 vxfs 4 yes rw
```

10. Replace it with an entry for the newly created partition.

```
/dev/dsk/clt12d0s1 /dev/rdsk/clt12d0s1 /vol01 vxfs 4 yes rw
```

11. Mount the disk partition.

```
# mount -F vxfs /dev/dsk/clt12d0s1 /vol01
```

12. Remove vol01 from VERITAS Volume Manager.

```
# vxedit -rf rm /dev/vx/dsk/voldg/vol01
```

13. Remove any disks that have become free (those having no subdisks defined on them) by removing the volumes from VERITAS Volume Manager control.

To check if there are still some subdisks remaining on a particular disk, use the command:

```
# vxprint -F '%snum' diskname
```

If the output is not 0, there are still some subdisks on this disk that you need to remove. If the output is 0, remove the disk from VERITAS Volume Manager control as follows:

```
# vxvg rmdisk diskname
```



---

```
# vxdisk rm devname
```

Use the free space created for adding the data from the next volume you want to remove.

14. After you successfully convert all volumes into disk partitions, reboot the system.
15. After the reboot, make sure none of the volumes are open by using the following command:

```
# vxprint -Aht -e v_open
```

# Index

---

- A**
  - A5x00 devices 16
  - AP (alternate pathing) 17
  - array support libraries 17
- B**
  - boot disk
    - encapsulation requirements 11
  - bootdg 43
- C**
  - cluster functionality
    - enabling 49, 107
    - environment requirements 18
    - shared disks 107
  - configuration daemon (vxconfigd), starting 46
  - configuring
    - new disks 108
    - shared disks 107
  - controllers, mirroring guidelines 105
  - CVM
    - protocol version 92
- D**
  - daemons, checking 46, 89
  - data
    - protecting 112
  - default disk group 43, 92
  - defaultdg 43, 92
  - deleting VxVM packages 96
  - devices
    - suppress devices 44
  - disk drives
    - variable geometry 104
  - disk group
    - version 92
  - disk groups
    - bootdg 43
    - default 43
    - default disk group 92
    - nodg 43
    - root 43, 92
    - rootdg 42, 43, 92
  - disks
    - partitioning on Sun StorEdge 6120/6320 arrays 17
    - placing in other disk group 111
    - stripe unit size 104
    - types of 10
  - DMP
    - prevent multipathing 44
  - DMP (dynamic multipathing)
    - AP co-existence 17
    - preventing 44
    - SENA category devices 16
  - driver, VxDMP 52
  - DRL guidelines 105
- E**
  - encapsulated disks 10
- G**
  - guidelines
    - DRL 105
    - mirroring 105
    - RAID-5 106
- H**
  - hot-relocation 102, 111
- I**
  - I/O daemon (vxiod), starting 47
  - If 92
  - initialized disks 10
  - installation
    - language CDs 38, 90
    - overview 25
    - packages 26
    - using pkgadd 28



---

- installation menu 20
- installation script 21
- installing
  - using installvm 32
  - VEA client (Windows) 37
- installvm
  - installation using 32
  - upgrading using 61

## L

- language packs
  - removal 97
- license keys, obtaining 5
- license, viewing 6
- licensing
  - removing previous licensing packages 31
- log subdisks 105

## M

- MANPATH variable 9
- mirroring
  - guidelines 105
  - root disk 112
- mirroring controllers 105

## N

- new disks, configuring 108
- nodg 43

## O

- overlapped seeks 105

## P

- packages
  - listed 26
  - space requirements 8
  - VRTSfmpro 26
  - VRTSvmpro 2, 26
- patches
  - A5x00 devices 16
  - installing 30, 66, 70, 75, 80, 85
- patchrm 98
- PATH variable 9
- pkgadd 60, 64, 68, 72, 82
- pkgrm command 96
- Prevent Multipathing/Suppress Devices
  - from VxVM's view 44
- preventive maintenance 112
- processes, checking 46, 89
- protecting data 112

## R

- RAID-5
  - guidelines 106
- removing VxVM packages 96
- restoring VxVM configuration 99
- root disk
  - alternate 112
- root disk group 42, 43, 92
- rootdg 43, 92

## S

- SANs, configuring 19
- shared disks, configuring 107
- shutting down VxVM 95
- Solaris upgrade 57
- starting vxconfigd configuration daemon 46
- starting vxiod daemon 47
- stripe unit size recommendations 104
- striping guidelines 104
- subdisks
  - physical disk placement 106
  - RAID-5 plex, configuring 106
- support matrix
  - VxVM and Solaris 57
- suppress devices 44
- swap relocation 11

## T

- The 96

## U

- uninstallinfr 96
- upgrade
  - alternate pathing enabled 52
  - checking 89
  - overview 51
  - planning 53
  - preparation 51
- upgrade paths 57
- upgrading
  - clustered environment 109
  - encapsulated root disk 64
  - root disk encapsulated 64
  - sing the installvm script 61
  - VxVM and Solaris 60, 77
  - VxVM only 60
  - VxVM with AP 52
- upgrading to 4.0 55

## V

- VEA

---

client, starting 48  
coexistence with VMSA 36  
installation 35  
VEA client (Windows), installing 37  
volume length, RAID-5 guidelines 106  
volumes  
    DRL 105  
VRTSexplorer xi  
vxconfigd configuration daemon,  
    starting 46  
vxdctl mode command 47  
VxDMP driver 52  
vxinstall program 42, 43, 44, 46  
vxinstall program, running 42  
vxiod I/O daemon, starting 47  
VxVM  
    obtaining system information xi  
VxVM configuration  
    restoring 99  
VxVM packages, removing 96

