VERITAS

VERITAS Storage Foundation™ 4.1

Installation Guide

Solaris x64 Platform Edition

Maintenance Pack 1

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VERITAS Software Corporation
350 Ellis Street
Mountain View, CA 94043
USA
Phone 650–527–8000 Fax 650–527–2908
www.veritas.com

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Contents

Preface

This guide provides information on installing, configuring, and uninstalling the components of the VERITAS Storage Foundation product.

Follow the instructions in this guide if you are installing one of the following products:

- VERITAS Storage Foundation (Basic, QuickStart, Standard, Enterprise, Standard HA, Enterprise HA Editions)
- VERITAS Volume Manager (VxVM)
- VERITAS File System (VxFS)
- VERITAS Enterprise Administrator

All Storage Foundation product installation information has been combined in this document in this release. For more information, see "Preinstallation Instructions" on page 1.

Note If you are installing VERITAS Volume Replicator (VVR), see the *VERITAS Volume Replicator Installation Guide* on the product disc. The *VERITAS Volume Replicator Installation Guide* explains how to install the product and directs you to the VERITAS Volume Replicator documentation.

How to Use This Guide

This guide describes how to install, upgrade, configure, and remove the VERITAS Storage Foundation software including VERITAS Volume Manager and VERITAS File System.

This guide assumes that the user has a:

- basic understanding of system and database administration
- working knowledge of the operating system
- general understanding of file systems
- general understanding of virtual device of Volume Manager

What's In This Guide?

This guide is organized as follows:

- Chapter 1. "Preinstallation Instructions" on page 1 describes the licensing, product, and system requirements for installing and using the VERITAS Storage Foundation software.
- Chapter 2. "Installing the VERITAS Software" on page 17 provides the installation procedures for the VERITAS Storage Foundation software including VERITAS Volume Manager and VERITAS File System.
- Chapter 3. "Upgrading the VERITAS Software" on page 55 provides procedures for upgrading the VERITAS Storage Foundation software.
- Chapter 4. "Configuring the VERITAS Software" on page 57 describes how to configure the VERITAS Storage Foundation software.
- Chapter 5. "Uninstalling the VERITAS Software" on page 77 provides the uninstallation procedures for the VERITAS Storage Foundation software.
- Appendix A. "VERITAS Storage Foundation Basic" on page 93 provides the installation, upgrade, and uninstallation procedures for the VERITAS Storage Foundation Basic software.
- Appendix B. "Installation Script Options" on page 109 describes the options available if you choose to install using the installation script instead of the product installer.

Conventions

Convention	Usage	Example
`monospace`	Used for path names, commands, output, directory and file names, functions, and parameters.	Read tunables from the `/etc/vx/tunefstab` file. See the `ls`(1) manual page for more information.
`monospace` (**`bold`**)	Indicates user input.	# **`ls pubs`** C:\> **`dir pubs`**
italic	Identifies book titles, new terms, emphasized text, and variables replaced with a name or value.	See the *User's Guide* for details. The variable *system_name* indicates the system on which to enter the command.
bold	Depicts GUI objects, such as fields, list boxes, menu selections, etc. Also depicts GUI commands.	Enter your password in the **Password** field. Press **Return.**
blue text	Indicates hypertext links.	See "Getting Help" on page xiv.
#	Unix superuser prompt (all shells).	# **`cp /pubs/4.1/user_book /release_mgnt/4.1/archive`**
C:\>	Windows user prompt.	C:\> **`copy \pubs\4.1\user_book c:\release_mgnt\4.1\archive`**

Getting Help

For technical assistance, visit http://support.veritas.com and select phone or email support. This site also provides access to resources such as TechNotes, product alerts, software downloads, hardware compatibility lists, and the VERITAS customer email notification service. Use the Knowledge Base Search feature to access additional product information, including current and past releases of product documentation.

Diagnostic tools are also available to assist in troubleshooting problems associated with the product. These tools are available on disc or can be downloaded from the VERITAS FTP site. See the `README.VRTSspt` file in the `/support` directory for details.

For license information, software updates and sales contacts, visit https://my.veritas.com/productcenter/ContactVeritas.jsp. For information on purchasing product documentation, visit http://webstore.veritas.com.

Documentation Feedback

Your feedback on product documentation is important to us. Send suggestions for improvements and reports on errors or omissions to foundation_docs@veritas.com. Include the title and part number of the document (located in the lower left corner of the title page), and chapter and section titles of the text on which you are reporting. Our goal is to ensure customer satisfaction by providing effective, quality documentation. For assistance with topics other than documentation, visit http://support.veritas.com.

Preinstallation Instructions 1

Follow the preinstallation instructions outlined in this chapter if you are installing one of the following VERITAS Storage Foundation products:

- VERITAS Storage Foundation (Basic, QuickStart, Standard, Enterprise, Standard HA, Enterprise HA Editions)
- VERITAS Volume Manager
- VERITAS File System
- VERITAS Enterprise Administrator

Note If you are installing VERITAS Volume Replicator, see the *VERITAS Volume Replicator Installation Guide* on the product disc. The *VERITAS Volume Replicator Installation Guide* explains how to install the product and directs you to the VERITAS Volume Replicator documentation.

After reviewing the information in this chapter, see "Installing the VERITAS Software" on page 17 for information on installing the software for the first time.

Topics covered in this chapter include:

Product Summary

The following table lists the VERITAS products that are available with the Storage Foundation software.

Storage Foundation Version	Products and Features
Storage Foundation Basic	VERITAS File System VERITAS Volume Manager
Storage Foundation QuickStart	VERITAS File System (Base feature set) VERITAS Volume Manager (Base feature set)
Storage Foundation Standard	VERITAS File System VERITAS Volume Manager **Optionally licensed features:** VERITAS Volume Replicator
Storage Foundation Enterprise	VERITAS File System VERITAS Volume Manager VERITAS FlashSnap Option **Optionally licensed features:** VERITAS Volume Replicator
Storage Foundation Standard HA	VERITAS File System VERITAS Volume Manager VERITAS Cluster Server **Optionally licensed features:** VERITAS Volume Replicator
Storage Foundation Enterprise HA	VERITAS File System VERITAS Volume Manager VERITAS Cluster Server VERITAS FlashSnap Option **Optionally licensed features:** VERITAS Volume Replicator

Storage Foundation Version	Products and Features
Storage Foundation for Oracle	VERITAS File System VERITAS Volume Manager Veritas Quick I/O option Veritas Extension for Oracle Disk Manager option **Optionally licensed features:** Veritas Volume Replicator
Storage Foundation for Oracle Enterprise	Veritas File System Veritas Volume Manager Veritas FlashSnap Option Veritas Quick I/O option Veritas Extension for Oracle Disk Manager option Veritas Storage Checkpoint option Veritas Storage Mapping option **Optionally licensed features:** Veritas Volume Replicator
Storage Foundation for Oracle Enterprise HA	Veritas File System Veritas Volume Manager Veritas Cluster Server Veritas FlashSnap Option Veritas Quick I/O option Veritas Extension for Oracle Disk Manager option Veritas Storage Checkpoint option Veritas Storage Mapping option **Optionally licensed features:** Veritas Volume Replicator
Storage Foundation for Sybase	Veritas File System Veritas Volume Manager Veritas Quick I/O option **Optionally licensed features:** Veritas Volume Replicator
Storage Foundation for Sybase Enterprise	Veritas File System Veritas Volume Manager Veritas Quick I/O option Veritas FastResync option **Optionally licensed features:** Veritas Volume Replicator

Storage Foundation Version	Products and Features
Storage Foundation for Sybase Enterprise HA	Veritas File System Veritas Volume Manager Veritas Cluster Server Veritas Quick I/O option Veritas FastResync option **Optionally licensed features:** Veritas Volume Replicator

For a product overview of Storage Foundation products, see the *VERITAS Storage Foundation and High Availability Solutions Getting Started Guide*.

General Installation Requirements

Before installing VERITAS Storage Foundation, read the following sections to make sure you understand and comply with the basic requirements of the software.

Obtaining a License Key

VERITAS Storage Foundation is a licensed product. When you purchase VERITAS products, you receive a license key, which is required during installation. VERITAS Storage Foundation requires one license key for all the software packages included with the product and any optional features you may have purchased.

If you already have an evaluation license key for VERITAS Storage Foundation, you need to obtain a permanent license key when you purchase the product.

Note You must obtain your license key before using this product.

You can obtain your license key through the VERITAS vLicense Web site or by completing a License Key Request Form.

Using the VERITAS vLicense Web site

You can obtain your license key through the VERITAS vLicense Web site. To use the Web site, you need your customer number, order number, and serial number.

▼ To obtain a license key using the Web site

1. Use a web browser to access the VERITAS vLicense Web site.

   http://vlicense.veritas.com

2. Create a new login using your customer number, order number, and serial number.

   If you already have an account, you can log in.

3. Follow the instructions on the Web site.

You should receive your license key shortly. After receiving your license key, you can install the product.

Note For more information, see the *VERITAS Storage Foundation and High Availability Solutions Getting Started Guide.*

Using the License Key Request Form

You should have received a License Key Request Form when you purchased this product. If you do not have a License Key Request Form, contact your sales channel to purchase one.

▼ To obtain a license key using the License Key Request Form

1. Complete the License Key Request Form.

   The License Key Request Form requires you to provide your system's host ID and machine type. You can obtain the host ID using the following command:

   ```
   # /usr/sbin/sysdef -h
   ```

   You can obtain the machine type using the following command:

   ```
   # prtconf | head -5 | tail -1
   ```

2. Fax or email the form to VERITAS.

   - Email: license@veritas.com
   - Fax: 1-650-527-0952

   VERITAS will send you a license key by return fax or email.

During installation, you are prompted for the license key. If the software is already installed and you are upgrading or replacing an evaluation license with a permanent license, follow the instructions that accompany the license key to replace the old license with the new one.

Note Make a note of your license key somewhere other than on the computer, so that the key is available if the system becomes unbootable or requires reinstallation.

System Requirements

The following sections provide requirements that your system must meet before installing the VERITAS software.

Storage Foundation Basic

For Storage Foundation Basic system requirements, see "Storage Foundation Basic System Requirements" on page 95.

Dependencies

VERITAS Storage Foundation can only be installed on a system running Solaris 10 (64-bit). Installing this product on any other Solaris release will fail. If necessary, upgrade Solaris before you install the VERITAS products.

Software and Hardware Requirements

For information on hardware requirements, see the *VERITAS Volume Manager Hardware Notes*.

Oracle Requirements

The following list identifies the supported Oracle and Solaris combinations if you plan to use VERITAS Storage Foundation with an Oracle database:

Oracle Release	Solaris 10 (64-bit)
10.1.0.3.0 (32- bit)	Yes

Refer to the appropriate Oracle installation guide that accompanied your Oracle software for additional preinstallation information.

In order to use VERITAS Extension for Oracle Disk Manager, you must use Oracle9*i* release 9.2 or later. Refer to Oracle bug number 1824061 for more details.

To use the Storage Mapping functionality, you must install Oracle 9.2.0.3 or higher.

Sybase Requirements

The following table identifies the supported Sybase and Solaris combinations if you plan to use VERITAS Storage Foundation with a Sybase database:

Sybase Release	Solaris 10 (64-bit)
12.5.2 and later versions	Yes

Refer to the appropriate Sybase installation guide that accompanied your Sybase software for additional information.

Disk Space

Before installing the software, confirm that there is sufficient disk space in the file systems on the target systems. You can use the **Precheck** option, in the product installer, to make sure that sufficient disk space is available.

The following table shows the approximate disk space used by the Storage Foundation products for all (both the required and optional) packages:

Product Name	/ root	/opt	/usr	/var
Storage Foundation QuickStart	52 MB	550 MB	92 MB	24 MB
Storage Foundation Standard	52 MB	550 MB	92 MB	24 MB
Storage Foundation Enterprise	52 MB	550 MB	92 MB	24 MB
Storage Foundation Standard HA	57 MB	962 MB	106 MB	53 MB
Storage Foundation Enterprise HA	57 MB	962 MB	106 MB	53 MB
Storage Foundation for Oracle Standard	52 MB	558 MB	92 MB	24 MB
Storage Foundation for Oracle Enterprise	52 MB	558 MB	92 MB	24 MB
Storage Foundation for Oracle Enterprise HA	57 MB	975 MB	106 MB	56 MB
Storage Foundation for Sybase Standard	52 MB	565 MB	92 MB	24 MB
Storage Foundation for Sybase Enterprise	52 MB	565 MB	92 MB	24 MB
Storage Foundation for Sybase Enterprise HA	57 MB	980 MB	106 MB	53 MB

The following table shows the suggested *approximate* space requirements for each package:

Package	Contents	Size
Volume Manager Packages		
`VRTSvxvm`	VERITAS Volume Manager, Binaries	232 MB
`VRTSvmpro`	VERITAS Volume Manager Management Services Provider	20.5 MB

Package	Contents	Size
VRTSalloc	VERITAS Volume Manager: VERITAS Intelligent Storage Provisioning	64.5 MB
VRTSvmdoc	VERITAS Volume Manager Documentation (optional)	16 MB
VRTSvmman	VERITAS Volume Manager -Manual Pages (optional)	3.5 MB
File System Packages		
VRTSvxfs	VERITAS File System	38 MB
VRTSfspro	VERITAS File System Management Services Provider	199 MB
VRTSfssdk	VERITAS File System Software Developer Kit	2.5 MB
VRTSfsdoc	VERITAS File System Documentation (optional)	3.5 MB
VRTSfsman	VERITAS File System - Manual Pages (optional)	2.5 MB
VRTSfsmnd	VERITAS File System Software Developer Kit Manual Pages (optional)	4.5 MB
VERITAS Enterprise Administrator Packages		
VRTSob	VERITAS Enterprise Administrator Service	27.5 MB
VRTSmuob	VERITAS Enterprise Administrator Service Localized Package	.02 MB
VRTSobgui	VERITAS Enterprise Administrator (optional)	80 MB
Infrastructure Packages		
VRTSddlpr	VERITAS Device Discovery Layer Services Provider	20.5 MB
VRTSap	VERITAS Action Provider (optional) **Note** VRTSap is the rules engine add-on for the VERITAS Enterprise Administrator GUI. Installing VRTSap enables SNMP trap and email	36 MB

Package	Contents	Size
VRTStep	VERITAS Task Execution Provider (optional) **Note** VRTStep provides the command execution add-on for the VERITAS Enterprise Administrator GUI. Installing VRTStep and VRTSap enables command execution in response to an alert.	7.2 MB
Miscellaneous Packages		
VRTSvlic	VERITAS License Utilities	3 MB
VRTSperl	Perl 5.8.0 for VERITAS	34.5 MB
VRTScpi	VERITAS Cross Product Installation Framework	1 MB
windows/VRTSobgui.msi	VERITAS Enterprise Administrator for Windows	19 MB
Total space for all packages		662.02 MB
Total space for required packages		795.72 MB
Volume Manager Packages		

Product Space requirements for Japanese Language Packages

Package	Contents	Size
VRTSmuvmp	VERITAS Volume Manager Provider (VRTSvmpro) Japanese Package	3.9 MB
VRTSmualc	VERITAS Intelligent Storage Provisioning (VRTSalloc) Multi-language Package	1.2 MB
VRTSmuddl	VERITAS Device Discovery Layer Provider (VRTSddlpr) Multi-language Package	0.13 MB
VRTSjavmc	VERITAS Volume Manager (VRTSvxvm) Multi-language Package	2.8 MB
VRTSjavmd	VERITAS Volume Manager Japanese Document Package	24.5 MB

Product Space requirements for Japanese Language Packages

Package	Contents	Size
VRTSjavmm	VERITAS Volume Manager Japanese Online Manual Document Package	3.5 MB
VRTSmufsp	VERITAS File System Provider (VRTSfspro) Multi-language Package	0.64 MB
VRTSjafsc	VERITAS File System (VRTSvxfs) Japanese Language Package	1 MB
VRTSjafsd	VERITAS File System Japanese Document Package	0.76 MB
VRTSfajsm	VERITAS File System Japanese Online Manual Document Package	1.6 MB
VRTSmuap	VERITAS Action Provider Language Package	0.75 MB
VRTSmulic	Multi-language VERITAS License Utilities	2.01 MB
VRTSmutep	VERITAS Task Exec Provider Language Package	0.03 MB
VRTSmuobg (Windows client only)	VERITAS Enterprise Administrator Localized GUI Package	2.43 MB
VRTSjadbe	VERITAS Storage Foundation *for Oracle* (VRTSdbed) Japanese Package	1.305 Mb
VRTSjaorg	VERITAS Storage Foundation *for Oracle* Graphical User Interface (VRTSorgui) Japanese Package	0.961 Mb
VRTSjaodm	VERITAS Oracle Disk Manager (VRTSodm), Japanese Package	0.064 Mb
VRTSjamsa	VERITAS VxMS Mapping Service (VRTSvxmsa) Japanese Package	0.05 Mb
VRTSjadbd	Japanese VERITAS Storage Foundation Documentation for Databases	0.5 Mb
Total space required for Solaris packages		66.18 MB

/opt Directory

The directory /opt must exist, be writable and must not be a symbolic link. When upgrading, volumes not temporarily converted by the upgrade_start script 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.

Environment Variables

Most of the commands used in the installation are in the /sbin or /usr/sbin directory. However, there are additional variables needed to use the VERITAS Storage Foundation product after installation. Add the following directories to your PATH environment variable:

- If you are using Bourne or Korn shell (sh or ksh), use the commands:

```
$ PATH=$PATH:/usr/sbin:/opt/VRTS/bin:/opt/VRTSvxfs/sbin:\
  /opt/VRTSob/bin
$ MANPATH=/usr/share/man:/opt/VRTS/man:$MANPATH
$ export PATH MANPATH
```

- If you are using a C shell (csh or tcsh), use the commands:

```
% set path = ( $path /usr/sbin /opt/VRTS/bin /opt/VRTSvxfs/sbin \
  /opt/VRTSob/bin )
% setenv MANPATH /usr/share/man:/opt/VRTS/man:$MANPATH
```

Release Notes

Read the *Release Notes* for all products included with this product. Portable Document Format (.pdf) versions of the *Release Notes* are included on the software disc in the storage_foundation/release_notes directory.

Because product *Release Notes* are not installed by any packages, VERITAS recommends that you copy them from the disc to the /opt/VRTS/docs directory on your system so that they are available for future reference.

VERITAS Volume Manager Requirements

Review the following Volume Manager-related items before installing or upgrading VERITAS Storage Foundation or VERITAS Volume Manager.

Taking a Disk Inventory

Selecting 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).

   _____
   _____
   _____

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

Disk ID	Encapsulate, Initialize, Exclude

Note In this release the root disk cannot be encapsulated.

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.

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.

Excluding Disks

It is possible to configure the `vxdiskadm` utility not to list certain disks or controllers as being available. For example, this may be useful in a SAN environment where disk enclosures are visible to a number of separate systems.

▼ To exclude a device from the view of VxVM

- Select `Prevent multipathing/Suppress devices from VxVM's view` option from the `vxdiskadm` main menu.

  See "Disabling and Enabling Multipathing for Specific Devices" in the "Administering Dynamic Multipathing (DMP)" chapter of the *VERITAS Volume Manager Administrator's Guide* for details.

Array Support Libraries

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*.

Disabling Hot-Relocation

The hot-relocation feature detects disk failure automatically, notifies you of the nature of the failure, attempts to relocate any affected subdisks that are redundant, and initiates recovery procedures.

The hot-relocation feature is enabled by default and it is recommended that you leave it on. However, if you need to disable it for some reason (for example, you do not want the free space on some of your disks used for relocation), you can do so by preventing the `vxrelocd` daemon from starting during system startup. Disable hot-relocation only after you install the VERITAS Volume Manager packages.

▼ To disable hot-relocation

1. Comment out the `vxrelocd` line in the startup file `/etc/rc2.d/S95vxvm-recover`, as follows:

```
# vxrelocd root &
```


2. After editing the file, you can kill the `vxrelocd` process or reboot the system.

Note If you disable hot-relocation, you are not notified by electronic mail of any failures that occur. This is because `vxrelocd` is responsible for notifying the system administrator of failures.

For more information on hot-relocation and `vxrelocd`, refer to the `vxrelocd` (1M) manual page.

VERITAS Enterprise Administrator

VERITAS Storage Foundation must be installed and run on a UNIX (Solaris) machine. The VERITAS Enterprise Administrator (VEA) client can be installed and run on any Solaris, Windows NT, Windows ME, Windows 2000, or Windows 98 machine that supports the Java Runtime Environment.

VERITAS Enterprise Administrator (VEA) is required to access the graphical user interface (GUI) for VERITAS Storage Foundation. You can use the GUI to administer disks, volumes, file systems, and database functionality on local or remote machines.

One of the following VEA packages needs to be installed and running on the client:

`VRTSobgui`	Client package for Solaris.
`windows/VRTSobgui.msi`	Client package for Windows.

See the *VERITAS Storage Foundation Release Notes* for patch information before you install VEA.

Requirements

The following are minimum system recommendations for the GUI:

Solaris	x64 system with 256MB memory
Windows XP, NT, Me, 2000, or 98	300MHz Pentium with 256MB memory

To install the VEA client on Solaris 8, you must install the appropriate java 1.4.1 patches for Solaris 8. See http://support.veritas.com/docs/264714 for more information.

Installing the VERITAS Software 2

This chapter provides an overview of the installation tasks for VERITAS Storage Foundation products and describes how to install the packages for the first time.

Topics covered in this chapter include:

Note Only users with superuser (root) privileges can install VERITAS products.

Installation Requirements

VERITAS software and operating system installation requirements are described in the following sections.

Remote Installation

The installation program installs the VERITAS Storage Foundation product that you are installing under the `/opt` directory on the specified host systems. It is advisable that `/opt` be an independently mounted volume and not a subdirectory, but this is not a requirement.

Installation on multiple hosts can be streamlined by copying the contents of the `/pkgs` directory from the VERITAS software disc to an NFS mounted file system. If you choose to install with an installation script instead of the VERITAS product installer, use the `-pkgpath` option. For installation on remote hosts, a secure client (`ssh`) or remote shell (`rsh`) is required. If you are installing VERITAS Storage Foundation on a single host, `ssh` or `rsh` is not required.

Configuring ssh

The `installsf`, `installsfora`, and `installsfsyb` scripts can perform remote installations using `ssh` as its communication mechanism if it is configured to operate in non-interactive mode (that is, without prompting for passwords or confirmations). See the operating system administration guide or the `ssh`(1) online manual page for configuration information.

Caution The `installsf`, `installsfora`, and `installsfsyb` scripts cannot be used with versions of `ssh` that do not use the `PubkeyAuthorization` password.

Configuring rsh

To verify that `rsh` is working between systems, enter the following command on the system where you are initiating the installation:

```
# rsh hostname "ls -l"
```

A list of files on the remote machine should be displayed.

If `rsh` is not working, create the `.rhosts` file with the following entry in the root (`/`) directory on the remote machine:

```
#.rhosts
server_name root
```

Note If `rsh` is not working and the steps above do not correct the problem, `rsh` may have been disabled for security reasons.

Operating System

If patches to the Solaris operating system are required, the patches should be applied just prior to installing the VERITAS products. Patches may be required to resolve Solaris kernel, product performance, or other issues.

The system should be in a quiescent state before adding patches.

Note See product *Release Notes* for last minute information on patches that are required for VERITAS products and Solaris to work properly.

Summary of VERITAS Storage Foundation Installation Tasks

Installation of VERITAS Storage Foundation products consists of the following tasks:

- Reviewing *Release Notes* for the most latest product information regarding packages and patches.
- Reviewing preinstallation requirements (see "Preinstallation Instructions" on page 1) and making any necessary modifications.
- Adding Solaris operating system patches, if needed. Refer to the *Release Notes* for specific software patch information.
- Obtaining a license key.
- Installing the VERITAS Storage Foundation software packages and patches. For new installations, use the instructions in this chapter. For upgrades, see "Upgrading the VERITAS Software" on page 55.

After you complete the installation procedure, read"Configuring the VERITAS Software" on page 57 for important details about initializing, setting up, and using the VERITAS software shipped with the VERITAS Storage Foundation products.

Note Installing VERITAS Storage Foundation using the product installer will automatically configure the software. If you install using an alternative method, you will have to run the product installer to configure the software.

Installing the VERITAS Storage Foundation Software

This section describes how to install the VERITAS Storage Foundation products for the first time.

Mounting the Software Disc

You must have superuser (root) privileges to load the VERITAS software.

▼ To mount the software disc

1. Log in as superuser (root).
2. Insert the appropriate media disc into your system's CD-ROM drive connected to your system.
3. If Solaris volume management software is running on your system, the software disc is automatically mounted as `/cdrom/cdrom0`.

VERITAS Storage Foundation Installation Paths

To install, use one of the following procedures:

To install	See
VERITAS Storage Foundation Basic	"VERITAS Storage Foundation Basic" on page 93
VERITAS Storage Foundation QuickStart	"Installing VERITAS Storage Foundation Using the Product Installer" on page 23
VERITAS Storage Foundation Standard VERITAS Storage Foundation *for Oracle* VERITAS Storage Foundation *for Sybase*	"Installing VERITAS Storage Foundation Using the Product Installer" on page 23
VERITAS Storage Foundation Enterprise VERITAS Storage Foundation *for Oracle* VERITAS Storage Foundation *for Sybase*	"Installing VERITAS Storage Foundation Using the Product Installer" on page 23
VERITAS Storage Foundation Standard High Availability VERITAS Storage Foundation *for Oracle* VERITAS Storage Foundation *for Sybase*	"Installing VERITAS Storage Foundation Using the Product Installer" on page 23
VERITAS Storage Foundation Enterprise High Availability VERITAS Storage Foundation *for Oracle* VERITAS Storage Foundation *for Sybase*	"Installing VERITAS Storage Foundation Using the Product Installer" on page 23
VERITAS Enterprise Administrator Client	"Installing VERITAS Enterprise Administrator Client on Windows" on page 29
VERITAS Volume Manager	"Installing VERITAS Volume Manager" on page 30
VERITAS File System	"Installing VERITAS File System" on page 33

Installing VERITAS Storage Foundation Using the Product Installer

The product installer is the recommended method to license and install the product. The installer also enables you to configure the product, verify preinstallation requirements, and view the product's description. See the "Storage Foundation Getting Started Guide" for information about the recommended preinstall check before beginning the installation procedure.

At most points during an installation, you can type **b** ("**back**") to return to a previous section of the installation procedure. The **back** feature of the 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.

The following sample procedure is based on the installation of the VERITAS Storage Foundation software on two systems: "host1" and "host2." If you are installing on standalone systems only, some steps are unnecessary, and these are indicated. Default responses are enclosed by parentheses. Press Return to accept defaults.

▼ To install the Storage Foundation Product

1. Insert the appropriate VERITAS Storage Foundation disc into your system's CD-ROM drive.

2. To invoke the common installer, run the `installer` command on the disc as shown in this example:

```
# cd /cdrom/cdrom0
# ./installer
```

3. If the `VRTSvlic` licensing package is installed, the Product Status page displays 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 Product Status page, enter **`I`** for the `Install/Upgrade a Product` and press Return. The product installer is displayed.

5. At the VERITAS product installer page, enter **2** to choose the Storage Foundation for Oracle option and press Enter. Enter **4** to choose the Storage Foundation for Sybase option and press Enter. You can enter **6** to choose the Storage Foundation option and press Enter.

   The product installation begins automatically.

6. When you are prompted to enter the system names on which the software is to be installed, enter the system name or names and then press Enter to continue.

7. After the script checks your system configuration, press Enter. The utility begins installing the infrastructure packages.

8. During license verification, you are prompted to enter a license key. Select **y** to add a license key. Then, enter the license key and press Enter.

Note Each system requires a Storage Foundation product license before installation. License keys for additional product features should also be added at this time.

```
SF Licensing Verification:

Checking SF license key on host1 ................. not licensed
Enter a SF license key for host1: [?]
XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-X
Registering VERITAS Storage Foundation key on host1

Do you want to enter another license key for host1? [y,n,q,?] (n) n

Registering XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-X on host1
Checking SF license key on host1 .......Storage Foundation

Do you want to enter another license key for host1? [y,n,q,?] (n) n

Enter n if you have no further license keys to add for a system.
You are then prompted to enter the keys for the next system. The
following prompt is displayed when you have added licenses to all
the systems. Press Enter to continue.
```

9. A list of optional packages is now displayed. Enter **1** or press Enter to install the standard and all optional packages.

```
1)  Install all of the optional filesets
2)  Install none of the optional filesets
3)  View fileset descriptions and select optional filesets
```

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

Note The list of optional filesets may differ depending on the license keys that you entered in step 7.

The utility lists the packages to be installed. Press Enter to continue listing the packages.

10. Press Enter. The utility begins checking the installation requirements for each of the hosts.

11. If you are installing the Storage Foundation HA proceed to "Configuring VERITAS Storage Foundation on a Cluster" on page 38.

12. If you are installing the Storage Foundation proceed to step 13.

13. As the utility continues the procedure, you are prompted to choose whether to install on all systems simultaneously. Enter **y** or press Enter to accept simultaneous installation.

```
Would you like to install Storage Foundation on all systems
simultaneously? [y,n,q,?] (y) y

Installing Storage Foundation 4.1 on all systems simultaneously:

Copying VRTSperl.rte.bff.gz to host2 ..... Done 1 of 102 steps
Installing VRTSperl 4.1 on host2 ..... Done 2 of 102 steps
Copying VRTSob.bff.gz to host2..... Done 3 of 102 steps
Installing VRTSperl 4.1 on host1 ..... Done 4 of 102 steps
Installing VRTSob 3.2.514.1 on host2 ..... Done 5 of 102 steps
Installing VRTSob 3.2.514.1 on host1 ..... Done 6 of 102 steps
.
.
.
```

14. A message displays notifying you of successful installation. Press Enter to continue.

```
Storage Foundation installation completed successfully.

Press [Return] to continue:
```


15. A message displays describing the VxVM enclosure-based naming scheme and showing which hosts are eligible. When prompted to configure this feature, enter **n** if you want to decline. If required, you can use the `vxdiskadm` command or the VERITAS Enterprise Administrator to configure this feature after installation. See the `vxdiskadm`(1M) manual page and the "Administering Disks" chapter of the *VERITAS Volume Manager Administrator's Guide* for more information.

16. A message displays indicating which systems can be started and on the systems that VxVM selects as targets.

```
Evaluating which systems can now be started...

System host1 is eligible -- can be started.
System host2 is eligible -- can be started.

Preparing to start VxVM on target systems...

Begin initial start of VxVM on system host1
Starting vxconfigd for VxVM
Done with initial start of VxVM on system host1

Begin initial start of VxVM on system host2
Starting vxconfigd for VxVM .........................Succeeded
Done with initial start of VxVM on system host2

Done with starting VxVM on target systems...
```

17. You are now given the option of specifying the default name of a disk group that is to be assumed by VERITAS Volume Manager commands if a disk group is not otherwise specified.

```
Many Volume Manager commands affect the contents or configuration
of a disk group. Such commands require that the user specify a
disk group. This is accomplished by using the -g option of a
command or setting the VXVM_DEFAULTDG environment variable. An
alternative to these two methods is to configure the default disk
group of a system.

Evaluating which systems can now have their default disk group
configured...

System host1 is eligible -- can configure the default diskgroup.
System host2 is eligible -- can configure the default diskgroup.

Do you want to set up the default disk group for each system?
[y,n,q,?] (y) n
```

Enter **n** if you do not want to specify the name of the default disk group at this time. You can set the name of the default disk group after installation by running the `vxdctl defaultdg` *diskgroup* command on a system. See the `vxdctl`(1M) manual page and the "Creating and Administering Disk Groups" chapter of the *VERITAS Volume Manager Administrator's Guide* for more information.

Note If you specify the name of a default disk group, this step does not create the disk group. After installation, you can use menu item 1 in the `vxdiskadm` command or the VERITAS Enterprise Administrator to create the disk group.

18. Finally, a message displays indicating the utility is preparing to start the daemons on the target systems.

```
Preparing to start daemons on target system(s)...
Starting vxrelocd on host1 ......................... Success
Starting vxcached on host1 ......................... Success
Starting vxconfigbackupd on host1 .................. Success

Starting vxrelocd on host2......................... Success
Starting vxconfigbackupd on host2 .................. Success

Storage Foundation was started successfully.

Press [Return] to continue:
```

Press Enter. A message displays notifying you of a successful installation and the locations of the `/opt/VRTS/install` files.

```
The installation summary is saved at:

  /opt/VRTS/install/logs/installer610192714.summary

The installer log is saved at:

  /opt/VRTS/install/logs/installer610192714.log

The installation response file is saved at:

  /opt/VRTS/install/logs/installer610192714.response
```

Note Do not remove the log files until the VERITAS products are working properly on your system. Technical Support will need these log files for debugging purposes.

19. Halt and reboot the system.

```
# reboot
```

Installing VERITAS Enterprise Administrator Client on Windows

The VERITAS Enterprise AdmVEA 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 GUI 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. Insert the appropriate media disc into your system's CD-ROM drive.
2. Using Windows Explorer or a DOS Command window, go to the `/windows` directory and execute the `vrtsobgui.msi` program with Windows Installer.
3. Follow the instructions presented by the `vrtsobgui.msi` program.
4. 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 VERITAS Volume Manager

To install VERITAS Volume Manager only, use the steps in this section. If you purchased one of the Storage Foundation products, see "Installing the VERITAS Storage Foundation Software" on page 21.

Installing VxVM Using the pkgadd Command

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 "Installing VERITAS Enterprise Administrator Client on Windows" on page 29 for VEA client information.

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

Before installing VxVM, you must first mount the software disc; see "Mounting the Software Disc" on page 21 for instructions.

▼ To copy, uncompress and install the VxVM packages

1. 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/cdrom0/storage_foundation/pkgs/* pkgs
   # cp /cdrom/cdrom0/storage_foundation/scripts/VRTSobadmin pkgs
   ```

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

   ```
   # /cdrom/cdrom0/storage_foundation/scripts/install/gunzip \
     pkgs/*.gz
   ```

3. 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.

4. 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
```

The `VRTSobgui`, `VRTSvmman` and `VRTSvmdoc` packages are optional.

Text similar to the following displays during the installation procedure:

```
VERITAS Volume Manager (x64) 4.1,REV=4.1A14_sol
Copyright (c) 1991 - 2005 VERITAS SOFTWARE CORP. ALL RIGHTS
RESERVED. THIS SOFTWARE IS THE PROPERTY OF AND IS LICENSED BY
VERITAS SOFTWARE, AND/OR ITS SUPPLIERS.

## Executing checkinstall script.
Using </> as the package base directory.
## Processing package information.
## Processing system information.
   26 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
The following files are being installed with setuid and/or
setgid permissions:
.
.
.
Do you want to install these as setuid/setgid files [y,n,?,q]
```


5. Type **y** to install these files as `setuid/setgid` files and continue the installation.

```
This package contains scripts which will be executed with
super-user permission during the process of installing this
package.
Do you want to continue with the installation
of <VRTSvxvm> [y,n,?]
```

6. Type **y** to continue. The package installs the files listed on your screen and ends with:

```
Installation of <VRTSvxvm> was successful.
```

7. Symbolic links to the VxVM commands and the online manual pages are installed in the `/opt/VRTS/bin` directory and the `/opt/VRTS/man` directory, respectively. Be sure to add the command directory to the end of your PATH, and the manual page directory to your MANPATH environment variables (see "Command Installation Verification" on page 49 for information on other VxFS command path names).

8. Before rebooting the system and using VxVM, you must enter a license key. Enter the license installation command:

```
# vxlicinst
```

9. The system responds with a prompt for the license key. Enter a valid key as shown in the following example:

```
VERITAS License Manager vxlicinst utility version 3.02.001
Copyright (C) VERITAS Software Corp 2005. All Rights reserved.

Please enter your key: XXXX-XXXX-XXXX-XXXX-XXX-XX

License key installed successfully for VERITAS File System
```

10. For the required VxVM patches, refer to VERITAS Patches in the *VERITAS Storage Foundation Release Notes*. See "Installing VERITAS Patches" on page 37 for instructions on installing the VxFS patches.

11. Halt and reboot the system.

```
# reboot
```

After you have installed VxVM using `pkgadd`, you should proceed to set up and configure VxVM. For information on setting up VxVM disk groups and volumes after installation, see "Configuring VERITAS Volume Manager" in the *VERITAS Volume Manager Administrator's Guide.*

Installing VERITAS File System

To install VERITAS File System only, use the steps in this section. To install Storage Foundation products using the product installer, see “Installing the VERITAS Storage Foundation Software” on page 21.

Installing VxFS Using the pkgadd Command

▼ To copy, uncompress and install the VxFS packages

1. Insert the appropriate VERITAS Storage Foundation disc into your system’s CD-ROM drive. For more information, see “Mounting the Software Disc” on page 21.

2. Copy the contents of the `file_system/pkgs` directory to a directory on your system:

   ```
   # cp -r /cdrom/cdrom0/storage_foundation/pkgs .
   ```

3. Uncompress the compressed packages:

   ```
   # /cdrom/cdrom0/storage_foundation/scripts/install/gunzip *.gz
   ```

4. Extract each archived package that you want to install:

   ```
   # tar xv package_name.tar
   ```


5. To install VRTSvxfs using pkgadd, install the VERITAS license package and the VERITAS file system packages in the order shown:

```
# pkgadd -d installation_directory VRTSvlic VRTSob VRTSmuob \
VRTSobgui VRTSvxfs VRTStep VRTSap VRTSfspro VRTSfsman VRTSfsdoc \
VRTSfssdk VRTSfsmnd
```

The VRTSobgui, VRTStep, VRTSap, VRTSfsman, VRTSfsdoc, and VRTSfsmnd packages are optional.

Text similar to the following displays during the installation procedure:

```
VERITAS File System (x64) 4.1,REV=4.1A14_sol
Copyright (c) 1991 - 2005 VERITAS SOFTWARE CORP. ALL RIGHTS
RESERVED. THIS SOFTWARE IS THE PROPERTY OF AND IS LICENSED BY
VERITAS SOFTWARE, AND/OR ITS SUPPLIERS.

## Executing checkinstall script.
Using </> as the package base directory.
## Processing package information.
## Processing system information.
   26 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
The following files are being installed with setuid and/or
setgid permissions:

   /opt/VRTSvxfs/sbin/qioadmin <setuid root>
   /opt/VRTSvxfs/sbin/qiomkfile <setuid root>
   /opt/VRTSvxfs/sbin/vxdump <setuid root setgid tty>
   /opt/VRTSvxfs/sbin/vxquota <setuid root>
   /opt/VRTSvxfs/sbin/vxrestore <setuid root setgid bin>

Do you want to install these as setuid/setgid files [y,n,?,q]
```

6. Type **y** to install these files as setuid/setgid files and continue the installation.

```
This package contains scripts which will be executed with
super-user permission during the process of installing this
package.
Do you want to continue with the installation
of <VRTSvxfs> [y,n,?]
```

7. Type **y** to continue. The package installs the files listed on your screen and ends with:

```
Installation of <VRTSvxfs> was successful.

*** IMPORTANT NOTICE ***
This machine must now be rebooted to ensure sane operation.
Execute
        shutdown -y -i6 -g0
and wait for the "Console Login:" prompt.
```

8. Symbolic links to the VxFS commands and the online manual pages are installed in the `/opt/VRTS/bin` directory and the `/opt/VRTS/man` directory, respectively. Be sure to add the command directory to the end of your PATH, and the manual page directory to your MANPATH environment variables (see "Command Installation Verification" on page 49 for information on other VxFS command path names).

9. Before rebooting the system and using VxFS, you must enter a license key. Enter the license installation command:

```
# vxlicinst
```

10. The system responds with a prompt for the license key. Enter a valid key as shown in the following example:

```
VERITAS License Manager vxlicinst utility version 3.02.001
Copyright (C) VERITAS Software Corp 2005. All Rights reserved.

Please enter your key: XXXX-XXXX-XXXX-XXXX-XXX-XX

License key installed successfully for VERITAS File System
```

11. For the required VxFS patches refer to VERITAS Patches in the *VERITAS Storage Foundation Release Notes*. See "Installing VERITAS Patches" on page 37 for instructions on installing the VxFS patches.

12. Halt and reboot the system.

```
# reboot
```


13. The installation procedure modifies the `/etc/system` file by adding lines similar to the following:

```
* vxfs_START -- do not remove the following lines:
* VxFS requires a stack size greater than the default 8K.
* The following value allows the kernel stack size to be
* increased to 24K for Solaris 7, 8 and 9.
set lwp_default_stksize=0x6000
* vxfs_END
```

    The original `/etc/system` file is copied to `/etc/fs/vxfs/system.preinstall`. The modifications are removed during a `pkgrm`.

14. To check the installation, refer to "Verifying VxFS Installation" on page 48.

Installing VERITAS Patches

If you install VERITAS Storage Foundation using the installation script, patches are added for you. However, if you choose to install the product using `pkgadd`, you need to manually add the patches after installing.

You must have superuser (`root`) privileges to load the VERITAS software.

▼ To manually install VERITAS patches

1. Make sure the same media disc you used to install VERITAS Storage Foundation is in your CD-ROM drive and mounted.

2. Change to a desired directory on your system.

   ```
   # cd /working_directory
   ```

3. Copy all the patches from the `storage_foundation/patches` directory to the desired directory on your system. Repeat step 3 through step 5 for each patch.

   ```
   # cp /cdrom/cdrom0/storage_foundation/patches/patch_number.tar.qz .
   ```

4. Decompress and then extract the patch.

   ```
   # /cdrom/cdrom0/storage_foundation/scripts \
   /install/gunzip patch_number.tar.qz
   # tar xvf patch_number.tar
   ```

5. Install the patches individually using the `patchadd` command.

   ```
   # patchadd patch_number
   ```

6. Use the `showrev` command to verify patch installation.

   ```
   # showrev -p | grep patch_number
   ```

7. Shutdown and halt system:

   ```
   # reboot
   ```


Configuring VERITAS Storage Foundation on a Cluster

Note Use the procedure in this section if you are installing an HA version of the Storage Foundation software.

As the installation and configuration procedure continues, a message displays notifying you that configuring Storage Foundation at this point in the installation procedure is optional.

▼ To configure Storage Foundation on a cluster

1. At the following prompt, enter **y** or press Enter to configure Storage Foundation.

   ```
   Are you ready to configure SF? [y,n,q] (y) y
   ```

   A message is displayed describing how to configure Storage Foundation using the product installer.

2. Press Enter to continue. A message is displayed describing the VERITAS Cluster Server (VCS) configuration requirements.

3. You are then prompted to enter information about the cluster. Sample entries and output are based on the two-node cluster comprising "host1" and "host2." The redundant private network is configured over the network interfaces e1000g1 and e1000g0., and the public network connected via "bge0" is not used as a low priority heartbeat link.

```
Enter the unique Cluster name: [?] clustertest
Enter the unique Cluster ID number between 0-255: 5

Discovering NICs on host1..... discovered bge0 bge1 e1000g0
e1000g1

Enter the NIC for the first private heartbeat NIC on host1: [b,?]
e1000g0
Would you like to configure a second private heartbeat link?
[y,n,q,b,?] (y) y
Enter the NIC for the second private heartbeat NIC on host1: [b,?]
e1000g1
Would you like to configure a third private heartbeat link?
[y,n,q,b,?] (n) n
Do you want to configure an additional low priority heartbeat link?
[y,n,q,b,?] (n) n
Are you using the same NICs for private heartbeat links on all
systems? [y,n,q,b,?] (y) n

Discovering NICs on host2..... discovered bge0 bge1
e1000g0 e1000g1

Enter the NIC for the first private heartbeat NIC on host2: [b,?]
e1000g1
Would you like to configure a second private heartbeat link?
[y,n,q,b,?] (y) y
Enter the NIC for the second private heartbeat NIC on host2: [b,?]
e1000g0
Would you like to configure a third private heartbeat link?
[y,n,q,b,?] (n) n
```


4. The utility summarizes the cluster information. When prompted, enter **y** to confirm the information is correct. If the information displayed is not correct, enter **n** to re-enter the information.

```
Cluster information verification:

Cluster Name: clustertest
Cluster ID Number: 5
Private Heartbeat NICs for host1: link1=e1000g0 link2=e1000g1
Private Heartbeat NICs for host2: link1=e1000g0 link2=e1000g1

Is this information correct? [y,n,q] (y) y
```

5. A message displays notifying you of the information required to add VCS users. When prompted to add a password for the Administrator, enter **y** to set the password for the administrator. Enter **n** if you want to decline.

6. At the prompt, enter the password and press Enter. You are then asked to re-enter the password for verification.

7. When prompted to add a user, enter **y** to proceed. Enter **n** if you want to decline.

8. For each user, enter the following:
   - user name
   - password
   - password again (for verification)
   - privilege

9. When you have finished adding users, enter **n** when prompted to add another user. A summary of the newly added users displays. Press **y** to confirm the information. Press **n** to enter the information again.

10. A message displays notifying you of the configuration requirements for Cluster Manager (the VCS graphical user interface). When prompted to configure this feature, enter **y** to continue. Enter **n** if you want to decline.

11. When prompted for Cluster Manager information, enter details of the public NIC, virtual IP address, and network mask to be used by Cluster Manager.

12. A message displays notifying you of the configuration requirements for SMTP email notification. When prompted to configure this feature, enter **y** to proceed. Enter **n** if you want to decline.

13. When prompted, enter the following information for SMTP email notification:
    - SMTP server's host name
    - email address of each recipient
    - minimum security level of messages to be sent to each recipient
14. A message displays notifying you of the configuration requirements for SNMP trap notification. When prompted to configure this feature, enter **y** to proceed. Enter **n** if you want to decline.
15. When prompted, enter the following information for SNMP trap notification:
    - SNMP trap daemon port
    - SNMP console system name
    - minimum security level of messages to be sent to each console
16. Proceed to "Completing the Installation Procedure on an HA Environment" on page 42.

Completing the Installation Procedure on an HA Environment

At this point in the installation and configuration procedure, the utility begins to install the packages on one node and copy them to any other specified nodes. The following sample output is for a Storage Foundation Enterprise HA installation.

▼ To complete the installation procedure

1. As the utility continues the procedure, you are prompted to choose whether to install on all systems simultaneously. Enter **y** or press Enter to accept simultaneous installation.

   ```
   Would you like to install Storage Foundation Enterprise HA on all
   systems simultaneously? [y,n,q,?] (y) y

   Installing Storage Foundation Enterprise HA 4.1 on all systems
   simultaneously:

   Copying VRTSperl.rte.tar.gz to host2 ...... Done 1 of 102 steps
   Installing VRTSperl 4.1 on host2 ...... Done 2 of 102 steps
   Copying VRTSob.tar.gz to host2............. Done 3 of 102 steps
   Installing VRTSperl 4.1 on host1 ...... Done 4 of 102 steps
   Installing VRTSob 3.2.514.1 on host2 ...... Done 5 of 102 steps
   Installing VRTSob 3.2.514.1 on host1 ...... Done 6 of 102 steps
   .
   .
   .
   ```

2. A message displays notifying you of successful installation. Press Enter to continue.

   ```
   Storage Foundation Enterprise HA installation completed
   successfully.

   Press [Return] to continue:
   ```

3. A message displays describing the VxVM enclosure-based naming scheme and showing which nodes are eligible. When prompted to configure this feature, enter **n** if you want to decline. If required, you can use the `vxdiskadm` command or the VERITAS Enterprise Administrator to configure this feature after installation.

   See the `vxdiskadm`(1M) manual page and the "Administering Disks" chapter of the *VERITAS Volume Manager Administrator's Guide* for more information.

4. A message displays indicating the VCS configuration files are being created and copied. Press Enter to continue.

   A message displays indicating which systems can be started and on the systems that VxVM selects as targets.

```
Evaluating which systems can now be started...

System host1 is eligible -- can be started.
System host2 is eligible -- can be started.

Preparing to start VxVM on target systems...

Begin initial start of VxVM on system host1
Starting vxconfigd for VxVM
Done with initial start of VxVM on system host1

Begin initial start of VxVM on system host2
Starting vxconfigd for VxVM .............................Succeeded
Done with initial start of VxVM on system host2

Done with starting VxVM on target systems...
```

5. Press Enter to continue. A message displays notifying you that Cluster Server is starting. This message also contains information about configuring a default disk group.

```
Starting Cluster Server:

Starting LLT on host1 ............................... Started
Starting LLT on host2 ............................... Started
Starting GAB on host1 ............................... Started
Starting GAB on host2 ............................... Started
Starting Cluster Server on host1 ..................... Started
Starting Cluster Server on host2 ..................... Started
Confirming Cluster Server startup .............. 2 systems RUNNING
```


6. You are now given the option of specifying the default name of a disk group that is to be assumed by VERITAS Volume Manager commands if a disk group is not otherwise specified.

```
Many Volume Manager commands affect the contents or configuration
of a disk group. Such commands require that the user specify a disk
group. This is accomplished by using the -g option of a command or
setting the VXVM_DEFAULTDG environment variable. An alternative to
these two methods is to configure the default disk group of a
system.

Evaluating which systems can now have their default disk group
configured...

System host1 is eligible -- can configure the default diskgroup.
System host2 is eligible -- can configure the default diskgroup.

Do you want to set up the default disk group for each system?
[y,n,q,?] (y) n
```

Enter **n** if you do not want to specify the name of the default disk group at this time. You can set the name of the default disk group after installation by running the `vxdctl defaultdg` *diskgroup* command on a system. See the `vxdctl`(1M) manual page and the "Creating and Administering Disk Groups" chapter of the *VERITAS Volume Manager Administrator's Guide* for more information.

Note If you specify the name of a default disk group, this step does not create the disk group. After installation, you can use menu item 1 in the `vxdiskadm` utility or the VERITAS Enterprise Administrator to create the disk group.

7. Finally, a message displays indicating the utility is preparing to start the daemons on the target systems.

```
Preparing to start daemons on target system(s)...
Starting vxrelocd on host1 ......................... Success
Starting vxcached on host1 ......................... Success
Starting vxconfigbackupd on host1 .................. Success

Starting vxrelocd on host2......................... Success
Starting vxcached on host2 ......................... Success
Starting vxconfigbackupd on host2 .................. Success
Storage Foundation Enterprise HA was started successfully.

Press [Return] to continue:
```

Press Enter. A message displays notifying you of a successful installation and the locations of the `/opt/VRTS/install` files.

```
The installation summary is saved at:

/opt/VRTS/install/logs/installer610192714.summary

The installer log is saved at:

/opt/VRTS/install/logs/installer610192714.log

The installation response file is saved at:

/opt/VRTS/install/logs/installer610192714.response
```

Note Do not remove the log files until the VERITAS products are working properly on your system. Technical Support will need these log files for debugging purposes.

8. Reboot the system.

9. Proceed to "Verifying the VERITAS Storage Foundation Installation" on page 46.

Verifying the VERITAS Storage Foundation Installation

Use the following sections to verify the product installation.

Checking Volume Manager Processes

After the Storage Foundation software has been successfully installed, you can confirm that key Volume Manager processes (`vxconfigd`, `vxnotify`, and `vxrelocd`) are running by using the following command:

```
# ps -e | grep vx
```

Entries for these processes appear in output similar to the following:

```
142  ?    00:00:00 vxiod
143  ?    00:00:00 vxiod
.
.
.
150  ?    00:00:00 vxiod
151  ?    00:00:00 vxiod
159  ?    00:01:12 vxconfigd
405  ?    00:00:00 vxrelocd
410  ?    00:00:00 vxnotify
411  ?    00:00:00 vxrelocd
```

Note If you have disabled hot-relocation, the `vxrelocd` and `vxnotify` processes are not displayed.

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.

Verifying VxFS Installation

The VERITAS File System package consists of a kernel component and administrative commands.

Kernel Installation Verification

To ensure that the file system driver is loaded, enter:

```
# modinfo | grep vxfs
```

The `modinfo` command displays information about all modules loaded on the system. If the `vxfs` module is loaded, you will see an entry corresponding to `vxfs`. If not, follow the instructions in “Loading and Unloading the File System Module” on page 52 to complete the process.

Command Installation Verification

The VERITAS File System commands are installed in four directories:

`/etc/fs/vxfs`	Contains the VERITAS `mount` command required to mount file systems.
`/usr/lib/fs/vxfs/bin`	Contains the VxFS type-specific switch-out commands.
`/opt/VRTSvxfs/sbin`	Contains the VERITAS-specific commands.
`/opt/VRTS/bin`	Contains symbolic links to all VERITAS-specific commands installed in the directories listed above.

Determine whether these subdirectories are present:

```
# ls /etc/fs/vxfs
# ls /usr/lib/fs/vxfs/bin
# ls /opt/VRTSvxfs/sbin
# ls /opt/VRTS/bin
```

Make sure you have adjusted your environment variables accordingly. See "Environment Variables" on page 12 for details.

Checking Cluster Operation

Note This section is only relevant if you installed and configured an HA version of the Storage Foundation software.

To verify that the cluster is operating, type the following command on any node:

```
# hastatus -summary

-- SYSTEM STATE
-- System          State          Frozen

A  host1           RUNNING        0
A  host2           RUNNING        0
```

Identify the system state of each node in the output of this command. If the value is RUNNING for all the nodes, VCS is successfully installed and running. Refer to the `hastatus`(1M) manual page and the *VERITAS Cluster Server User's Guide* for more information on system states and state transitions.

To display the VCS attribute values for each node in the cluster, enter the following command on any node:

```
# hasys -display
```

For more information on interpreting the output from this command, see the `hasys`(1M) manual page and the *VERITAS Cluster Server User's Guide*.

Low Latency Transport

The /etc/llthosts File

The file `llthosts`(4) is a database containing one entry per node that links the Low Latency Transport (LLT) system ID (in the first column) with the LLT host name. This file is identical on each cluster node.

Based on the sample installation, the file `/etc/llthosts` contains the entries:

```
0 host1
1 host2
```

The /etc/lltab File

The file `lltab`(1M) contains information derived from the installation and used by the utility `lltconfig`(1M). After installation, this file lists the network links that correspond to the specific node.

The first line identifies the node. The second line identifies the cluster, based on the cluster ID entered during installation. The next two lines, beginning with the `link` command, identify the two network cards used by the LLT protocol.

See the `lltab`(4) manual page for details on how to modify the LLT configuration. The manual page describes ordering the directives in the `lltab` file.

Low Latency Transport Operation

Use the `lltstat` command to verify that links are active for LLT. This command returns information about the links for LLT for the node on which it is typed.

With LLT configured correctly, the output of `lltstat -n` shows all of the nodes in the cluster and two links for each node. If the output shows otherwise, type `lltstat -nvv | more` on any node to view additional information about LLT.

For information on ports open for LLT, type `lltstat -p` on any node.

Group Membership and Atomic Broadcast Files and Cluster Operation

After installation, the file `/etc/gabtab` contains a `gabconfig`(1M) command that configures the Group Membership and Atomic Broadcast (GAB) driver.

The /etc/gabtab File

The file `/etc/gabtab` contains a line that resembles:

```
/sbin/gabconfig -c -nN
```

where the `-c` option configures the driver and `-n`*N* specifies the cluster will not be formed until at least *N* nodes are ready. The variable *N* represents the number of cluster nodes.

Group Membership and Atomic Broadcast Operation

To verify that GAB is operating, type the following command on each node:

```
# /sbin/gabconfig -a
```

If GAB is operating, the following GAB port membership information is returned:

```
GAB Port Memberships
===================================
Port a gen a36e0003 membership 01
Port h gen fd570002 membership 01
```

`Port a` indicates that GAB is communicating, `gen a36e0003` is a random generation number, and `membership 01` indicates that nodes `0` and `1` are connected.

`Port h` indicates that VCS is started, `gen fd570002` is a random generation number, and `membership 01` indicates that nodes `0` and `1` are both running VCS.

If GAB is not operating, no GAB port membership information is returned:

```
GAB Port Memberships
===================================
```


If only one network is connected, the following GAB port membership information is returned:

```
GAB Port Memberships
===================================
Port a gen a36e0003 membership 01
Port a gen a36e0003 jeopardy    1
Port h gen fd570002 membership 01
Port h gen fd570002 jeopardy    1
```

For more information on GAB, including descriptions of ports, refer to the *VERITAS Cluster Server User's Guide*.

Loading and Unloading the File System Module

On Solaris 10, the `vxfs` file system module automatically loads on the first reference to a VxFS file system. This occurs when a user tries to mount a VxFS disk layout. In some instances, you may want to load the file system module manually. To do this, first load `vxfs`, then `vxportal`. `vxportal` is a pseudo device driver that enables VxFS commands to issue ioctls to the VxFS modules even when there are no file systems mounted on the system.

```
# modload /kernel/fs/vxfs
# modload /kernel/drv/vxportal
```

To determine if the modules successfully loaded, enter:

```
# modinfo | grep vxportal
# modinfo | grep vxfs
```

The above commands provide information about the modules. The first field in the output is the module ID.

You can unload the module by entering:

```
# modunload -i portal_module_id
# modunload -i vxfs_module_id
```

The `modunload` command fails if any mounted VxFS file systems exist. To determine if any VxFS file systems are mounted, enter:

```
# df -F vxfs
```

Installing Language Packages

If you are installing VERITAS Storage Foundation in a language other than English, you must install the required language packages *after* installing the English packages. If you are planning to use the GUI, you must install the language package for the VEA client.

▼ To install the product language packages on the server

1. Make sure the VEA Service is not running.

```
# /opt/VRTS/bin/vxsvcctrl status
Current state of server : RUNNING
```

2. If the VEA Service is running, stop it using the `vxsvcctrl stop` command.

```
# /opt/VRTS/bin/vxsvcctrl stop
```

3. Insert the "Language" disc into the CD-ROM drive. If you are using Solaris volume management software, the disc is automatically mounted as `/cdrom/cdrom0`.

4. Install the language packages using the `install_lp` command.

```
# cd /cdrom/cdrom0
# ./install_lp
```

5. After installing the language packages, restart the VEA Service.

```
# /opt/VRTS/bin/vxsvcctrl start
```

▼ To install the client language package on Windows

1. Insert the "Language" disc into the CD-ROM drive.

2. Go to the directory containing the client language package.

   Go to `D:\`*`language`*`\windows`

   where `D` is the CD-ROM drive.

3. Double-click on the `VRTSmuobg.msi` package to install it.

4. Follow any instructions during installation.

Configuring VERITAS Volume Manager

For information on setting up VxVM disk groups and volumes after installation, see "Configuring VERITAS Volume Manager" in the *VERITAS Volume Manager Administrator's Guide.*

Configuring VERITAS File System

After installing VERITAS File System, you can create a file system on a disk slice or VERITAS Volume Manager volume with the `mkfs` command. Before you can use this file system, you must mount it with the `mount` command. You can unmount the file system later with the `umount` command. A file system can be automatically mounted at system boot time if you add an entry for it in the `/etc/vfstab` file.

The VERITAS-specific commands are described in the VERITAS File System guides and online manual pages. See the Quick Start Guide Reference chapter of the *VERITAS File System Administrator's Guide* for examples of the most common VxFS operating procedures.

Upgrading the VERITAS Software 3

If you are running an earlier release of VERITAS Storage Foundation, you can upgrade your product using the procedures described in this chapter.

Topics covered in this chapter include:

Preparing to Upgrade VERITAS Storage Foundation

This section prepares you for the VERITAS Storage Foundation upgrade.

Planning the Upgrade

Complete the following tasks in advance of upgrading:

- Ensure that you have created a valid backup.
- Review the *VERITAS Storage Foundation Release Notes* for any late-breaking information on upgrading your system.
- Be sure that the administrator doing the upgrade has root access and a working knowledge of Solaris operating system administration.
- Schedule sufficient outage time for the upgrade.
- If upgrading from or to Storage Foundation Basic, see "VERITAS Storage Foundation Basic" on page 93.

VERITAS Storage Foundation Upgrade Paths

The upgrade paths for VERITAS Storage Foundation are:

From	Upgrade to	Tasks
Storage Foundation 4.1	Storage Foundation 4.1 MP1 or Storage Foundation 4.1 MP1 High Availability	To upgrade from 4.1 Storage Foundation to 4.1 MP1 Storage Foundation, see "Installing VERITAS Storage Foundation Using the Product Installer" on page 23.

Configuring the VERITAS Software 4

This chapter covers important details about initializing (where required), setting up, and configuring the VERITAS software.

Topics covered in this document include:

Database Configuration Requirements

Most relational database management system (RDBMS) software requires operating system parameters to be set prior to operation. The Oracle and Sybase databases require modifications to kernel settings in the `/etc/system` file before the databases will run correctly. The most critical settings are normally located in the Shared Memory and Semaphore settings on Solaris. For precise settings, consult your current database installation and configuration documentation.

Oracle

The following list is an example of the changes that need to be made to the `/etc/system` file for Oracle, before a reboot, so you can use your database:

```
* start Oracle *
  set shmsys:shminfo_shmmax=0xffffffff
  set shmsys:shminfo_shmmin=1
  set shmsys:shminfo_shmmni=100
  set shmsys:shminfo_shmseg=200

  set semsys:seminfo_semmap=100
  set semsys:seminfo_semmni=1000
  set semsys:seminfo_semmns=4000
  set semsys:seminfo_semmnu=800
  set semsys:seminfo_semmsl=512

  * end Oracle *
```

Sybase

The following list is an example of the changes that need to be made to the `/etc/system` file for Sybase, before a reboot, so you can use your database:

```
  * start Sybase *
  set shmsys:shminfo_shmmax=0xffffffff
  set shmsys:shminfo_shmmin=1
  set shmsys:shminfo_shmseg=60

  set semsys:seminfo_semmnu=60

  * end Sybase *
```

Configuring VERITAS Storage Foundation

Once you install and initialize all of the VERITAS software, you can take advantage of the various storage management features to ease the task of system and database administration.

Setting Administrative Permissions

To allow database administrators to administer a database using VERITAS Storage Foundation, you are required to change some permission settings. You are asked during the installation process if you want to allow database administrators access to various functionality. If you did not make the permission changes during installation, you can do so at a later time.

Oracle

The default settings at installation time for the `/opt/VRTSdbed` directory allow only the `root` login to access the directory.

▼ **To allow the user "oracle" access to the /opt/VRTSdbed directory**

Use the `chown` and `chmod` commands, as follows:

```
# chown oracle /opt/VRTSdbed
# chmod 500 /opt/VRTSdbed
```

▼ **To allow users in the group "dba" access to the /opt/VRTSdbed directory**

Use the `chgrp` and `chmod` commands, as follows:

```
# chgrp dba /opt/VRTSdbed
# chmod 550 /opt/VRTSdbed
```

Sybase

No changes are required.

VERITAS Enterprise Administrator

You may need to update VERITAS Enterprise Administrator so that users other than `root` can access features.

Adding Users to the VEA Service Console Registry for Oracle

You may want to add users to the VEA server console registry to allow access to the interface to users other than `root`. You also have the option to give database administrators `root` privileges.

▼ To add users other than root to the VERITAS Enterprise Administrator Service console registry

1. Make sure that the optional GUI package was installed.

   # **pkginfo -l VRTSorgui**

```
   PKGINST:  VRTSorgui
      NAME:  VERITAS Storage Foundation Graphical User Interface for
              Oracle
  CATEGORY:  application
      ARCH:  Sparc
   VERSION:  4.1
    VENDOR:  VERITAS Software
      DESC:  VERITAS Storage Foundation Graphical User Interface for
              Oracle
    PSTAMP: 020322155315
  INSTDATE:  Jan 03 2005 15:55
   HOTLINE:  1-800-342-0652
     EMAIL:  support@veritas.com
    STATUS:  completely installed
     FILES:     29 installed pathnames
                 8 shared pathnames
                13 directories
                 4 executables
               13514 blocks used (approx)PKGINST:  VRTSorgui
```

2. Stop the VEA server.

   # **/opt/VRTS/bin/vxsvcctrl stop**

3. To give `root` privileges to the database administrator, use the `vxdbedusr` command as follows.

   # **`/opt/VRTS/bin/vxdbedusr -a <user or group>[-A] [-f] -n user_name`**

   where:

   `-a user` adds a user to the registry

   `-A` grants the user root access

   `-f` allows the user to be a user other than the `/opt/VRTSdbed` owner.

   `-n` indicates the name of the user.

   For example, to add a database administrator with the name “oracle” as a user with `root` privileges, enter the following:

   # **`/opt/VRTS/bin/vxdbedusr -a user -A -f -n oracle`**

4. To add a user without `root` privileges, use the `vxdbedusr` command as follows.

   # **`/opt/VRTS/bin/vxdbedusr -a user -n user_name`**

   where `-a` adds a user to the registry.

   For example, to add “oracle” as a user, enter the following:

   # **`/opt/VRTS/bin/vxdbedusr -a user -n oracle`**

5. To add a group to the console registry, use the `vxdbedusr` command as follows:

   # **`/opt/VRTS/bin/vxdbedusr -a group -n group_name`**

   where `-a` adds the user group to the registry.

   For example, to add “dba” as a group, enter the following:

   # **`/opt/VRTS/bin/vxdbedusr -a group -n dba`**

6. Restart the VEA Server.

   # **`/opt/VRTS/bin/vxsvcctrl start`**

Removing Users from the VEA Service Console Registry for Oracle

You may need to restrict access to the VEA server console registry. You can remove users or user groups from the registry if they have been previously added.

Note You cannot remove `root` from the VEA console registry.

▼ **To remove users other than root from the VERITAS Enterprise Administrator Service console registry**

1. Make sure that the optional GUI package was installed.

   ```
   # pkginfo -l VRTSorgui
   ```

   ```
   PKGINST:  VRTSorgui
      NAME:  VERITAS Storage Foundation Graphical User Interface for
              Oracle
  CATEGORY:  application
      ARCH:  Sparc
   VERSION:  4.1
    VENDOR:  VERITAS Software
      DESC:  VERITAS Storage Foundation Graphical User Interface for
              Oracle
    PSTAMP: 020322155315
  INSTDATE:  Jan 03 2005 15:55
   HOTLINE:  1-800-342-0652
     EMAIL:  support@veritas.com
    STATUS:  completely installed
     FILES:     29 installed pathnames
                 8 shared pathnames
                13 directories
                 4 executables
               13514 blocks used (approx)
   ```

2. Stop the VEA server.

   ```
   # /opt/VRTS/bin/vxsvcctrl stop
   ```

3. Use the `vxdbedusr` command to remove a group or user.

   ```
   # /opt/VRTS/bin/vxdbedusr -r <user or group> \
     -n <user_name or group_name>
   ```

   where `-r` removes a user or user group from the registry.

   For example, to remove the user “oracle,” enter the following:

   ```
   # /opt/VRTS/bin/vxdbedusr -r user -n oracle
   ```

4. Restart the VEA Server.

```
# /opt/VRTS/bin/vxsvcctrl start
```

vxtunefs Command Permissions and Cached Quick I/O

By default, you must have superuser (`root`) privileges to use the `/opt/VRTS/bin/vxtunefs` command. The `vxtunefs` command is a tool that lets you change caching policies to enable Cached Quick I/O and change other file system options. Database administrators can be granted permission to change default file system behavior in order to enable and disable Cached Quick I/O. The system administrator must change the `vxtunefs` executable permissions as follows:

```
# chown root /opt/VRTS/bin/vxtunefs
# chgrp dba /opt/VRTS/bin/vxtunefs
# chmod 4550 /opt/VRTS/bin/vxtunefs
```

Note Setting the permissions for `/opt/VRTS/bin/vxtunefs` to 4550 allows all users in the dba group to use the `vxtunefs` command to modify caching behavior for Quick I/O files.

For more information, see the *VERITAS File System Administrator's Guide.*

Configuring VERITAS Volume Manager

This section explains how to set up VxVM enclosure-based naming. To carry out further tasks such as disk encapsulation or initialization, please see the *VERITAS Volume Manager System Administrator's Guide.*

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 immediately, `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 "Obtaining a License Key" on page 4.

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:

```
# vxdg 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 see the *VERITAS Volume Manager System Administrator's Guide.*

Using Dynamic MultiPathing

To allow DMP to receive correct enquiry data, the common Serial Number (C-bit) Symmetrix Director parameter must be set to enabled.

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:[ctlr_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/vxdmpinq`.

- 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:[<ctlr-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.

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/VRTS/bin/vxsvcctrl status
```

To stop the VEA server, enter:

```
# /opt/VRTS/bin/vxsvcctrl stop
```

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/VRTS/bin/vxsvcctrl start
```

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** > **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 and restart the ISIS server daemon, as in the following example.

1. Add a new group:

   ```
   # groupadd -g gid veagrp
   ```

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 veagrp
   ```

4. Restart the VEA server.

   ```
   # /opt/VRTS/bin/vxsvcctrl restart
   ```


Enabling Cluster Support in VxVM (Optional)

Note This section assumes that you are using Sun Java System Cluster 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**

1. Obtain a license for the VxVM cluster feature. See "Obtaining a License Key" on page 4 for details.
2. Install the software packages onto each system (node) to be included in the cluster as described in "Installing VxVM Using the pkgadd Command" on page 30 and "Installing VERITAS Enterprise Administrator Client on Windows" on page 29.
3. Initialize VxVM using the procedures described in "Configuring VERITAS Volume Manager" on page 64.
4. Start VEA as described in "Starting the VEA Server" on page 68 and "Starting the VEA Client" on page 69.
5. Configure shared disks as described in "Configuring Shared Disks" on page 70.

Configuring 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 "Reserving Shared Disks" on page 73).

Configuring 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 `vxdctl 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 `vxdctl -c mode`.

   Use the `vxdg` program or VEA to create disk groups. In the `vxdg` 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 Adminstrator's Guide.*

6. If the cluster is only running with one node, bring up the other cluster nodes. Enter the `vxdg list` command on each node to display the shared disk groups.

Verifying 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:

   ```
   # vxdg list
   ```

   This displays the existing shared disk groups.

Converting Existing VxVM Disk Groups to Shared Disk Groups

If you are upgrading and you want to convert existing disk groups to shared disk groups, configure the shared disks as follows:

1. Ensure that all systems that are running are part of the same cluster.

2. Configure the disk groups using the following procedure.

   To list all disk groups, use the following command:

   # **`vxdg list`**

3. Determine which node is the master. To determine if a node is a master or a slave, run the following command:

   # **`vxdctl -c mode`**

   To deport disk groups to be shared, use the following command:

   # **`vxdg deport`** ***disk-group-name***

   To import disk groups to be shared, use the following command on the master node:

   # **`vxdg -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:

   # **`vxdg list`**

   The disk groups are now ready to be shared.

4. If the cluster is only running with one node, bring up the other cluster nodes. Enter the `vxdg list` command on each node to display the shared disk groups. This command displays the same list of shared disk groups displayed earlier.

5. For information on upgrading in a Cluster Volume Manager (CVM) environment, see the *VERITAS Cluster File System Installation and Configuration Guide.*

Reserving Shared Disks

As part of its quorum control, the Sun Java System 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 Java System 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 Java System 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.

Adding 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” on page 73.

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.

Placing Disks in another Disk Group

To place disks in another disk group, use VEA or the `vxdiskadm` program after completing the `vxinstall` program.See the *VERITAS Volume Manager Administrator's Guide* for information on how to create other disk groups for your disks.

Adding 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). See the *VERITAS Volume Manager Administrator's Guide* for details.

Protecting Your Data

A disk failure can cause loss of data on the failed disk. The following are suggestions for protecting your data:

- 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.
- 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.
- 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.

Configuring VERITAS File System

After installing VERITAS File System, you can create a file system on a disk slice or VERITAS Volume Manager volume with the `mkfs` command. Before you can use this file system, you must mount it with the `mount` command. You can unmount the file system later with the `umount` command. A file system can be automatically mounted at system boot time if you add an entry for it in the `/etc/vfstab` file.

The VERITAS-specific commands are described in the VERITAS File System guides and online manual pages. See the Quick Start Guide Reference chapter of the *VERITAS File System Administrator's Guide* for examples of the most common VxFS operating procedures.

Uninstalling the VERITAS Software 5

This chapter covers uninstallation requirements and steps to uninstall the VERITAS software.

Topics covered in this document include:

Uninstallation Requirements

Review the uninstallation requirements before removing the VERITAS software.

Caution Failure to follow the preparations in this section might result in loss of data.

VERITAS Volume Manager

This section describes the steps you need to take before removing VERITAS Volume Manager to preserve the contents of the volumes.

All VxVM volumes must be moved to disk partitions. You can do this using one of these procedures:

- Back up the entire system to 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.
- Move volumes incrementally to disk partitions.

Continue to the next section if you choose to use the last procedure. Otherwise, proceed to "Shutting Down VERITAS Volume Manager" on page 85.

Moving Volumes to Disk Partitions

▼ **To move volumes incrementally to disk partitions**

1. Evacuate disks using `vxdiskadm`, the GUI, or the `vxevac` script.

   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 VERITAS Volume Manager control by entering:

   ```
   # vxdg rmdisk diskname
   # vxdisk rm devname
   ```

3. Decide which volume to move first, and if the volume is mounted, unmount it.

4. If the volume is being used as a raw partition for database applications, make sure that the application is not updating the volume and that you have applied the `sync` command to the data on the volume.

5. Create a partition on free disk space of the same size as the volume using the `format` command.

   If there is not enough free space for the partition, add a new disk to the system for the first volume removed. Subsequent volumes can use the free space generated by the removal of this first volume.

6. Copy the data on the volume onto the newly created disk partition using a command such as `dd`.

   ```
   # dd if=/dev/vx/dsk/diskgroup/lhome of=/dev/dsk/c2t2d2s7
   ```

   where `c2t2d2` is the disk outside of Volume Manager 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 VERITAS Volume Manager using the command.

   ```
   # vxedit -rf rm volume_name
   ```

10. Remove any free disks (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 `vxprint` command.

    ```
    # vxprint -F '%sdnum' 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.

    ```
    # 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 `vxprint` command.

```
# vxprint -Aht -e v_open
```

If any volumes remain open, repeat the steps listed above.

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`.

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
```

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
```


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
```

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 -g voldg rmdisk disk1
# vxdg -g voldg rmdisk disk2
# vxdisk -g voldg rm c1t12d0
# vxdisk -g voldg rm c1t14d0
```

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
```

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
```

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> 1
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
```

Copy the data on `vol01` to the newly created disk partition.

```
# dd if=/dev/vx/dsk/voldg/vol01 of=/dev/dsk/c1t12d0s1
```

In the `/etc/vfstab` file, remove the following entry.

```
/dev/vx/dsk/voldg/vol1 /dev/vx/rdsk/voldg/vol1 /vol1 vxfs 4  yes rw
```

Replace it with an entry for the newly created partition.

```
/dev/dsk/c1t12d0s1 /dev/rdsk/c1t12d0s1 /vol01 vxfs 4  yes rw
```

Mount the disk partition.

```
# mount -F vxfs /dev/dsk/c1t12d0s1 /vol01
```

Remove `vol01` from VERITAS Volume Manager.

```
# vxedit -g voldg -rf rm /dev/vx/dsk/voldg/vol01
```

To complete the procedure, follow Steps 10 through 12 in the previous section, "Moving Volumes to Disk Partitions" on page 78.

Shutting Down VERITAS Volume Manager

▼ To shut down VERITAS Volume Manager

Enter the `vxdctl` and `vxiod` commands as follows:

```
# vxdctl stop
# vxiod -f set 0
```

VERITAS File System

The `VRTSvxfs` package cannot be removed if there are any mounted VxFS file systems. Unmount the VxFS file systems before uninstalling VERITAS Storage Foundation. After you remove the `VRTSvxfs` package, VxFS file systems are not mountable or accessible until another `VRTSvxfs` package is installed.

▼ To unmount a file system

1. Check if any VxFS file systems are mounted.

   ```
   # cat /etc/mnttab | grep vxfs
   ```

2. Unmount any file systems.

   ```
   # umount [ special | mount_point ]
   ```

Specify the file system to be unmounted as a *mount_point* or *special* (the device on which the file system resides). See the `umount_vxfs`(1M) manual page for more information about this command and its available options.

Note You can use the `-a` option to unmount all file systems except `/`, `/usr`, `/usr/kvm`, `/var`, `/proc`, `/dev/fd`, and `/tmp`.

Uninstalling VERITAS Storage Foundation Using the Product Installer

The product installer simplifies the process of uninstalling VERITAS software and VERITAS recommends this method of uninstallation.

▼ To uninstall using the product installer

1. Log in as superuser (root).
2. Mount the VERITAS Storage Foundation disc as described in "Mounting the Software Disc" on page 21.
3. Run the product installer.

   ```
   # ./installer
   ```

4. At the Selection Menu, enter U to uninstall and press Return. The product installer is displayed.

   ```
   Selection Menu:

      I) Install/Upgrade a Product      C) Configure an Installed
   Product
      L) License a Product             P) Perform a Preinstallation Che
   ck
      U) Uninstall a Product            D) View a Product Description
      Q) Quit                           ?) Help

    Enter a Selection: [I,C,L,P,U,D,Q,?] U
   ```

5. At the VERITAS product installer page, enter the number of the product you want to uninstall and press Return.
6. Enter the system names that the software is installed on, when prompted press Return to continue.

   ```
    Enter the system names separated by spaces on which to uninstall
   SF: host1 host2
   ```

7. After the product installer checks the system communication, press Return.
8. At the following prompt, enter y and press Return to continue.

   ```
    Are you sure you want to uninstall SF packages? [y,n,q] (y) y
   ```

9. A successfully message displays, when prompted press Return to continue:

```
Storage Foundation Standard HA package uninstall completed
successfully.
Press [Return] to continue:
```

10. The following message displays when the uninstall of the Storage Foundation Standard HA has completed successfully:

```
 Uninstallation of Storage Foundation Standard HA has completed
successfully.

 The uninstallation summary is saved at:

       /opt/VRTS/install/logs/installer919105512.summary

 The installer log is saved at:

       /opt/VRTS/install/logs/installer919105512.log
```

Uninstalling VERITAS Storage Foundation Using the Product Installation Script

If you need to uninstall the VERITAS Storage Foundation software, use the uninstallation script. The uninstallation script removes all the VERITAS packages and patches.

▼ To remove the VERITAS Storage Foundation software packages and patches

1. Comment out or remove any VERITAS File System (VxFS) entries from the file system table `/etc/vfstab`. Failing to remove these entries could result in system boot problems later.

2. Unmount all mount points for VxFS file systems.

```
# umount /mount_point
```

3. If the VERITAS Volume Manager package (`VRTSvxvm`) is installed, read and follow the uninstallation procedures in the section titled "VERITAS Volume Manager" on page 78.

4. Stop the VEA Service.

```
# /opt/VRTS/bin/vxsvcctrl stop
```


5. Move to the `/opt/VRTS/install` directory on your system and use the uninstallation script to remove the VERITAS Storage Foundation product installed on your system.

   Use the table to determine which uninstallation script to use:.

If you are uninstalling:	Use
Storage Foundation	uninstallsf
Storage Foundation for Oracle	uninstallsfora
Storage Foundation for Sybase	uninstallsfsyb

   For example, to remove VERITAS Storage Foundation:

```
# cd /opt/VRTS/install
# ./uninstallsf
```

   Note Most packages have kernel components. In order to ensure complete removal, a system reboot is recommended after all packages have been removed.

6. If you installed the Storage Foundation HA, you must uninstall VCS. See the *VERITAS Cluster Server Installation Guide* for details on uninstalling VCS.

7. To verify the removal of the packages, use the `pkginfo` command.

```
# pkginfo | grep VRTS
```

8. The `VRTScpi`, `VRTSvlic`, `VRTSperl`, `VRTSobgui`, and `VRTSob` packages are not removed by the script. After running the `uninstallsf` script, remove these packages.

   To remove the packages using `pkgrm`:

```
# pkgrm VRTScpi VRTSvlic VRTSperl VRTSobgui VRTSob
```

   To remove the packages using the script located in `/opt/VRTS/install`:

```
# ./uninstallinfr
```

Uninstalling the VERITAS Enterprise Administrator Client

You should also remove the client software from any machines you used to access the VERITAS software.

▼ **To remove the VEA client from a Solaris system other than the server**

1. Stop the VEA Service.

   ```
   # /opt/VRTS/bin/vxsvcctrl stop
   ```

2. Use the `pkgrm` command to remove the `VRTSobgui` software package.

   ```
   # pkgrm VRTSobgui
   ```

▼ **To remove the VEA client from a Windows system**

1. Log in as the database administrator.
2. Select **Start** > **Settings** > **Control Panel**.
3. Double-click **Add/Remove Programs** to display a list of installed products.
4. Select **VERITAS Enterprise Administrator** from the list, and click the **Remove** button.
5. Click **Yes** when a dialog box appears asking you to confirm the removal.

Uninstalling Language Packages

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 VRTSjafsc VRTSjafsm VRTSjavmc VRTSjavmd VRTSjavmm \
VRTSmuap VRTSmutep VRTSmuvmp VRTSmufsp VRTSmuddl VRTSmualc \
VRTSmulic VRTSmuobg VRTSmuob
```

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

Uninstalling VERITAS Volume Manager

If you are using VERITAS Volume Manager only, use the steps in this section to remove the product. If you purchased one of the Storage Foundation products, see "Uninstalling VERITAS Storage Foundation Using the Product Installer" on page 86.

Uninstalling VxVM Using the pkgrm Command

▼ **To remove the installed VxVM packages**

Use the following command:

```
# pkgrm VRTSddlpr VRTSalloc VRTSfspro VRTSvmpro VRTSvmman VRTSvmdoc \
  VRTSob VRTSobgui VRTSvxvm
```

You can also include `VRTSvlic` in the removal line if you have not installed any other packages that use `VRTSvlic`.

Uninstalling VERITAS File System

If you are using VERITAS File System only, use the steps in this section to remove the product. If you purchased one of the Storage Foundation products, see "Uninstalling VERITAS Storage Foundation Using the Product Installer" on page 86.

Uninstalling VxFS Using the pkgrm Command

▼ **To uninstall using the pkgrm command**

1. Remove the VxFS packages using the `pkgrm` command, starting with the optional packages. Do not remove the license packages `VRTSvlic` or `VRTSlic` if there are other VERITAS products installed.

   ```
   # pkgrm VRTSfsmnd VRTSfssdk VRTSfsdoc VRTSfsman VRTSap \
   VRTStep VRTSmuob VRTSfspro VRTSob VRTSvxfs
   ```

   The system responds with a message similar to the following:

   ```
   The following package is currently installed:
     VRTSvxfs        VERITAS File System
                     (x64) 4.1,REV=4.1A14_sol

   Do you want to remove this package? [y,n,?,q]
   ```

2. Type **y** to continue the removal.

```
## Removing installed package instance <VRTSvxfs>
This package contains scripts which will be executed with
superuser permission during the process of removing this package.
Do you want to continue with the removal of this package
[y,n,?,q]
```

3. Type **y** to continue the removal.

```
## Verifying package dependencies
## Processing package information.
## Executing preremove script.
## Removing pathnames in class <s210b64>
. . .
## Removing pathnames in class <s210>
. . .
## Removing pathnames in class <all>
. . .
## Updating system information.
Removal of <VRTSvxfs> was successful.
```

4. After the uninstall completes, remove any VxFS file system entries from the `/etc/vfstab` file.

VERITAS Storage Foundation Basic A

This appendix describes how to install, upgrade, and uninstall VERITAS Storage Foundation Basic software.

Storage Foundation Basic is a special offering that is available on a separate Storage Foundation Basic disc or downloadable from the Symantec website. Storage Foundation Basic is not part of the Storage Foundation and High Availability Solutions product suite. For complete information on ordering this product, licensing, and technical support, visit:

http://www.symantec.com/sfbasic

Topics covered in this appendix include:

- "VERITAS Storage Foundation Basic Introduction"
- "Installing VERITAS Storage Foundation Basic"
- "Upgrading VERITAS Storage Foundation Basic"
- "Uninstalling VERITAS Storage Foundation Basic"

VERITAS Storage Foundation Basic Introduction

The Storage Foundation Basic contains the same features as Storage Foundation Standard, but has the following limitations:

- Maximum of 4 user data Volumes
- Maximum of 4 user data File Systems
- Maximum server capacity of 2 CPU sockets

For a product overview on Storage Foundation Basic, see the *VERITAS Storage Foundation and High Availability Solutions Getting Started Guide*.

Storage Foundation Basic Technical Support

Technical support is self-service only, available from the VERITAS Support website. You can purchase additional support corresponding to the terms of the Storage Foundation Basic license. To access the self-service knowledge base, go to:

http://support.veritas.com

When contacting Support with questions relating to Storage Foundation Basic, be prepared to provide your product license key. You can determine your currently installed license by running the Veritas license report utility as shown in the following example:

```
# vxlicrep
....
License Key       = WXYZ-9999-WXY7-WXYZ-WXYZ-WX3
Product Name      = VERITAS Storage Foundation Basic
```

Storage Foundation Basic System Requirements

Dependencies

VERITAS Storage Foundation Basic can only be installed on a system running Solaris 10 (64-bit). Installing this product on any other Solaris release will fail. If necessary, upgrade Solaris before you install the VERITAS products.

Disk Space

Before installing the VERITAS Storage Foundation Basic software, confirm that there is sufficient disk space in the file systems on the target systems. You can use the **Precheck** option, in the product installer, to make sure that sufficient disk space is available.

The following table shows the approximate disk space used by the Storage Foundation Basic for all (both the required and optional) packages:

Product Name	/ root	/opt	/usr	/var
Storage Foundation Basic	55930 KB	280850 KB	78010 KB	1005094 KB

The following table shows the suggested approximate space requirements for each package:

Package	Contents	Size
Volume Manager Packages		
VRTSvxvm	VERITAS Volume Manager, Binaries	232 MB
VRTSvmpro	VERITAS Volume Manager Management Services Provider	20.5 MB
VRTSalloc	VERITAS Volume Manager: VERITAS Intelligent Storage Provisioning	64.5 MB
VRTSvmdoc	VERITAS Volume Manager Documentation (optional)	16 MB
VRTSvmman	VERITAS Volume Manager -Manual Pages (optional)	3.5 MB

Package	Contents	Size
File System Packages		
VRTSvxfs	VERITAS File System	38 MB
VRTSfspro	VERITAS File System Management Services Provider	199 MB
VRTSfssdk	VERITAS File System Software Developer Kit	2.5 MB
VRTSfsdoc	VERITAS File System Documentation (optional)	3.5 MB
VRTSfsman	VERITAS File System - Manual Pages (optional)	2.5 MB
VRTSfsmnd	VERITAS File System Software Developer Kit Manual Pages (optional)	4.5 MB
VERITAS Enterprise Administrator Packages		
VRTSob	VERITAS Enterprise Administrator Service	27.5 MB
VRTSmuob	VERITAS Enterprise Administrator Service Localized Package	.02 MB
VRTSobgui	VERITAS Enterprise Administrator (optional)	80 MB
Infrastructure Packages		
VRTSddlpr	VERITAS Device Discovery Layer Services Provider	20.5 MB
VRTSap	VERITAS Action Provider (optional) **Note** VRTSap is the rules engine add-on for the VERITAS Enterprise Administrator GUI. Installing VRTSap enables SNMP trap and email	36 MB
VRTStep	VERITAS Task Execution Provider (optional) **Note** VRTStep provides the command execution add-on for the VERITAS Enterprise Administrator GUI. Installing VRTStep and VRTSap enables command execution in response to an alert.	7.2 MB
Miscellaneous Packages		

Package	Contents	Size
VRTSvlic	VERITAS License Utilities	3 MB
VRTSperl	Perl 5.8.0 for VERITAS	34.5 MB
VRTScpi	VERITAS Cross Product Installation Framework	1 MB
VRTSat	VERITAS Authentication Service	302.5 MB
VRTSjre	VERITAS Java Runtime Environment Redistribution	70 MB
VRTSjre15	VERITAS Java Runtime Environment Redistribution	70 MB
VRTSmulic	Multi Language VERITAS License Utilities (optional)	2.5 MB
VRTSweb	VERITAS Java Web Server	10 MB
Total space for all packages		1095.02 MB
Total space for required packages		1251.22 MB

Installing VERITAS Storage Foundation Basic

This sections describes how to install VERITAS Storage Foundation Basic.

Note No license is required for installation.

▼ To install VERITAS Storage Foundation Basic

1. Log in as superuser (root).
2. Insert the appropriate VERITAS Storage Foundation Basic disc into your system's CD-ROM drive.
3. If Solaris volume management software is running on your system, the software disc is automatically mounted as `/cdrom/cdrom0`.
4. Run the `installsf` program.
   - If the disc is mounted automatically, enter:

     ```
     # cd /cdrom/cdrom0/storage_foundation_basic
     # ./installsf
     ```

   - If the disc is mounted manually, enter:

     ```
     # cd /mount_point/storage_foundation_basic
     # ./installsf
     ```

   ```
   Enter the system names separated by spaces on which to install
   SF: host1 host2
   ```

5. Enter the system names on which the software is to be installed. You are prompted to press Return to continue.

   ```
   Initial system check completed successfully.

   Press [Return] to continue:
   ```

6. Press **Return** to continue after the initial system check is completed successfully. You are prompted to press Return to continue.

   ```
   VERITAS Infrastructure packages installed successfully.

   Press [Return] to continue:
   ```

7. Press **Return** to continue after the VERITAS infrastructure packages are installed successfully. You are prompted to press Return to continue.

```
SF licensing completed successfully.

Press [Return] to continue:
```

8. Press **Return** to continue after the Storage Foundation licensing completed successfully. You are prompted to install optional Storage Foundation packages.

```
installsf can install the following optional SF packages:

VRTSobgui    VERITAS Enterprise Administrator
VRTSvmman    VERITAS Volume Manager Manual Pages
VRTSvmdoc    VERITAS Volume Manager Documentation
VRTStep      VERITAS Task Provider
VRTSap       VERITAS Action Provider
VRTSfsman    VERITAS File System Manual Pages
VRTSfsdoc    VERITAS File System Documentation
VRTSfsmnd    VERITAS File System Software Developer Kit Manual
             Pages

     1)  Install all of the optional packages
     2)  Install none of the optional packages
     3)  View package descriptions and select optional packages

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

9. Enter **1** to install all of the optional packages. You are prompted to press Return to continue.

```
installsf will install the following SF packages:
VRTSperl     VERITAS Perl 5.8.0 Redistribution
VRTSob       VERITAS Enterprise Administrator Service
.
.
.
Press [Return] to continue:
```

10. Press **Return** to continue with the install of the optional packages. You are prompted to press Return to continue.

```
Installation requirement checks completed successfully.

Press [Return] to continue:
```


11. Press **Return** to continue after the installation requirement checks are completed successfully. You are prompted if you are ready to configure Storage Foundation Basic.

```
It is possible to install SF packages without performing
configuration.

It is optional to configure SF now. If you choose to configure SF
later, you can either do so manually or run the
installsf -configure command.
Are you ready to configure SF? [y,n,q] (y)
```

12. Enter **y** to configure Storage Foundation Basic. You are prompted if you want to install Storage Foundation Basic on all systems simultaneously.

```
SF can be installed on systems consecutively or simultaneously.
Installing on systems consecutively takes more time but allows
for better error handling.

Would you like to install Storage Foundation Basic on all systems
simultaneously? [y,n,q,?] (y)
```

13. Enter **y** to install Storage Foundation Basic on all systems simultaneously. You are prompted to press Return to continue.

```
Storage Foundation Basic installation completed successfully.

Press [Return] to continue:
```

14. Press **Return** to continue after the Storage Foundation Basic installation completed successfully. You are prompted if you want to set up the enclosure-based naming scheme.

```
The enclosure-based naming scheme is a feature of Volume Manager.
It allows one to reference disks using a symbolic name that is
more meaningful than the operating system's normal device access
name. This symbolic name is typically derived from the array
name.

Do you want to set up the enclosure-based naming scheme?
[y,n,q,?] (n)
```

15. Enter **y** or **n** for setting up the enclosure-based naming scheme. You are prompted to press Return to continue.

```
Storage Foundation Basic configured successfully.

Press [Return] to continue:
```

16. Press **Return** to continue after Storage Foundation Basic configured successfully. You are prompted if you want to start Storage Foundation Basic processes.

```
Do you want to start Storage Foundation Basic processes now?
[y,n,q] (y)

Note: The vxconfigd daemon will be started, which can take a
while depending upon the hardware configuration.
```

17. Enter **y** to start the Storage Foundation Basic processes. You are prompted to set up the default disk group for each system.

```
  Volume Manager default disk group configuration:

Many Volume Manager commands affect the contents or configuration
of a disk group. Such commands require that the user specify a
disk group.  This is accomplished by using the -g option of a
command or setting the VXVM_DEFAULTDG environment variable. An
alternative to these two methods is to configure the default disk
group of a system.

Do you want to set up the default disk group for each system?
[y,n,q,?] (y)
```

18. Enter **y** to set up the default disk group for each system. You are prompted if you will specify one disk group name for all eligible systems.

```
Will you specify one disk group name for all eligible systems?
[y,n,q,?] (y)
```

19. Enter **y** to specify one disk group name for all eligible systems. You are prompted to specify a default disk group for all systems or enter `l` to display a listing of existing disk groups.

```
Specify a default disk group for all systems or type 'l' to
display a listing of existing disk group(s). [?] sfbasic_dg
```

20. Enter a default disk group. You are prompted to enter if this is correct.

```
Is this correct? [y,n,q] (y)
```


21. Enter **y**, if this is correct. You are prompted to press Return to continue.

```
Storage Foundation Basic was started successfully.

Press [Return] to continue:
```

22. Press **Return** to continue after the Storage Foundation Basic was started successfully. The following message displays when the installation of the Storage Foundation Basic has completed successfully:

```
Installation of Storage Foundation Basic 4.1 has completed
successfully.

The installation summary is saved at:

      /opt/VRTS/install/logs/installsf201164832.summary

The installsf log is saved at:

      /opt/VRTS/install/logs/installsf201164832.log

The installation response file is saved at:

      /opt/VRTS/install/logs/installsf201164832.response

Reboot all systems on which VxFS was installed or upgraded.
       shutdown -y -i6 -g0

See the VERITAS File System Administrators Guide for information
on using VxFS.
```

Note Do not remove the log files until the VERITAS products are working properly on your system. Technical Support will need these log files for debugging purposes. See "Storage Foundation Basic Technical Support" on page 94.

Upgrading VERITAS Storage Foundation Basic

This sections describes how to upgrade VERITAS Storage Foundation Basic.

Note If you upgrade Storage Foundation Basic to any other product, contact VERITAS Sales for product information. See "Getting Help" on page xiv.

Planning the Upgrade

Complete the following tasks in advance of upgrading:

- Ensure that you have created a valid backup.
- Review the *VERITAS Storage Foundation Release Notes* for any late-breaking information on upgrading your system.
- Be sure that the administrator doing the upgrade has root access and a working knowledge of Solaris operating system administration.
- Schedule sufficient outage time for the upgrade.
- To determine which version of Storage Foundation is installed on your system, run the `vxlicrep` command.

Upgrade Paths

The upgrade paths for VERITAS Storage Foundation Basic are:

From	Upgrade to	Tasks
Storage Foundation QuickStart	Storage Foundation Basic	**1.** Uninstall Storage Foundation QuickStart, see "Uninstalling VERITAS Storage Foundation Using the Product Installation Script". **2.** Install Storage Foundation Basic, see "Installing VERITAS Storage Foundation Basic" on page 98.

From	Upgrade to	Tasks
Storage Foundation Basic	Storage Foundation Standard	1. Install the license key by running `vxlicinst` command. 2. Run `vxdctl license init` to reread the Storage Foundation Standard license key.
Storage Foundation Basic	Storage Foundation Enterprise	1. Install the licence key by running `vxlicinst` command. 2. Run `vxdctl license init` to reread the Storage Foundation Enterprise license key.
Storage Foundation Basic	Storage Foundation Enterprise with licensed features: VERITAS Volume Replicator	1. Run the Storage Foundation product `installer` to install the Storage Foundation Enterprise and VERITAS Volume Replicator key, see "Installing the VERITAS Storage Foundation Software" on page 21. 2. Run `vxdctl license init` to reread the VERITAS Volume Replicator license key.

From	Upgrade to	Tasks
Storage Foundation Basic	Any Storage Foundation product	**1.** Uninstall Storage Foundation Basic, see "Uninstalling VERITAS Storage Foundation Basic" on page 106. **2.** Install any Storage Foundation product, see the *VERITAS 4.1 MP1 Storage Foundation and High Availability Solutions Getting Started Guide.*

Uninstalling VERITAS Storage Foundation Basic

This section describes how to uninstall VERITAS Storage Foundation Basic.

▼ To uninstall VERITAS Storage Foundation Basic

1. Log in as superuser (root).
2. Insert the appropriate VERITAS Storage Foundation Basic disc into your system's CD-ROM drive.
3. If Solaris volume management software is running on your system, the software disc is automatically mounted as `/cdrom/cdrom0`.
4. Run the `uninstallsf` program.
   - If the disc is mounted automatically, enter:

     ```
     # cd /cdrom/cdrom0/storage_foundation_basic
     # ./uninstallsf
     ```

   - If the disc is mounted manually, enter:

     ```
     # cd /mount_point/storage_foundation_basic
     # ./uninstallsf
     ```

   ```
   Enter the system names separated by spaces on which to uninstall
   SF: host1 host2
   ```

5. Enter the system names on which the software is installed on. You are prompted to press Return to continue.

   ```
   Press [Return] to continue:
   ```

6. Press **Return** to continue. You are prompted to uninstall the Storage Foundation Basic packages.

   ```
   uninstallsf is now ready to uninstall SF packages.
   All SF processes that are currently running will be stopped.

   Are you sure you want to uninstall SF packages? [y,n,q] (y)
   ```

7. Enter **y** to uninstall the Storage Foundation Basic packages. You are prompted to press Return to continue.

   ```
   Storage Foundation Basic package uninstall completed
   successfully.

   Press [Return] to continue:
   ```

8. Press **Return** to continue after the Storage Foundation Basic package uninstall completed successfully. The following message displays when the uninstall of the Storage Foundation Standard Basic has completed successfully:

```
Uninstallation of Storage Foundation Basic has completed
successfully.

The uninstallation summary is saved at:

      /opt/VRTS/install/logs/uninstallsf201165811.summary
The uninstallsf log is saved at:

      /opt/VRTS/install/logs/uninstallsf201165811.log

CPI WARNING V-9-111-1048
As part of the uninstallation process on Solaris, the current
configuration of VxVM was saved in the directory /VXVM-CFG-BAK.
This configuration may be used in a future installation of VxVM.
If you do not plan to reuse it, you may manually remove this
subdirectory.
```

   Make copies of these files for review in the event that the files are needed at a later date.

9. Proceed to "Uninstalling VERITAS Infrastructure Packages" on page 107.

Uninstalling VERITAS Infrastructure Packages

There are several packages, referred to as *infrastructure* packages, that are used by multiple VERITAS products. These packages are not removed when uninstalling a single VERITAS product. If you remove all VERITAS products from a system and want to ensure that there are no remaining VERITAS packages, use the following commands:

```
# cd /opt/VRTS/install
# ./uninstallinfr
```

The `uninstallinfr` script removes the remaining packages that are required for product installation. The VERITAS Enterprise Administrator packages, `VRTSob` and `VRTSobgui`, are also removed.

Installation Script Options B

If you choose to install VERITAS Storage Foundation, VERITAS Storage Foundation for Oracle, or VERITAS Storage Foundation for Sybase using the product installation script instead of the product installer, you have several options you can use.

Use the table to determine which installation script to use:

If you are installing:	Use
Storage Foundation	installsf
Storage Foundation for Oracle	installsfora
Storage Foundation for Sybase	installsfsyb

Options for the Installation Script

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

Available Command Line Options

Command Line Option	Function
–configure *system1 system2...*	Configures the product after installing using the `-installonly` option.
–installonly *system1 system2...*	Installs packages, but does not configure the product.
–license *system1 system2...*	Updates or installs a product license.
–nolic *system1 system2...*	Installs product packages without licensing or configuring. Licensed features are not installed when using this option.

Available Command Line Options

Command Line Option	Function
–patchpath *patch_path*	Designates a path to VERITAS patches. Used for cluster updates. This option enables the installation of patches without having to copy them to all systems in a cluster. *patch_path* must be a full path name, typically to an NFS-mounted location, that contains the patches to be installed on all systems by any cluster product installation script.
–pkgpath *package_path*	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. *package_path* 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.
–precheck *system1 system2...*	Performs a preinstallation check to determine if systems meet all installation requirements.
–responsefile *response_file*	Automates installation and configuration by using system and configuration information stored in a specified file instead of prompting for information. The *response_file* must be a full path name. For more information, see "Using a Response File With the Installation Script" on page 111.
–systems *system1 system2...*	Specifies the systems to be installed.
–tmppath *tmp_path*	Selects a directory other than `/var/tmp` 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.
–usessh	Specifies when the secure shell (`ssh`) or secure copy (`scp`) programs are used for communication between systems instead of `rsh` and `rcp`. The `–usessh` option requires that systems be preconfigured to allow execution of secure commands without prompting for passwords or confirmations.

Using a Response File With the Installation Script

To use a response file for a fresh installation, you can use any text editor to create a file similar to the following:

```
#
# installsf configuration values:
#
$CFG{DONOTINSTALL}=[];
$CFG{DONOTREMOVE}=[];
$CFG{INSTALL}{AUTOSTART}=1;
$CFG{INSTALL}{SIMULTANEOUS}=0;
$CFG{INSTALL}{SYSTEMS}=["system_name"];
$CFG{INSTALL}{USESSH}=0;
$CFG{KEYS}{system_name}=[];
$CFG{NEWNAMES_FILE}{system_name}=0;
$CFG{VM_RESTORE_CFG}{system_name}=1;
```

Refer to the following table for descriptions of the response file variables:

Response File Variable Explanations

Response File Variable	Description
`CFG{DONOTINSTALL}{`*`package_name`*`}`	Optional, two-dimensional list variable that instructs the installation script to either install or not install the optional packages designated in the list. A **`1`** (one) indicates that the optional packages will be installed and a **`0`** (zero) indicates that the optional packages will not be installed.
`CFG{DONOTREMOVE}{`*`package_name`*`}`	Optional, two-dimensional list variable that instructs the installation script to either remove the existing packages in the list and install new packages or to leave the existing packages on the system and skip installation of the new packages. A **`1`** (one) indicates that the existing packages will not be removed and a **`0`** (zero) indicates that the existing packages will be removed.
`CFG{INSTALL}{AUTOSTART}`	Optional, one-dimensional scalar variable that defines whether the product is to be started following installation. A **`1`** (one) indicates that the system will be restarted and a **`0`** (zero) indicates that the system will not be restarted.

Response File Variable Explanations

Response File Variable	Description
CFG{INSTALL}{SIMULTANEOUS}	Optional, one-dimensional scalar variable that defines whether the product is to be installed on systems simultaneously or consecutively. A **1** (one) indicates that the installation will be simultaneous and a **0** (zero) indicates that the installation will be consecutive.
CFG{INSTALL}{SYSTEMS}	Required, one-dimensional list variable that defines the list of systems on which the product will be installed.
CFG{INSTALL}{USESSH}	Optional, one-dimensional scalar variable that defines whether ssh and scp are configured or rsh is configured for execution of the local or remote installation. A **1** (one) indicates that ssh and scp are configured and a **0** (zero) indicates that rsh is configured.
CFG{KEYS}{*system_name*}	Optional, two-dimensional scalar variable that defines the product keys to be registered on a system. This variable is not necessary if the system already has a license key installed.
CFG{NEWNAMES_FILE}{*system_name*}	Optional, one-dimensional scalar variable that defines whether enclosure-based naming is being used or not. A **1** (one) indicates enclosure-based naming is being used and a **0** (zero) indicates that enclosure-based naming is not being used.
CFG{SFORA_USERNAME}{*system_name*} For an installsfora installation only.	An optional, two-dimensional scalar variable that defines the user name of the database administrator.
CFG{SFORA_GROUPNAME}{*system_name*} For an installsfora installation only.	An optional, two-dimensional scalar variable that defines the group name for the database administrators (DBAs).

Response File Variable Explanations

Response File Variable	Description
`CFG{VM_RESTORE_CFG}{`*`system_name`*`}`	Optional, one-dimensional scalar variable that determines whether a previously-existing configuration of VERITAS Volume Manager will be restored or not. A **`1`** (one) indicates that the configuration will be restored and a **`0`** (zero) indicates that the configuration will not be restored.
`CFG{INSTALL}{SYSTEMSCONFIG}`	Optional, one-dimensional list variable that defines the list of systems to be recognized for configuration when a secure environment prevents all systems from being installed simultaneously.

Note Installing on a Sybase database does not require that you set up a user name or group name for the database. However, this must be done if you are installing on a Oracle database.

When you perform an interactive installation of VERITAS Storage Foundation using the installation script, a response file is automatically generated in the `/opt/VRTS/install/logs` directory. The file name is generated as `installer`*`number`*`.response`, where the number is random. You can use this response file for future installations on the same machine.

Note If you installed to a remote system, the response file will be generated on that system.