Veritas InfoScale™ 7.0 Installation Guide - Solaris

September 2015

VERITAS™

Veritas InfoScale™ Installation Guide

The software described in this book is furnished under a license agreement and may be used only in accordance with the terms of the agreement.

Product version: 7.0

Document version: 7.0 Rev 1

Legal Notice

Symantec Corporation
350 Ellis Street
Mountain View, CA 94043

http://www.symantec.com

Contents

Section 1

Introduction to Veritas InfoScale

Chapter 1

Introducing Veritas InfoScale

This chapter includes the following topics:

About the Veritas InfoScale product suite

The Veritas InfoScale product suite addresses enterprise IT service continuity needs. It draws on Veritas' long heritage of world-class availability and storage management solutions to help IT teams in realizing ever more reliable operations and better protected information across their physical, virtual, and cloud infrastructures. It provides resiliency and software defined storage for critical services across the datacenter infrastructure. It realizes better Return on Investment (ROI) and unlocks high performance by integrating next-generation storage technologies. The solution provides high availability and disaster recovery for complex multi-tiered applications across any distance. Management operations for Veritas InfoScale are enabled through a single, easy-to-use, web-based graphical interface, Veritas InfoScale Operations Manager.

The Veritas InfoScale product suite offers the following products:

- Veritas InfoScale Foundation

- Veritas InfoScale Storage
- Veritas InfoScale Availability
- Veritas InfoScale Enterprise

About Veritas InfoScale Foundation

Veritas InfoScale™ Foundation is specifically designed for enterprise edge-tier, departmental, and test/development systems. InfoScale Foundation combines the industry-leading File System and Volume Manager technology, and delivers a complete solution for heterogeneous online storage management while increasing storage utilization and enhancing storage I/O path availability.

Storage features included in InfoScale Foundation products are listed below:

- No restriction on number of Volumes or File Systems being managed
- Veritas InfoScale Operations Manager Support
- 1-256 TB File System
- Device names using Array Volume IDs
- Dirty region logging
- Dynamic LUN expansion
- Dynamic Multi-pathing
- Enclosure based naming
- iSCSI device support
- Keyless licensing
- Online file system defragmentation
- Online file system grow & shrink
- Online relayout
- Online volume grow & shrink

Storage features included in InfoScale Storage and Enterprise products, but not included in the InfoScale Foundation product are listed below:

- Hot-relocation
- Remote mirrors for campus clusters
- SCSI-3 based I/O Fencing
- SmartMove

- Split-mirror snapshot
- Thin storage reclamation
- Flexible Storage Sharing

About Veritas InfoScale Storage

Veritas InfoScale™ Storage enables organizations to provision and manage storage independently of hardware types or locations. InfoScale Storage delivers predictable Quality-of-Service by identifying and optimizing critical workloads. InfoScale Storage increases storage agility enabling you to work with and manage multiple types of storage to achieve better ROI without compromising on performance and flexibility.

About Veritas InfoScale Availability

Veritas InfoScale™ Availability helps keep organizations' information available and critical business services up and running with a robust software-defined approach. Organizations can innovate and gain cost benefits of physical and virtual across commodity server deployments. Maximum IT service continuity is ensured at all times, moving resiliency from the infrastructure layer to the application layer.

About Veritas InfoScale Enterprise

Veritas InfoScale™ Enterprise addresses enterprise IT service continuity needs. It provides resiliency and software defined storage for critical services across your datacenter infrastructure. Realize better ROI and unlock high performance by integrating next-generation storage technologies. The solution provides high availability and disaster recovery for complex multi-tiered applications across any distance in physical and virtual environments.

Components of the Veritas InfoScale product suite

Each new InfoScale product consists of two or more components. Each component within a product offers a unique capability that you can configure for use in your environment.

Table 1-1 lists the components of each Veritas InfoScale product.

Table 1-1 Veritas InfoScale product suite

Product	Description	Components
Veritas InfoScale™ Foundation	Veritas InfoScale™ Foundation delivers a comprehensive solution for heterogeneous online storage management while increasing storage utilization and enhancing storage I/O path availability.	Storage Foundation (SF) Standard (entry-level features)
Veritas InfoScale™ Storage	Veritas InfoScale™ Storage enables organizations to provision and manage storage independently of hardware types or locations while delivering predictable Quality-of-Service, higher performance, and better Return-on-Investment.	Storage Foundation (SF) Enterprise including Replication Storage Foundation (SF) Standard (entry-level features) Storage Foundation Cluster File System (SFCFS)
Veritas InfoScale™ Availability	Veritas InfoScale™ Availability helps keep an organization's information and critical business services up and running on premise and across globally dispersed data centers.	Cluster Server (VCS) including HA/DR
Veritas InfoScale™ Enterprise	Veritas InfoScale™ Enterprise addresses enterprise IT service continuity needs. It provides resiliency and software defined storage for critical services across your datacenter infrastructure.	Cluster Server (VCS) including HA/DR Storage Foundation (SF) Enterprise including Replication Storage Foundation and High Availability (SFHA) Storage Foundation Cluster File System High Availability (SFCFSHA) Storage Foundation for Oracle RAC (SF Oracle RAC) Storage Foundation for Sybase ASE CE (SFSYBASECE)

Chapter 2

Licensing Veritas InfoScale

This chapter includes the following topics:

About Veritas InfoScale product licensing

You must obtain a license to install and use Veritas InfoScale products.

You can choose one of the following licensing methods when you install a product:

- Install with a license key for the product
  When you purchase a Veritas InfoScale product, you receive a License Key certificate. The certificate specifies the product keys and the number of product licenses purchased.
  See "Registering Veritas InfoScale using product license keys" on page 14.
- Install without a license key (keyless licensing)
  Installation without a license does not eliminate the need to obtain a license. The administrator and company representatives must ensure that a server or cluster is entitled to the license level for the products installed. Symantec reserves the right to ensure entitlement and compliance through auditing.

See "Registering Veritas InfoScale product using keyless licensing" on page 15.

If you encounter problems while licensing this product, visit the Symantec licensing Support website.

http://www.symantec.com/products-solutions/licensing/activating-software/detail.jsp?detail_id=licensing_portal

Registering Veritas InfoScale using product license keys

You can register your product license key in the following ways:

Using the `installer`

The installer automatically registers the license at the time of installation or upgrade.

- You can register your license keys during the installation process. During the installation, you will get the following prompt:

```
1) Enter a valid license key
2) Enable keyless licensing and complete system licensing

How would you like to license the systems? [1-2,q] (2)
```

  Enter **1** to register your license key.
  See "Installing Veritas InfoScale using the installer" on page 55.
- You can also register your license keys using the installer menu. Run the following command:

```
./installer
```

  Select the **L) License a Product** option in the installer menu.

Manual

If you are performing a fresh installation, run the following commands on each node:

```
# cd /opt/VRTS/bin

# ./vxlicinst -k license key

# vxdctl license init
```

If you are performing an upgrade, run the following commands on each node:

```
# cd /opt/VRTS/bin

# ./vxlicinstupgrade -k license key
```

For more information:

See "Using the `vxlicinstupgrade` utility" on page 17.

Even though other products are included on the enclosed software discs, you can only use the Veritas InfoScale software products for which you have purchased a license.

Registering Veritas InfoScale product using keyless licensing

The keyless licensing method uses product levels to determine the Veritas InfoScale products and functionality that are licensed.

You can register a Veritas InfoScale product in the following ways:

Using the `installer`

- Run the following command:

  `./installer`

  The installer automatically registers the license at the time of installation or upgrade.
  See "Installing Veritas InfoScale using the installer" on page 55.
- You can also register your license keys using the installer menu.
  Run the following command:

  `./installer`

  Select the **L) License a Product** option in the installer menu.

Manual	Perform the following steps after installation or upgrade:
	1 Change your current working directory:
	`# export PATH=$PATH:/opt/VRTSvlic/bin`
	2 View the possible settings for the product level:
	`# vxkeyless displayall`
	3 Register the desired product:
	`# vxkeyless set prod_levels`
	where *prod_levels* is a comma-separated list of keywords. The keywords are the product levels as shown by the output of step 2.

Warning: Within 60 days of choosing this option, you must install a valid license key corresponding to the license level entitled, or continue with keyless licensing by managing the systems with Veritas InfoScale Operation Manager. If you fail to comply with the above terms, continuing to use the Veritas InfoScale product is a violation of your End User License Agreement, and results in warning messages.

For more information about keyless licensing, see the following URL:

http://go.symantec.com/sfhakeyless

For more information to use keyless licensing and to download the Veritas InfoScale Operation Manager, see the following URL:

http://go.symantec.com/vom

Updating your product licenses

At any time, you can update your product licenses in any of the following ways:

Move from one product to another	Perform the following steps:
	`# export PATH=$PATH:/opt/VRTSvlic/bin`
	`# vxkeyless set prod_levels`

Move from keyless licensing to key-based licensing	You will need to remove the keyless licenses by using the NONE keyword. **Note:** Clearing the keys disables the Veritas InfoScale products until you install a new key or set a new product level. `# vxkeyless [-q] set NONE` Register a Veritas InfoScale product using a license key: See "Registering Veritas InfoScale using product license keys" on page 14.

Using the `vxlicinstupgrade` utility

The `vxlicinstupgrade` utility enables you to perform the following tasks:

- Upgrade to another Veritas InfoScale product
- Update a temporary license to a permanent license
- Manage co-existence of multiple licenses

On executing the `vxlicinstupgrade` utility, the following checks are done:

- If the current license key is keyless or user-defined and if the user is trying to install the keyless or user defined key of the same product.
  Example: If the 7.0 Foundation Keyless license key is already installed on a system and the user tries to install another 7.0 Foundation Keyless license key, then `vxlicinstupgrade` utility shows an error message:

  ```
  vxlicinstupgrade WARNING: The input License key and Installed key are same.
  ```

- If the current key is keyless and the newly entered license key is user-defined of the same product
  Example: If the 7.0 Foundation Keyless license key is already installed on a system and the user tries to install 7.0 Foundation user-defined license, then the `vxlicinstupgrade` utility installs the new licenses at `/etc/vx/licenses/lic` and all the 7.0 Foundation Keyless keys are deleted and backed up at `/var/vx/licenses/lic<date-timestamp>`.
- If the current key is of higher version and the user tries to install a lower version license key.
  Example: If the 7.0 Enterprise license key is already installed on a system and the user tries to install the 6.0 SFSTD license key, then the `vxlicinstupgrade` utility shows an error message:

```
 vxlicinstupgrade WARNING: The input License key is lower than the
Installed key.
```

- If the current key is of a lower version and the user tries to install a higher version license key.
  Example: If 6.0 SFSTD license key is already installed on a system and the user tries to install 7.0 Storage license key, then the `vxlicinstupgrade` utility installs the new licenses at `/etc/vx/licenses/lic` and all the 6.0 SFSTD keys are deleted and backed up at `/var/vx/licenses/lic<date-timestamp>`.
- Supported Co-existence scenarios:
- InfoScale Foundation and InfoScale Availability
- InfoScale Storage and InfoScale Availability

Example: If the 7.0 Foundation or 7.0 Storage license key is already installed and the user tries to install 7.0 Availability license key or vice -versa, then the `vxlicinstupgrade` utility installs the new licenses and both the keys are preserved at `/etc/vx/licenses/lic`.

Note: When registering license keys manually during upgrade, you have to use the `vxlicinstupgrade` command. When registering keys using the installer script, the same procedures are performed automatically.

About the `VRTSvlic` package

The `VRTSvlic` package enables product licensing. After the `VRTSvlic` is installed, the following commands and their manual pages are available on the system:

`vxlicinst`	Installs a license key for a Veritas InfoScale product See the `vxlicinst(1m)` manual page
`vxlicinstupgrade`	Upgrades your license key when you have a product or older license already present on the system. See the `vxlicinstupgrade(1m)` manual page
`vxlicrep`	Displays the currently installed licenses
`vxlictest`	Retrieves the features and their descriptions that are encoded in a license key

Section 2

Planning and preparation

Chapter 3

System requirements

This chapter includes the following topics:

Important release information

Review the Release notes for the latest information before you install the product.

Review the current compatibility lists to confirm the compatibility of your hardware and software:

- For important updates regarding this release, review the Late-Breaking News TechNote on the Symantec Technical Support website:
  http://www.symantec.com/docs/TECH230620
- For the latest patches available for this release, go to:
  https://sort.symantec.com/
- The hardware compatibility list contains information about supported hardware and is updated regularly. For the latest information on supported hardware, visit the following URL:
  http://www.symantec.com/docs/TECH230646
- The software compatibility list summarizes each Veritas InfoScale product stack and the product features, operating system versions, and third-party products

it supports. For the latest information on supported software, visit the following URL:

http://www.symantec.com/docs/TECH230619

Disk space requirements

Table 3-1 lists the minimum disk space requirements for each product.

Table 3-1 Disk space requirements

Product name	Solaris 10 (MB)	Solaris 11 (MB)
Veritas InfoScale Foundation	566	586
Veritas InfoScale Availability	701	746
Veritas InfoScale Storage	1176	1190
Veritas InfoScale Enterprise	1260	1270

Hardware requirements

This section lists the hardware requirements for Veritas InfoScale.

Table 3-2 lists the hardware requirements for each component in Veritas InfoScale.

Table 3-2 Hardware requirements for components in Veritas InfoScale

Component	Requirement
Dynamic Multi-Pathing (DMP) Storage Foundation (SF) Storage Foundation for High Availability (SFHA)	See "SF and SFHA hardware requirements" on page 22.
Storage Foundation Cluster File System (SFCFS) and Storage Foundation Cluster File System for High Availability (SFCFSHA)	See "SFCFS and SFCFSHA hardware requirements" on page 22.

Table 3-2 Hardware requirements for components in Veritas InfoScale *(continued)*

Component	Requirement
Storage Foundation for Oracle RAC (SF Oracle RAC) Storage Foundation for Sybase CE (SF Sybase CE)	See "SF Oracle RAC and SF Sybase CE hardware requirements" on page 23.
Cluster Server (VCS)	See "VCS hardware requirements" on page 24.

For additional information, see the hardware compatibility list (HCL) at:

http://entsupport.symantec.com/docs/283161

SF and SFHA hardware requirements

Table 3-3 lists the hardware requirements for SF and SFHA.

Table 3-3 SF and SFHA hardware requirements

Item	Requirement
Memory	Each system requires at least 1 GB.

SFCFS and SFCFSHA hardware requirements

Table 3-4 lists the hardware requirements for SFCFSHA.

Table 3-4 Hardware requirements for SFCFSHA

Requirement	Description
Memory (Operating System)	2 GB of memory.
CPU	A minimum of 2 CPUs.
Node	Storage Foundation Cluster File System High Availability supports mixed cluster environments with Solaris 10 SPARC operating systems as long as all the nodes in the cluster have the same CPU architecture.

Table 3-4 Hardware requirements for SFCFSHA *(continued)*

Requirement	Description
Shared storage	Shared storage can be one or more shared disks or a disk array connected either directly to the nodes of the cluster or through a Fibre Channel Switch. Nodes can also have non-shared or local devices on a local I/O channel. It is advisable to have `/`, `/usr`, `/var` and other system partitions on local devices. In a Flexible Storage Sharing (FSS) environment, shared storage may not be required.
Fibre Channel or iSCSI storage	Each node in the cluster must have a Fibre Channel I/O channel or iSCSI storage to access shared storage devices. The primary component of the Fibre Channel fabric is the Fibre Channel switch.
Cluster platforms	There are several hardware platforms that can function as nodes in a Veritas InfoScale cluster. See the *Veritas InfoScale 7.0 Release Notes*. For a cluster to work correctly, all nodes must have the same time. If you are not running the Network Time Protocol (NTP) daemon, make sure the time on all the systems comprising your cluster is synchronized.
SAS or FCoE	Each node in the cluster must have an SAS or FCoE I/O channel to access shared storage devices. The primary components of the SAS or Fibre Channel over Ethernet (FCoE) fabric are the switches and HBAs.

SF Oracle RAC and SF Sybase CE hardware requirements

Table 3-5 Hardware requirements for basic clusters

Item	Description
DVD drive	A DVD drive on one of the nodes in the cluster.
Disks	All shared storage disks support SCSI-3 Persistent Reservations (PR). **Note:** The coordinator disk does not store data, so configure the disk as the smallest possible LUN on a disk array to avoid wasting space. The minimum size required for a coordinator disk is 128 MB.
RAM	Each system requires at least 8 GB.

Table 3-5 Hardware requirements for basic clusters *(continued)*

Item	Description
Swap space	For SF Oracle RAC: See the Oracle Metalink document: 169706.1
Network	Two or more private links and one public link. Links must be 100BaseT or gigabit Ethernet directly linking each node to the other node to form a private network that handles direct inter-system communication. These links must be of the same type; you cannot mix 100BaseT and gigabit. Symantec recommends gigabit Ethernet using enterprise-class switches for the private links. application requires that all nodes use the IP addresses from the same subnet. You can also configure aggregated interfaces.
Fiber Channel or SCSI host bus adapters	At least one additional SCSI or Fibre Channel Host Bus Adapter per system for shared data disks.

VCS hardware requirements

Table 3-6 lists the hardware requirements for a VCS cluster.

Table 3-6 Hardware requirements for a VCS cluster

Item	Description
DVD drive	One drive in a system that can communicate to all the nodes in the cluster.
Disks	Typical configurations require that the applications are configured to use shared disks/storage to enable migration of applications between systems in the cluster. The SFHA I/O fencing feature requires that all data and coordinator disks support SCSI-3 Persistent Reservations (PR).
Ethernet controllers	In addition to the built-in public Ethernet controller, VCS requires at least one more Ethernet interface per system. Symantec recommends two additional network interfaces for private interconnects. You can also configure aggregated interfaces. Symantec recommends that you turn off the spanning tree algorithm on the switches used to connect private network interfaces..

Table 3-6 Hardware requirements for a VCS cluster *(continued)*

Item	Description
Fibre Channel or SCSI host bus adapters	Typical VCS configuration requires at least one SCSI or Fibre Channel Host Bus Adapter per system for shared data disks.
RAM	Each VCS node requires at least 1024 megabytes.

Supported operating systems and database versions

For information on supported operating systems and database versions for various components of Veritas InfoScale, see the *Veritas InfoScale Release Notes*.

Veritas File System requirements

Veritas File System requires that the values of the Solaris variables `lwp_default_stksize` and `svc_default_stksize` are at least 0x6000 (for Solaris 10) and 0x8000 (for Solaris 11). When you install the Veritas File System package, `VRTSvxfs`, the VRTSvxfs packaging scripts check the values of these variables in the kernel. If the values are less than the required values, VRTSvxfs increases the values and modifies the `/etc/system` file with the required values. If the VRTSvxfs scripts increase the values, the installation proceeds as usual except that you must reboot and restart the installation program. A message displays if a reboot is required.

To avoid an unexpected need for a reboot, verify the values of the variables before installing Veritas File System. Use the following commands to check the values of the variables:

For Solaris 10:

```
# echo "lwp_default_stksize/X" | mdb -k
lwp_default_stksize:
lwp_default_stksize:            6000

# echo "svc_default_stksize/X" | mdb -k
svc_default_stksize:
svc_default_stksize:            6000
```

For Solaris 11:
```
# echo "lwp_default_stksize/X" | mdb -k
lwp_default_stksize:
lwp_default_stksize:            8000

# echo "svc_default_stksize/X" | mdb -k
svc_default_stksize:
svc_default_stksize:            8000
```

If the values shown are less than 6000 (for Solaris 10) and less than 8000 (for Solaris 11), you can expect a reboot after installation.

Note: The default value of the `svc_default_stksize` variable is 0 (zero), which indicates that the value is set to the value of the `lwp_default_stksize` variable. In this case, no reboot is required, unless the value of the `lwp_default_stksize` variable is too small.

To avoid a reboot after installation, you can modify the `/etc/system` file with the appropriate values. Reboot the system prior to installing the packages. Add the following lines to the `/etc/system` file:

For Solaris 10:
```
set lwp_default_stksize=0x6000
set rpcmod:svc_default_stksize=0x6000
```

For Solaris 11:
```
set lwp_default_stksize=0x8000
set rpcmod:svc_default_stksize=0x8000
```

Number of nodes supported

Veritas InfoScale supports cluster configurations up to 64 nodes. At the time of product release, cluster configurations have been qualified and tested with up to 32 nodes.

SFHA, SFCFSHA, SF Oracle RAC: Flexible Storage Sharing (FSS) only supports cluster configurations with up to 8 nodes.

SFHA, SFCFSHA: SmartIO writeback caching only supports cluster configurations with up to 2 nodes.

Chapter 4

Preparing to install

This chapter includes the following topics:

Mounting the ISO image

An ISO file is a disc image that must be mounted to a virtual drive for use. You must have superuser (root) privileges to mount the Veritas InfoScale ISO image.

To mount the ISO image

1. Log in as superuser on a system where you want to install Veritas InfoScale.
2. Associate the ISO image to a block device:

   ```
   # lofiadm -a <ISO_image_path> <block_device>
   ```

   Where:

   <ISO_image_path> is the complete path to the ISO image

   <block_device> is the complete path to the block device
3. Mount the image:

   ```
   # mount -F hsfs -o ro <block_device> /mnt
   ```

Setting up ssh or rsh for inter-system communications

The installer uses passwordless Secure Shell (ssh) or Remote Shell (rsh) communications among systems. During an installation, you choose the communication method that you want to use. Or, you can run the `installer -comsetup` command to set up ssh or rsh explicitly. When the installation process completes, the installer asks you if you want to remove the password-less connection. If installation terminated abruptly, use the installation script's `-comcleanup` option to remove the ssh or rsh configuration from the systems.

In most installation, configuration, upgrade (where necessary), and uninstallation scenarios, the installer configures ssh or rsh on the target systems. When you perform installation using a response file, you need to set up ssh or rsh manually, or use the`installer -comsetup` option to set up an ssh or rsh configuration from the systems.

See “Installation script options” on page 110.

Obtaining installer patches

You can access public installer patches automatically or manually on the Symantec Operations Readiness Tools (SORT) website's Patch Finder page at:

https://sort.symantec.com/patch/finder

To download installer patches automatically

- If you are running Veritas InfoScale version 7.0 or later, and your system has Internet access, the installer automatically imports any needed installer patch, and begins using it.

Automatically downloading installer patches requires the installer to make outbound networking calls. You can also disable external network connection attempts.

See "Disabling external network connection attempts" on page 29.

If your system does not have Internet access, you can download installer patches manually.

To download installer patches manually

1. Go to the Symantec Operations Readiness Tools (SORT) website's Patch Finder page, and save the most current patch on your local system.
2. Navigate to the directory where you want to unzip the file you downloaded in step 1.
3. Unzip the patch tar file. For example, run the following command:

```
# gunzip cpi-7.0P2-patches.tar.gz
```

4. Untar the file. For example, enter the following:

```
# tar -xvf cpi-7.0P2-patches.tar
patches/
patches/CPI70P2.pl
README
```

5. Navigate to the installation media or to the installation directory.
6. To start using the patch, run the `installer` command with the `-require` option. For example, enter the following:

```
# ./installer -require /target_directory/patches/CPI70P2.pl
```

Disabling external network connection attempts

When you execute the `installer` command, the installer attempts to make an outbound networking call to get information about release updates and installer patches. If you know your systems are behind a firewall, or do not want the installer to make outbound networking calls, you can disable external network connection attempts by the installer.

To disable external network connection attempts

- Disable inter-process communication (IPC).

  To disable IPC, run the installer with the `-noipc` option.

  For example, to disable IPC for system1 (sys1) and system2 (sys2) enter the following:

  ```
  # ./installer -noipc sys1 sys2
  ```

Verifying the systems before installation

Use any of the following options to verify your systems before installation:

- Option 1: Run Symantec Operations Readiness Tools (SORT).
  For information on downloading and running SORT:
  https://sort.symantec.com

  Note: You can generate a pre-installation checklist to determine the pre-installation requirements: Go to the SORT installation checklist tool. From the drop-down lists, select the information for the Veritas InfoScale product you want to install, and click Generate Checklist.

- Option 2: Run the installer with the "-precheck" option as follows:
  Navigate to the directory that contains the installation program.
  Start the preinstallation check:

  ```
  # ./installer -precheck sys1 sys2
  ```

  where *sys1, sys2* are the names of the nodes in the cluster.
  The program proceeds in a non-interactive mode, examining the systems for licenses, packages, disk space, and system-to-system communications. The program displays the results of the check and saves them in a log file. The location of the log file is displayed at the end of the precheck process.

Setting up the private network

This topic applies to VCS, SFHA, SFCFS, SFCFSHA, SF Oracle RAC, and SF Sybase CE.

VCS requires you to set up a private network between the systems that form a cluster. You can use either NICs or aggregated interfaces to set up private network.

You can use network switches instead of hubs. However, Oracle Solaris systems assign the same MAC address to all interfaces by default. Thus, connecting two or more interfaces to a network switch can cause problems.

For example, consider the following case where:

- The IP address is configured on one interface and LLT on another
- Both interfaces are connected to a switch (assume separate VLANs)

The duplicate MAC address on the two switch ports can cause the switch to incorrectly redirect IP traffic to the LLT interface and vice versa. To avoid this issue, configure the system to assign unique MAC addresses by setting the `eeprom(1M)` parameter local-mac-address to true.

The following products make extensive use of the private cluster interconnects for distributed locking:

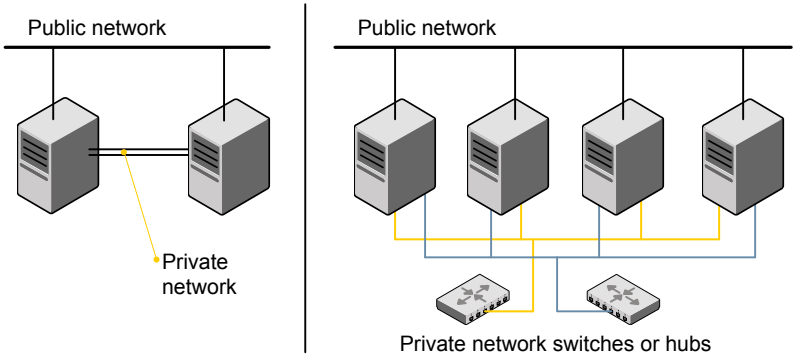
- Storage Foundation Cluster File System (SFCFS)
- Storage Foundation for Oracle RAC (SF Oracle RAC)

Symantec recommends network switches for the SFCFS and the SF Oracle RAC clusters due to their performance characteristics.

Refer to the *Cluster Server Administrator's Guide* to review VCS performance considerations.

Figure 4-1 shows two private networks for use with VCS.

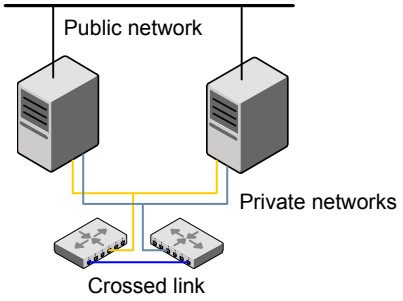
Figure 4-1 Private network setups: two-node and four-node clusters



You need to configure at least two independent networks between the cluster nodes with a network switch for each network. You can also interconnect multiple layer 2 switches for advanced failure protection. Such connections for LLT are called cross-links.

Figure 4-2 shows a private network configuration with crossed links between the network switches.

Figure 4-2 Private network setup with crossed links



Symantec recommends one of the following two configurations:

- Use at least two private interconnect links and one public link. The public link can be a low priority link for LLT. The private interconnect link is used to share cluster status across all the systems, which is important for membership arbitration and high availability. The public low priority link is used only for heartbeat communication between the systems.
- If your hardware environment allows use of only two links, use one private interconnect link and one public low priority link. If you decide to set up only two links (one private and one low priority link), then the cluster must be configured to use I/O fencing, either disk-based or server-based fencing configuration. With only two links, if one system goes down, I/O fencing ensures that other system can take over the service groups and shared file systems from the failed node.

To set up the private network

1. Install the required network interface cards (NICs).

   Create aggregated interfaces if you want to use these to set up private network.

2. Connect the Veritas InfoScale private Ethernet controllers on each system.
3. Use crossover Ethernet cables, switches, or independent hubs for each Veritas InfoScale communication network. Note that the crossover Ethernet cables are supported only on two systems.

   Ensure that you meet the following requirements:

   - The power to the switches or hubs must come from separate sources.
   - On each system, you must use two independent network cards to provide redundancy.

- If a network interface is part of an aggregated interface, you must not configure the network interface under LLT. However, you can configure the aggregated interface under LLT.
- When you configure Ethernet switches for LLT private interconnect, disable the spanning tree algorithm on the ports used for the interconnect.

During the process of setting up heartbeat connections, consider a case where a failure removes all communications between the systems.

Note that a chance for data corruption exists under the following conditions:

- The systems still run, and
- The systems can access the shared storage.

4 Configure the Ethernet devices that are used for the private network such that the autonegotiation protocol is not used. You can achieve a more stable configuration with crossover cables if the autonegotiation protocol is not used.

To achieve this stable configuration, do one of the following:

- Edit the /etc/system file to disable autonegotiation on all Ethernet devices system-wide.
- Create a qfe.conf or bge.conf file in the /kernel/drv directory to disable autonegotiation for the individual devices that are used for private network.

Refer to the Oracle Ethernet driver product documentation for information on these methods.

5 Test the network connections. Temporarily assign network addresses and use `telnet` or `ping` to verify communications.

LLT uses its own protocol, and does not use TCP/IP. So, you must ensure that the private network connections are used only for LLT communication and not for TCP/IP traffic. To verify this requirement, unplumb and unconfigure any temporary IP addresses that are configured on the network interfaces.

The installer configures the private network in the cluster during configuration.

You can also manually configure LLT.

Optimizing LLT media speed settings on private NICs

For optimal LLT communication among the cluster nodes, the interface cards on each node must use the same media speed settings. Also, the settings for the switches or the hubs that are used for the LLT interconnections must match that of the interface cards. Incorrect settings can cause poor network performance or even network failure.

If you use different media speed for the private NICs, Symantec recommends that you configure the NICs with lesser speed as low-priority links to enhance LLT performance.

Guidelines for setting the media speed for LLT interconnects

Review the following guidelines for setting the media speed for LLT interconnects:

- Symantec recommends that you manually set the same media speed setting on each Ethernet card on each node.

  If you use different media speed for the private NICs, Symantec recommends that you configure the NICs with lesser speed as low-priority links to enhance LLT performance.
- If you have hubs or switches for LLT interconnects, then set the hub or switch port to the same setting as used on the cards on each node.

Details for setting the media speeds for specific devices are outside of the scope of this manual. Consult the device's documentation or the operating system manual for more information.

Guidelines for setting the maximum transmission unit (MTU) for LLT interconnects in Flexible Storage Sharing (FSS) environments

Review the following guidelines for setting the MTU for LLT interconnects in FSS environments:

- Set the maximum transmission unit (MTU) to the highest value (typically 9000) supported by the NICs when LLT is configured over Ethernet or UDP for both high priority and low priority links. Ensure that the switch is also set to 9000 MTU.

  Note: MTU setting is not required for LLT over RDMA configurations.

- For virtual NICs, all the components—the virtual NIC, the corresponding physical NIC, and the virtual switch—must be set to 9000 MTU.
- If a higher MTU cannot be configured on the public link (because of restrictions on other components such as a public switch), do not configure the public link in LLT. LLT uses the lowest of the MTU that is configured among all high priority and low priority links.

Setting up shared storage

This topic applies to VCS, SFHA, SFCFSHA, SF Oracle RAC, and SF Sybase CE.

The sections describe how to set up the SCSI and the Fibre Channel devices that the cluster systems share.

Setting up shared storage: SCSI disks

When SCSI devices are used for shared storage, the SCSI address or SCSI initiator ID of each node must be unique. Since each node typically has the default SCSI address of "7," the addresses of one or more nodes must be changed to avoid a conflict. In the following example, two nodes share SCSI devices. The SCSI address of one node is changed to "5" by using `nvedit` commands to edit the `nvramrc` script.

If you have more than two systems that share the SCSI bus, do the following:

- Use the same procedure to set up shared storage.
- Make sure to meet the following requirements:
  - The storage devices have power before any of the systems
  - Only one node runs at one time until each node's address is set to a unique value

To set up shared storage

1. Install the required SCSI host adapters on each node that connects to the storage, and make cable connections to the storage.

   Refer to the documentation that is shipped with the host adapters, the storage, and the systems.

2. With both nodes powered off, power on the storage devices.
3. Power on one system, but do not allow it to boot. If necessary, halt the system so that you can use the ok prompt.

   Note that only one system must run at a time to avoid address conflicts.

4. Find the paths to the host adapters:

   ```
   {0} ok show-disks
   ...b) /sbus@6,0/QLGC,isp@2,10000/sd
   ```

   The example output shows the path to one host adapter. You must include the path information without the "/sd" directory, in the `nvramrc` script. The path information varies from system to system.

5 Edit the `nvramrc` script on to change the scsi-initiator-id to 5. (The *Solaris OpenBoot 3.x Command Reference Manual* contains a full list of `nvedit` commands and keystrokes.) For example:

```
{0} ok nvedit
```

As you edit the script, note the following points:

- Each line is numbered, 0:, 1:, 2:, and so on, as you enter the `nvedit` commands.
- On the line where the scsi-initiator-id is set, insert exactly one space after the first quotation mark and before scsi-initiator-id.

In this example, edit the nvramrc script as follows:

```
0: probe-all
1: cd /sbus@6,0/QLGC,isp@2,10000
2: 5 " scsi-initiator-id" integer-property
3: device-end
4: install-console
5: banner
6: <CTRL-C>
```

6 Store the changes you make to the `nvramrc` script. The changes you make are temporary until you store them.

```
{0} ok nvstore
```

If you are not sure of the changes you made, you can re-edit the script without risk before you store it. You can display the contents of the `nvramrc` script by entering:

```
{0} ok printenv nvramrc
```

You can re-edit the file to make corrections:

```
{0} ok nvedit
```

Or, discard the changes if necessary by entering:

```
{0} ok nvquit
```

7 Instruct the OpenBoot PROM Monitor to use the `nvramrc` script on the node.

```
{0} ok setenv use-nvramrc? true
```

8. Reboot the node. If necessary, halt the system so that you can use the ok prompt.
9. Verify that the scsi-initiator-id has changed. Go to the ok prompt. Use the output of the show-disks command to find the paths for the host adapters. Then, display the properties for the paths. For example:

```
{0} ok show-disks
...b) /sbus@6,0/QLGC,isp@2,10000/sd
{0} ok cd /sbus@6,0/QLGC,isp@2,10000
{0} ok .properties
scsi-initiator-id     00000005
```

   Permit the system to continue booting.

10. Boot the second node. If necessary, halt the system to use the ok prompt. Verify that the scsi-initiator-id is 7. Use the output of the `show-disks` command to find the paths for the host adapters. Then, display the properties for that paths. For example:

```
{0} ok show-disks
...b) /sbus@6,0/QLGC,isp@2,10000/sd
{0} ok cd /sbus@6,0/QLGC,isp@2,10000
{0} ok .properties
scsi-initiator-id      00000007
```

   Permit the system to continue booting.

Setting up shared storage: Fibre Channel

Perform the following steps to set up Fibre Channel.

To set up shared storage

1. Install the required FC-AL controllers.
2. Connect the FC-AL controllers and the shared storage devices to the same hub or switch.

   All systems must see all the shared devices that are required to run the critical application. If you want to implement zoning for a fibre switch, make sure that no zoning prevents all systems from seeing all these shared devices.

3 Boot each system with the reconfigure devices option:

```
ok boot -r
```

4 After all systems have booted, use the `format(1m)` command to verify that each system can see all shared devices.

If Volume Manager is used, the same number of external disk devices must appear, but device names (c#t#d#s#) may differ.

If Volume Manager is not used, then you must meet the following requirements:

- The same number of external disk devices must appear.
- The device names must be identical for all devices on all systems.

Synchronizing time settings on cluster nodes

Make sure that the time settings on all cluster nodes are synchronized. If the nodes are not in sync, timestamps for change (`ctime`) and modification (`mtime`) may not be consistent with the sequence in which operations actually happened.

For instructions, see the operating system documentation.

Creating a root user

This topic applies to DMP, SFHA, SFCFSHA, SF Oracle RAC, and VCS.

On Oracle Solaris 11, you need to change the root role into a user as you cannot directly log in as root user.

To change root role into a user

1 Log in as local user and assume the root role.

```
% su  - root
```

2 Remove the root role from local users who have been assigned the role.

```
# roles admin

root

# usermod -R " " admin
```

3 Change the root role into a user.

```
# rolemod -K type=normal root
```

4 Verify the change.

- `# getent user_attr root`

  ```
  root::::auths=solaris.*;profiles=All;audit_flags=lo\
  :no;lock_after_retries=no;min_label=admin_low;clearance=admin_high
  ```

  If the `type` keyword is not present in the output or is equal to normal, the account is not a role.

- `# userattr type root`

  If the output is empty or lists normal, the account is not a role.

Note: For more information, see the Oracle documentation on Oracle Solaris 11 operating system.

Note: After installation, you may want to change root user into root role to allow local users to assume the root role.

Creating the /opt directory

This topic applies to DMP, SFHA, and SFCFSHA.

The directory `/opt` must exist, be writable, and must not be a symbolic link.

If you want to upgrade, you cannot have a symbolic link from `/opt` to an unconverted volume. If you have a symbolic link to an unconverted volume, the symbolic link does not function during the upgrade and items in `/opt` are not installed.

Planning the installation setup for SF Oracle RAC and SF Sybase CE systems

This section provides guidelines and best practices for planning resilient, high-performant clusters. These best practices suggest optimal configurations for your core clustering infrastructure such as network and storage. Recommendations are also provided on planning for continuous data protection and disaster recovery.

Review the following planning guidelines before you install Veritas InfoScale:

- Planning your network configuration
  See "Planning your network configuration" on page 40.
- Planning the storage
  See "Planning the storage" on page 44.
- Planning volume layout
  See "Planning volume layout" on page 50.
- Planning file system design
  See "Planning file system design" on page 51.

Planning your network configuration

The following practices are recommended for a resilient network setup:

- Configure the private cluster interconnect over multiple dedicated gigabit Ethernet links. All single point of failures such as network interface cards (NIC), switches, and interconnects should be eliminated.
- The NICs used for the private cluster interconnect should have the same characteristics regarding speed, MTU, and full duplex on all nodes. Do not allow the NICs and switch ports to auto-negotiate speed.
- Configure non-routable IP addresses for private cluster interconnects.
- The default value for LLT peer inactivity timeout is 16 seconds.
  For SF Oracle RAC: The value should be set based on service availability requirements and the propagation delay between the cluster nodes in case of campus cluster setup. The LLT peer inactivity timeout value indicates the interval after which Veritas InfoScale on one node declares the other node in the cluster dead, if there is no network communication (heartbeat) from that node.
  The default value for the CSS miss-count in case of Veritas InfoScale is 600 seconds. The value of this parameter is much higher than the LLT peer inactivity timeout so that the two clusterwares, VCS and Oracle Clusterware, do not interfere with each other's decisions on which nodes should remain in the cluster in the event of network split-brain. Veritas I/O fencing is allowed to decide on the surviving nodes first, followed by Oracle Clusterware. The CSS miss-count value indicates the amount of time Oracle Clusterware waits before evicting another node from the cluster, when it fails to respond across the interconnect.
  For more information, see the Oracle Metalink document: 782148.1

Planning the public network configuration for application

Identify separate public virtual IP addresses for each node in the cluster. application requires one public virtual IP address for the application listener process on each node. Public virtual IP addresses are used by client applications to connect to the application database and help mitigate TCP/IP timeout delays.

For SF Oracle RAC: For Oracle 11g Release 2 and later versions, additionally, you need a Single Client Access Name (SCAN) registered in Enterprise DNS that resolves to three IP addresses (recommended). Oracle Clusterware/Grid Infrastructure manages the virtual IP addresses.

Planning the private network configuration for Oracle RAC

application requires a minimum of one private IP address on each node for Oracle Clusterware heartbeat.

Depending on the version of application you want to install, use one of the following options for setting up the private network configuration for application database cache fusion:

a10g	Use either application UDP IPC or VCSIPC/LMX/LLT for the database cache fusion traffic. By default, the database cache fusion traffic is configured to use VCSIPC/LMX/LLT.
Oracle and later versions	You must use UDP IPC for the database cache fusion traffic.

Symantec recommends using multiple private interconnects for load balancing the cache fusion traffic.

Note: The private IP addresses of all nodes that are on the same physical network must be in the same IP subnet.

The following practices provide a resilient private network setup:

- Configure Oracle Clusterware interconnects over LLT links to prevent data corruption.

  In an Veritas InfoScale cluster, the Oracle Clusterware heartbeat link MUST be configured as an LLT link. If Oracle Clusterware and LLT use different links for their communication, then the membership change between VCS and Oracle Clusterware is not coordinated correctly. For example, if only the Oracle Clusterware links are down, Oracle Clusterware kills one set of nodes after the expiry of the css-misscount interval and initiates the Oracle Clusterware and

database recovery, even before CVM and CFS detect the node failures. This uncoordinated recovery may cause data corruption.

- Oracle Clusterware interconnects need to be protected against NIC failures and link failures. For Oracle RAC 10g Release 2 and 11.2.0.1 versions, the PrivNIC or MultiPrivNIC agent can be used to protect against NIC failures and link failures, if multiple links are available. Even if link aggregation solutions in the form of bonded NICs are implemented, the PrivNIC or MultiPrivNIC agent can be used to provide additional protection against the failure of the aggregated link by failing over to available alternate links. These alternate links can be simple NIC interfaces or bonded NICs.
  An alternative option is to configure the Oracle Clusterware interconnects over bonded NIC interfaces.
  See "High availability solutions for Oracle RAC private network" on page 43.

  Note: The PrivNIC and MultiPrivNIC agents are no longer supported in Oracle RAC 11.2.0.2 and later versions for managing cluster interconnects.

  For 11.2.0.2 and later versions, Symantec recommends the use of alternative solutions such as bonded NIC interfaces or Oracle High Availability IP (HAIP).

- Configure Oracle Cache Fusion traffic to take place through the private network. Symantec also recommends that all UDP cache-fusion links be LLT links.
  For Oracle RAC 10g Release 2 and 11.2.0.1 versions, the PrivNIC and MultiPrivNIC agents provide a reliable alternative when operating system limitations prevent you from using NIC bonding to provide high availability and increased bandwidth using multiple network interfaces. In the event of a NIC failure or link failure, the agent fails over the private IP address from the failed link to the connected or available LLT link. To use multiple links for database cache fusion for increased bandwidth, configure the `cluster_interconnects` initialization parameter with multiple IP addresses for each database instance and configure these IP addresses under MultiPrivNIC for high availability.
  Oracle database clients use the public network for database services. Whenever there is a node failure or network failure, the client fails over the connection, for both existing and new connections, to the surviving node in the cluster with which it is able to connect. Client failover occurs as a result of Oracle Fast Application Notification, VIP failover and client connection TCP timeout. It is strongly recommended not to send Oracle Cache Fusion traffic through the public network.
- Use NIC bonding to provide redundancy for public networks so that application can fail over virtual IP addresses if there is a public link failure.

High availability solutions for Oracle RAC private network

Table 4-1 lists the high availability solutions that you may adopt for your private network.

Table 4-1 High availability solutions for Oracle RAC private network

Options	Description
Using IPMP for Oracle Clusterware	If Oracle Clusterware interconnects are configured over IPMP, all the NICs that are configured under LLT must be configured under the IPMP group. In such a configuration, it is recommended not to manage these links using the PrivNIC/MultiPrivNIC agents.
Using link aggregation/ NIC bonding for Oracle Clusterware	Use a native NIC bonding solution to provide redundancy, in case of NIC failures. Make sure that a link configured under a aggregated link or NIC bond is not configured as a separate LLT link. When LLT is configured over a bonded interface, do one of the following steps to prevent GAB from reporting jeopardy membership: ■ Configure an additional NIC under LLT in addition to the bonded NIC. ■ Add the following line in the `/etc/lltab` file: `set-dbg-minlinks 2`
Using PrivNIC/MultiPrivNIC agents	**Note:** The PrivNIC and MultiPrivNIC agents are no longer supported in Oracle RAC 11.2.0.2 and later versions for managing cluster interconnects. For 11.2.0.2 and later versions, Symantec recommends the use of alternative solutions such as bonded NIC interfaces or Oracle HAIP. Use the PrivNIC agent when operating system limitations prevent you from using NIC bonding to provide high availability using multiple network interfaces. Use the MultiPrivNIC agent when operating system limitations prevent you from using NIC bonding to provide high availability and increased bandwidth using multiple network interfaces. For more deployment scenarios that illustrate the use of PrivNIC/MultiPrivNIC deployments, see the appendix "SF Oracle RAC deployment scenarios" in this document.

Planning the public network configuration for application

Public interconnects are used by the clients to connect to application database. The public networks must be physically separated from the private networks.

See application documentation for more information on recommendations for public network configurations.

Planning the private network configuration for application

Private interconnect is an essential component of a shared disk cluster installation. It is a physical connection that allows inter-node communication. Symantec recommends that these interconnects and LLT links must be the same. You must have the IP addresses configured on these interconnects, persistent after reboot. You must use solutions specific to the operating System.

See application documentation for more information on recommendations for private network configurations.

Planning the storage

Veritas InfoScale provides the following options for shared storage:

- CVM
  CVM provides native naming (OSN) as well as enclosure-based naming (EBN). Use enclosure-based naming for easy administration of storage. Enclosure-based naming guarantees that the same name is given to a shared LUN on all the nodes, irrespective of the operating system name for the LUN.
- CFS
- **For SF Oracle RAC:** Local storage
  With FSS, local storage can be used as shared storage. The local storage can be in the form of Direct Attached Storage (DAS) or internal disk drives.
- **For SF Oracle RAC:**Oracle ASM over CVM

The following recommendations ensure better performance and availability of storage.

- Use multiple storage arrays, if possible, to ensure protection against array failures. The minimum recommended configuration is to have two HBAs for each host and two switches.
- Design the storage layout keeping in mind performance and high availability requirements. Use technologies such as striping and mirroring.
- Use appropriate stripe width and depth to optimize I/O performance.
- Use SCSI-3 persistent reservations (PR) compliant storage.

- Provide multiple access paths to disks with HBA/switch combinations to allow DMP to provide high availability against storage link failures and to provide load balancing.

Planning the storage

Table 4-2 lists the type of storage required for SF Oracle RAC and SF Sybase CE.

Table 4-2 Type of storage required for SF Oracle RAC and SF Sybase CE

Files	Type of storage
SF Oracle RAC and SF Sybase CE binaries	Local
SF Oracle RAC and SF Sybase CE database storage management repository	Shared

Planning the storage for Oracle RAC

Review the storage options and guidelines for application:

- Storage options for OCR and voting disk
  See "Planning the storage for OCR and voting disk" on page 45.
- Storage options for the application installation directories (ORACLE_BASE, CRS_HOME or GRID_HOME (depending on application version), and ORACLE_HOME)
  See "Planning the storage for Oracle RAC binaries and data files" on page 48.

Planning the storage for OCR and voting disk

Depending on the application version and the type of redundancy you want for the OCR and voting disks, use one of the following storage options:

External redundancy

Oracle RAC 10g Release 2:

- Clustered File System
- CVM raw volumes

Oracle RAC 11g Release 2 and later versions:

- Clustered File System
- ASM disk groups created using CVM raw volumes

See " OCR and voting disk storage configuration for external redundancy" on page 46.

Normal redundancy	Clustered File System See " OCR and voting disk storage configuration for normal redundancy" on page 47. **Note:** It is recommended that you configure atleast resource dependency for high availability of the OCR and voting disk resources.

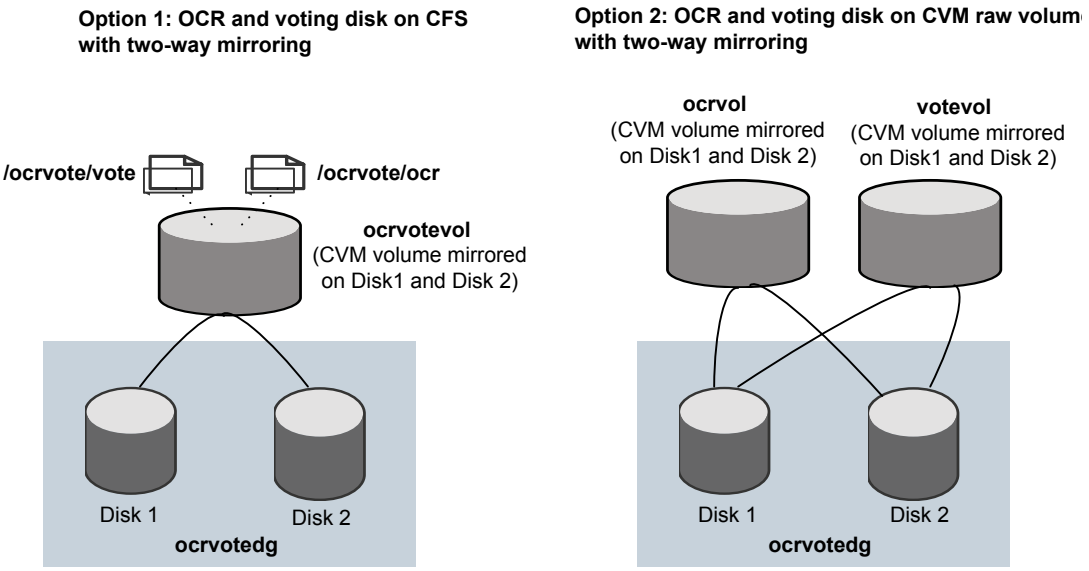
Review the following notes before you proceed:

- Set the disk detach policy setting to (`local`) with ioship off for OCR and voting disk.
- Configure OCR and voting disk on non-replicated shared storage when you configure global clusters.
- If you plan to use FSS, configure OCR and voting disk on SAN storage.

OCR and voting disk storage configuration for external redundancy

Figure 4-3 illustrates the OCR and voting disk storage options for external redundancy.

Figure 4-3 OCR and voting disk storage configuration for external redundancy



- If you want to place OCR and voting disk on a clustered file system (option 1), you need to have two separate files for OCR and voting information respectively on CFS mounted on a CVM mirrored volume.
- If you want to place OCR and voting disk on CVM raw volumes or on ASM disk groups that use CVM raw volumes (option 2), you need to use two CVM mirrored volumes for configuring OCR and voting disk on these volumes.

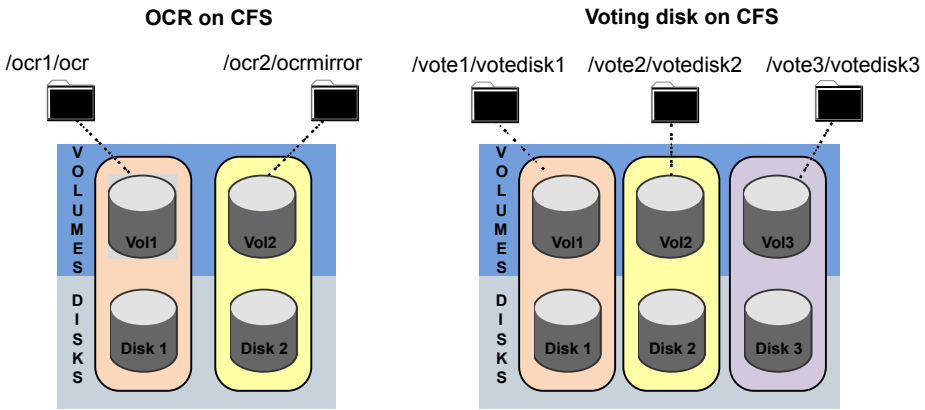
For both option 1 and option 2:

- The option **External Redundancy** must be selected at the time of installing Oracle Clusterware/Grid Infrastructure.
- The installer needs at least two LUNs for creating the OCR and voting disk storage.
  See the application documentation for application's recommendation on the required disk space for OCR and voting disk.

OCR and voting disk storage configuration for normal redundancy

Figure 4-4 illustrates the OCR and voting disk storage options for normal redundancy.

Figure 4-4 OCR and voting disk storage configuration for normal redundancy



The OCR and voting disk files exist on separate cluster file systems.

Configure the storage as follows:

- Create separate filesystems for OCR and OCR mirror.
- Create separate filesystems for a minimum of 3 voting disks for redundancy.
- The option **Normal Redundancy** must be selected at the time of installing Oracle Clusterware/Grid Infrastructure.

Note: It is recommended that you configure atleast resource dependency for high availability of the OCR and voting disk resources.

Planning the storage for Oracle RAC binaries and data files

The Oracle RAC binaries can be stored on local storage or on shared storage, based on your high availability requirements.

Note: Symantec recommends that you install the Oracle Clusterware and Oracle RAC database binaries local to each node in the cluster.

Consider the following points while planning the installation:

- Local installations provide improved protection against a single point of failure and also allows for applying Oracle RAC patches in a rolling fashion.
- CFS installations provide a single Oracle installation to manage, regardless of the number of nodes. This scenario offers a reduction in storage requirements and easy addition of nodes.

Table 4-3 lists the type of storage for Oracle RAC binaries and data files.

Table 4-3 Type of storage for application binaries and data files

Oracle RAC files	Type of storage
Oracle base	Local
Oracle Clusterware/Grid Infrastructure binaries	Local Placing the Oracle Grid Infrastructure binaries on local disks enables rolling upgrade of the cluster.
Oracle RAC database binaries	Local Placing the Oracle RAC database binaries on local disks enables rolling upgrade of the cluster.

Table 4-3 Type of storage for application binaries and data files *(continued)*

Oracle RAC files	Type of storage
Database datafiles	Shared Store the Oracle RAC database files on CFS rather than on raw device or CVM raw device for easier management. Create separate clustered file systems for each Oracle RAC database. Keeping the Oracle RAC database datafiles on separate mount points enables you to unmount the database for maintenance purposes without affecting other databases. If you plan to store the Oracle RAC database on ASM, configure the ASM disk groups over CVM volumes to take advantage of dynamic multi-pathing.
Database recovery data (archive, flash recovery)	Shared Place archived logs on CFS rather than on local file systems.

Planning for Oracle RAC ASM over CVM

Review the following information on storage support provided by Oracle RAC ASM:

Supported by ASM	ASM provides storage for data files, control files, online redo logs and archive log files, and backup files. Starting with Oracle RAC 11g Release 2, ASM also supports storage for OCR and voting disk.
Not supported by ASM	Oracle RAC 10g Release 2: ASM does not support Oracle binaries, trace files, alert logs, export files, tar files, core files, Oracle Cluster Registry devices (OCR), and voting disk, and application binaries on ASM. Oracle RAC 11g Release 2 and later versions: ASM does not support Oracle binaries, trace files, alert logs, export files, tar files, core files, and application binaries on ASM.

The following practices offer high availability and better performance:

- Use CVM mirrored volumes with dynamic multi-pathing for creating ASM disk groups. Select external redundancy while creating ASM disk groups.
- The CVM raw volumes used for ASM must be used exclusively for ASM. Do not use these volumes for any other purpose, such as creation of file systems. Creating file systems on CVM raw volumes used with ASM may cause data corruption.

- Do not link the Veritas ODM library when databases are created on ASM. ODM is a disk management interface for data files that reside on the Veritas File System.
- Use a minimum of two application ASM disk groups. Store the data files, one set of redo logs, and one set of control files on one disk group. Store the Flash Recovery Area, archive logs, and a second set of redo logs and control files on the second disk group.
  For more information, see application's ASM best practices document.
- Do not configure DMP meta nodes as ASM disks for creating ASM disk groups. Access to DMP meta nodes must be configured to take place through CVM.
- Do not combine DMP with other multi-pathing software in the cluster.
- Do not use coordinator disks, which are configured for I/O fencing, as ASM disks. I/O fencing disks should not be imported or used for data.
- Volumes presented to a particular ASM disk group should be of the same speed and type.

Planning volume layout

The following recommendations ensure optimal layout of VxVM/CVM volumes:

- Mirror the volumes across two or more storage arrays, if using VxVM mirrors. Keep the Fast Mirror Resync regionsize equal to the database block size to reduce the copy-on-write (COW) overhead. Reducing the regionsize increases the amount of Cache Object allocations leading to performance overheads.
- Distribute the I/O load uniformly on all Cache Objects when you create multiple Cache Objects.
- Implement zoning on SAN switch to control access to shared storage. Be aware that physical disks may be shared by multiple servers or applications and must therefore be protected from accidental access.
- Choose DMP I/O policy based on the storage network topology and the application I/O pattern.
- Exploit thin provisioning for better return on investment.
- **For SF Oracle RAC:**
  Separate the Oracle recovery structures from the database files to ensure high availability when you design placement policies.
  Separate redo logs and place them on the fastest storage (for example, RAID 1+ 0) for better performance.
  Use "third-mirror break-off" snapshots for cloning the Oracle log volumes. Do not create Oracle log volumes on a Space-Optimized (SO) snapshot.

Create as many Cache Objects (CO) as possible when you use Space-Optimized (SO) snapshots for Oracle data volumes.

Planning file system design

The following recommendations ensure an optimal file system design for databases:

- Create separate file systems for application binaries, data, redo logs, and archive logs. This ensures that recovery data is available if you encounter problems with database data files storage.
- Always place archived logs on CFS file systems rather then local file systems.
- **For SF Oracle RAC:** If using VxVM mirroring, use ODM with CFS for better performance. ODM with SmartSync enables faster recovery of mirrored volumes using Oracle resilvering.

Setting the umask before installation

The topic applies to SF Oracle RAC.

Set the umask to provide appropriate permissions for Veritas InfoScale binaries and files. This setting is valid only for the duration of the current session.

```
# umask 0022
```

Making the IPS publisher accessible

The topic applies to SFHA, SFCFSHA, SF Oracle RAC, and VCS.

The installation of Veritas InfoScale 7.0 fails on Solaris 11 if the Image Packaging System (IPS) publisher is inaccessible. The following error message is displayed:

CPI ERROR V-9-20-1273 Unable to contact configured publishers on <node_name>.

Solaris 11 introduces the new Image Packaging System (IPS) and sets a default publisher (solaris) during Solaris installation. When additional packages are being installed, the set publisher must be accessible for the installation to succeed. If the publisher is inaccessible, as in the case of a private network, then package installation will fail. The following commands can be used to display the set publishers:

```
# pkg publisher
```

Example:

```
root@sol11-03:~# pkg publisher
```

```
PUBLISHER       TYPE     STATUS   URI
solaris         origin   online   http://pkg.oracle.com/solaris/release/
root@sol11-03:~# pkg publisher solaris
Publisher: solaris
                Alias:
           Origin URI: http://pkg.oracle.com/solaris/release/
              SSL Key: None
             SSL Cert: None
          Client UUID: 00000000-3f24-fe2e-0000-000068120608
      Catalog Updated: October 09:53:00 PM
              Enabled: Yes
     Signature Policy: verify
```

To make the IPS publisher accessible

1. Enter the following to disable the publisher (in this case, solaris):

   ```
   # pkg set-publisher --disable solaris
   ```

2. Repeat the installation of Veritas InfoScale 7.0.
3. Re-enable the original publisher. If the publisher is still inaccessible (private network), then the `no-refresh` option can be used to re-enable it.

   ```
   # pkg set-publisher --enable solaris
   ```

   or

   ```
   # pkg set-publisher --enable --no-refresh solaris
   ```

Note: Unsetting the publisher will have a similar effect, except that the publisher can only be re-set if it is accessible. See pkg(1) for further information on the pkg utility.

Preparing zone environments

The topic applies to SFHA, SFCFSHA, SF Oracle RAC, and VCS.

You need to keep the following items in mind when you install or upgrade VCS in a zone environment on an Oracle Solaris 10 operating system.

- When you install or upgrade Veritas InfoScale using the `installer` program, all zones are upgraded (both global and non-global) unless they are detached and unmounted.

- Make sure that all non-global zones are booted and in the running state before you install or upgrade the Veritas InfoScale packages in the global zone. If the non-global zones are not mounted and running at the time of upgrade, you must attach the zone with **-U** option to install or upgrade the Veritas InfoScale packages inside the non-globle zone.
- If you install Veritas InfoScale on Solaris 10 systems that run non-global zones, you need to make sure that non-global zones do not inherit the `/opt` directory. Run the following command to make sure that the `/opt` directory is not in the inherit-pkg-dir clause:

  ```
  # zonecfg -z zone_name info
  zonepath: /export/home/zone1
  autoboot: false
  pool: yourpool
  inherit-pkg-dir:
  dir: /lib
  inherit-pkg-dir:
  dir: /platform
  inherit-pkg-dir:
  dir: /sbin
  inherit-pkg-dir:
  dir: /usr
  ```

  If the /opt directory appears in the output, remove the /opt directory from the zone's configuration and reinstall the zone.

After installing packages in the global zone, you need to install the required packages in the non-global zone for Oracle Solaris 11. On Oracle Solaris 11.1, if the non-global zone has an older version of Veritas InfoScale packages already installed then during the upgrade of the Veritas InfoScale packages in global zone, packages inside non-global zone are automatically upgraded provided zone is running.

Section 3

Installation of Veritas InfoScale

Chapter 5

Installing Veritas InfoScale using the installer

This chapter includes the following topics:

Installing Veritas InfoScale using the installer

The product installer is the recommended method to license and install Veritas InfoScale.

To install Veritas Infoscale

1. Load and mount the software disc. If you downloaded the software, navigate to the top level of the download directory and skip the next step.

2. Move to the top-level directory on the disc.

   ```
   # cd /mnt/cdrom
   ```

3. From this directory, type the following command to start the installation on the local system.

   ```
   # ./installer
   ```

4. Press **I** to install and press **Enter**.

5 The list of available products is displayed. Select the product that you want to install on your system.

```
1)  Veritas InfoScale Foundation
2)  Veritas InfoScale Availability
3)  Veritas InfoScale Storage
4)  Veritas InfoScale Enterprise
b)  Back to previous menu
Select a product to install: [1-4,b,q]
```

6 The installer asks whether you wants to configure the product.

```
Would you like to configure InfoScale Enterprise after installation?
[y,n,q]
```

If you enter **y**, the installer configures the product after installation. If you enter **n**, the installer quits after the installation is complete.

7 At the prompt, specify whether you accept the terms of the End User License Agreement (EULA).

```
Do you agree with the terms of the End User License Agreement as
specified in the EULA/en/EULA_InfoScale_Ux_7.0.pdf file
present on media? [y,n,q,?] y
```

8 The installer performs the pre-checks. If it is a fresh system, the product is set as the user defined it. If the system already has a different product installed, the product is set as Veritas InfoScale Enterprise with a warning message after pre-check.

```
Veritas InfoScale Availability is installed. Installation of two
products is not supported, Veritas InfoScale Enterprise will be
installed to include Veritas InfoScale Storage and Veritas
InfoScale Availability on all the systems.
```

9 Choose the licensing method. Answer the licensing questions and follow the prompts.

```
1)  Enter a valid license key
2)  Enable keyless licensing and complete system licensing later
How would you like to license the systems? [1-2,q] (2)
```

Note: You can also register your license using the installer menu by selecting the **L) License a Product** option.

See "Registering Veritas InfoScale using product license keys" on page 14.

---

10 Check the log file to confirm the installation. The log files, summary file, and response file are saved at: `/opt/VRTS/install/logs` directory.

Installing language packages

To install Veritas InfoScale in a language other than English, install the required language packages after installing the English packages.

To install the language packages on the server

1 Insert the "Language" disc into the DVD-ROM or CD-ROM drive. With Solaris volume management software, the disc is automatically mounted as `/cdrom/cdrom0`.

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

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

Chapter 6

Installing Veritas InfoScale using response files

This chapter includes the following topics:

About response files

The installer script or product installation script generates a response file during any installation, configuration, upgrade, or uninstall procedure. The response file contains the configuration information that you entered during the procedure. When the procedure completes, the installation script displays the location of the response files.

You can use the response file for future installation procedures by invoking an installation script with the `-responsefile` option. The response file passes arguments to the script to automate the installation of that product. You can edit the file to automate installation and configuration of additional systems.

Note: Symantec recommends that you use the response file created by the installer and then edit it as per your requirement.

Syntax in the response file

The syntax of the Perl statements that is included in the response file variables varies. It can depend on whether the variables require scalar or list values.

For example, in the case of a string value:

```
$CFG{Scalar_variable}="value";
```

or, in the case of an integer value:

```
$CFG{Scalar_variable}=123;
```

or, in the case of a list:

```
$CFG{List_variable}=["value 1 ", "value 2 ", "value 3 "];
```

Installing Veritas InfoScale using response files

Typically, you can use the response file that the installer generates after you perform Veritas InfoScale installation on a system to install Veritas InfoScale on other systems..

To install Veritas InfoScale using response files

1. Make sure the systems where you want to install Veritas InfoScale meet the installation requirements.
2. Make sure that the preinstallation tasks are completed.
3. Copy the response file to the system where you want to install Veritas InfoScale.
4. Edit the values of the response file variables as necessary.
5. Mount the product disc and navigate to the directory that contains the installation program.
6. Start the installation from the system to which you copied the response file. For example:

   ```
   # ./installer -responsefile /tmp/response_file
   ```

   Where `/tmp/response_file` is the response file's full path name.
7. Complete the Veritas InfoScale post-installation tasks.

   For instructions, see the chapter *Performing post-installation tasks* in this document.

Response file variables to install Veritas InfoScale

Table 6-1 lists the response file variables that you can define to install Veritas InfoScale.

Table 6-1 Response file variables for installing Veritas InfoScale

Variable	Description
CFG{opt}{install}	Installs Veritas InfoScale packages. Configuration can be performed at a later time using the `-configure` option. List or scalar: scalar Optional or required: optional
CFG{activecomponent}	Specifies the component for operations like precheck, configure, addnode, install and configure(together). List or scalar: list Optional or required: required
CFG{accepteula}	Specifies whether you agree with the EULA.pdf file on the media. List or scalar: scalar Optional or required: required
CFG{keys}{vxkeyless} CFG{keys}{license}	`CFG{keys}{vxkeyless}` gives the list of keyless keys to be registered on the system. `CFG{keys}{license}` gives the list of user defined keys to be registered on the system List of Scalar: List Optional or required: Required.
CFG{systems}	List of systems on which the product is to be installed or uninstalled. List or scalar: list Optional or required: required
CFG{prod}	Defines the product to be installed or uninstalled. List or scalar: scalar Optional or required: required

Table 6-1 Response file variables for installing Veritas InfoScale *(continued)*

Variable	Description
CFG{opt}{keyfile}	Defines the location of an ssh keyfile that is used to communicate with all remote systems. List or scalar: scalar Optional or required: optional
CFG{opt}{tmppath}	Defines the location where a working directory is created to store temporary files and the packages that are needed during the install. The default location is /var/tmp. List or scalar: scalar Optional or required: optional
CFG{opt}{rsh}	Defines that *rsh* must be used instead of ssh as the communication method between systems. List or scalar: scalar Optional or required: optional
CFG{opt}{logpath}	Mentions the location where the log files are to be copied. The default location is /opt/VRTS/install/logs. List or scalar: scalar Optional or required: optional

Sample response file for Veritas InfoScale installation

The following example shows a response file for installing Veritas InfoScale.

```
our %CFG;

$CFG{accepteula}=1;
$CFG{keys}{keyless}=[ qw(ENTERPRISE) ];
$CFG{opt}{gco}=1;
$CFG{opt}{install}=1;
$CFG{prod}="ENTERPRISE70";
$CFG{systems}=[ qw(system1 system2) ];

1;
```

Chapter 7

Installing Veritas Infoscale using operating system-specific methods

This chapter includes the following topics:

About installing Veritas InfoScale using operating system-specific methods

On Solaris, you can install Veritas InfoScale using the following methods:

- You can use the Oracle Solaris Automated Installer (AI) to install the Solaris 11 operating system and Storage Foundation product on multiple client systems in a network.
  See "Installing Veritas InfoScale on Solaris 11 using Automated Installer" on page 63.
- The procedure to manually install Veritas InfoScale differs depending on the Solaris version.
  See "Manually installing Veritas InfoScale using the system command" on page 74.

- You can install Veritas InfoScale on Solaris 10 systems using Solaris JumpStart.
  See "Installing Veritas InfoScale on Solaris 10 using JumpStart" on page 68.
- You can install Veritas InfoScale using Flash archive on the Solaris 10 operating system.
  See "Using a Flash archive to install Veritas InfoScale and the operating system" on page 72.

Installing Veritas InfoScale on Solaris 11 using Automated Installer

You can use the Oracle Solaris Automated Installer (AI) to install the Solaris 11 operating system and Veritas InfoScale product on multiple client systems in a network. AI performs a hands-free installation (automated installation without manual interactions) of SPARC systems. You can also use AI media to install the Oracle Solaris OS on a single SPARC platform. Oracle provides the AI bootable image and it can be downloaded from the Oracle website. All cases require access to a package repository on the network to complete the installation.

About Automated Installation

AI automates the installation of the Oracle Solaris 11 OS on one or more SPARC clients in a network. Automated Installation applies to Solaris 11 only. You can install the Oracle Solaris OS on many different types of clients. The clients can differ in:

- Architecture
- Memory characteristics
- MAC address
- IP address
- CPU

The installations can differ depending on specifications including network configuration and packages installed.

An automated installation of a client in a local network consists of the following high-level steps:

1. A client system boots and gets IP information from the DHCP server
2. Characteristics of the client determine which AI service and which installation instructions are used to install the client.
3. The installer uses the AI service instructions to pull the correct packages from the package repositories and install the Oracle Solaris OS on the client.

Using Automated Installer

To use Automated Installer to install systems over the network, set up DHCP and set up an AI service on an AI server. The DHCP server and AI server can be the same system or two different systems.

Make sure that the systems can access an Oracle Solaris Image Packaging System (IPS) package repository. The IPS package repository can reside on the AI server, on another server on the local network, or on the Internet.

An AI service is associated with a SPARC AI install image and one or more sets of installation instructions. The installation instructions specify one or more IPS package repositories from where the system retrieves the packages that are needed to complete the installation. The installation instructions also include the names of additional packages to install and information such as target device and partition information. You can also specify instructions for post-installation configuration of the system.

Consider the operating systems and packages you want to install on the systems. Depending on your configuration and needs, you may want to do one of the following:

- If two systems have different architectures or need to be installed with different versions of the Oracle Solaris OS, create two AI services. Then, associate each AI service with a different AI image
- If two systems need to be installed with the same version of the Oracle Solaris OS but need to be installed differently in other ways, create two sets of installation instructions for the AI service. The different installation instructions can specify different packages to install or a different slice as the install target.

The installation begins when you boot the system. DHCP directs the system to the AI install server, and the system accesses the install service and the installation instructions within that service.

For more information, see the *Oracle® Solaris 11 Express Automated Installer Guide*.

Using AI to install the Solaris 11 operating system and Veritas InfoScale products

Use the following procedure to install the Solaris 11 operating system and Veritas InfoScale products using AI.

To use AI to install the Solaris 11 operating system and Veritas InfoScale products

1. Follow the Oracle documentation to set up a Solaris AI server and DHCP server.

   You can find the documentation at http://docs.oracle.com.

2. Set up the Veritas InfoScale package repository.

   Run the following commands to startup necessary SMF services and create directories:

   ```
   # svcadm enable svc:/network/dns/multicast:default
   # mkdir /ai
   # zfs create -o compression=on -o mountpoint=/ai rpool/ai
   ```

3 Run the following commands to set up IPS repository for Symantec SPARC packages:

```
# mkdir -p /ai/repo_symc_sparc
# pkgrepo create /ai/repo_symc_sparc
# pkgrepo add-publisher -s /ai/repo_symc_sparc Symantec
# pkgrecv -s <media_sparc>/pkgs/VRTSpkgs.p5p -d
/ai/repo_symc_sparc '*'
# svccfg -s pkg/server list
# svcs -a | grep pkg/server
# svccfg -s pkg/server add symcsparc
# svccfg -s pkg/server:symcsparc addpg pkg application
# svccfg -s pkg/server:symcsparc setprop pkg/port=10003
# svccfg -s pkg/server:symcsparc setprop pkg/inst_root=
/ai/repo_symc_sparc
# svccfg -s pkg/server:symcsparc addpg general framework
# svccfg -s pkg/server:symcsparc addpropvalue general/complete
astring: symcsparc
# svccfg -s pkg/server:symcsparc addpropvalue general/enable
boolean: true
# svcs -a | grep pkg/server
# svcadm refresh application/pkg/server:symcsparc
# svcadm enable application/pkg/server:symcsparc
```

Or run the following commands to set up the private depot server for testing purposes:

```
# /usr/lib/pkg.depotd -d /ai/repo_symc_sparc -p 10003 > /dev/null &
```

Check the following URL on IE or Firefox browser:

http://<host>:10003

4 Set up the install service on the AI server.

Run the following command:

```
# mkdir /ai/iso
```

Download the AI image from the Oracle website and place the `iso` in the `/ai/iso` directory.

Create an install service.

For example:

To set up the AI install service for SPARC platform::

```
# # installadm create-service -n sol11sparc -s\
 /ai/iso/sol-11-1111-ai-sparc.iso -d /ai/aiboot/
```

5 Run the installer to generate manifest XML files for all the Veritas InfoScale products that you plan to install.

```
# mkdir /ai/manifests
# <media>/installer -ai /ai/manifests
```

6 For each system, generate the system configuration and include the host name, user accounts, and IP addresses. For example, enter one of the following:

```
# mkdir /ai/profiles
# sysconfig create-profile -o /ai/profiles/profile_client.xml
```

or

```
# cp /ai/aiboot/auto-install/sc_profiles/sc_sample.xml
/ai/profiles/profile_client.xml
```

7 Add a system and match it to the specified product manifest and system configuration.

Run the following command to add a SPARC system, for example:

```
# installadm create-client -e "<client_MAC>" -n sol11sparc
# installadm add-manifest -n sol11sparc -f \
/ai/manifests/vrts_manifest_sfha.xml
# installadm create-profile -n sol11sparc -f \
/ai/profiles/profile_client.xml -p profile_sc
# installadm set-criteria -n sol11sparc -m \
vrts_sfha -p profile_sc -c mac="<client_MAC>"
# installadm list -m -c -p -n sol11sparc
```

8 Run the following command to restart the system and install the operating system and Storage Foundation products:

```
# boot net:dhcp - install
```

If the Solaris operating system version is 11.1 or later, DMP is enabled for the ZFS root device.

For more information about ZFS root support, see *Dynamic Multi-Pathing Administrator's* Guide.

9 When the system is up and running, run the installer command from the installation media to configure the Veritas InfoScale software.

```
# /opt/VRTS/install/installer -configure
```

Note: If you do not find the installer script, execute the `/opt/VRTSsfcpi/bin/run-once` command.

Installing Veritas InfoScale on Solaris 10 using JumpStart

This installation method applies only to Solaris 10. These JumpStart instructions assume a working knowledge of JumpStart. See the JumpStart documentation that came with your operating system for details on using JumpStart.

Upgrading is not supported. The following procedure assumes a standalone configuration.

For the language pack, you can use JumpStart to install packages. You add the language packages in the script, and put those files in the JumpStart server directory.

You can use a Flash archive to install Veritas InfoScale and the operating system with JumpStart.

See "Using a Flash archive to install Veritas InfoScale and the operating system" on page 72.

Overview of JumpStart installation tasks

Review the summary of tasks before you perform the JumpStart installation.

Summary of tasks

1. Add a client (register to the JumpStart server). See the JumpStart documentation that came with your operating system for details.
2. Read the JumpStart installation instructions.
3. Generate the finish scripts.

   See "Generating the finish scripts" on page 69.
4. Prepare shared storage installation resources.

   See "Preparing installation resources" on page 70.
5. Modify the rules file for JumpStart.

   See the JumpStart documentation that came with your operating system for details.
6. Install the operating system using the JumpStart server.
7. When the system is up and running, run the installer command from the installation media to configure the Veritas InfoScale software.

   ```
   # /opt/VRTS/install/installer -configure
   ```

Generating the finish scripts

Perform these steps to generate the finish scripts to install Veritas InfoScale.

To generate the script

1. Run the product installer program to generate the scripts for all products.

   ```
   ./installer -jumpstart directory_to_generate_scripts
   ```

   Or

   ```
   ./installer -prod<productname> -jumpstart
   directory_to_generate_script
   ```

   where ***<productname>*** is the product's installation command, and *directory_to_generate_scripts* is where you want to put the product's script.

   For example:

   ```
   # ./installer -prod storage -jumpstart /js_scripts
   ```
2. When you are prompted to encapsulate the root disk automatically, choose **yes** to do so. If you do not want to encapsulate it automatically, choose **no** and go to step 6.

3 Specify a disk group name for the root disk.

```
Specify the disk group name of the root disk to be encapsulated:
rootdg
```

4 Specify private region length.

```
Specify the private region length of the root disk to be
encapsulated: (65536)
```

5 Specify the disk's media name of the root disk to encapsulate.

```
Specify the disk media name of the root disk to be encapsulated:
(rootdg_01)
```

6 JumpStart finish scripts and encapsulation scripts are generated in the directory you specified in step 1.

List the js_scripts directory.

```
# ls /js_scripts
```

7 Modify the JumpStart script according to your requirements. You must modify the *BUILDSRC* and *ENCAPSRC* values. Keep the values aligned with the resource location values.

```
BUILDSRC="hostname_or_ip:/path_to_pkgs"
// If you don't want to encapsulate the root disk automatically
// comment out the following line.
ENCAPSRC="hostname_or_ip:/path_to_encap_script"
```

Preparing installation resources

Prepare resources for the JumpStart installation.

To prepare the resources

1 Copy the `pkgs` directory of the installation media to the shared storage.

```
# cd /path_to_installation_media
# cp -r pkgs BUILDSRC
```

2 Copy the patch directory of the installation media to the shared storage and decompress the patch.

```
# cd /path_to_installation_media

# cp -r patches BUILDSRC

# gunzip 151218-01.tar.gz

# tar vxf 151218-01.tar
```

3 Generate the response file with the list of packages.

```
# cd BUILDSRC/pkgs/
# pkgask -r package_name.response -d /
BUILDSRC/pkgs/packages_name.pkg
```

4 Create the `adminfile` file under *BUILDSRC*`/pkgs/` directory.

```
mail=
instance=overwrite
partial=nocheck
runlevel=quit
idepend=quit
rdepend=nocheck
space=quit
setuid=nocheck
conflict=nocheck
action=nocheck
basedir=default
```

5 If you want to encapsulate the root disk automatically when you perform the JumpStart installation, copy the scripts `encap_bootdisk_vm.fin` generated previously to *ENCAPSRC*.

See "Generating the finish scripts" on page 69.

Adding language pack information to the finish file

To add the language pack information to the finish file, perform the following procedure.

To add the language pack information to the finish file

1. For the language pack, copy the language packages from the language pack installation disc to the shared storage.

```
# cd /cdrom/cdrom0/pkgs
# cp -r * BUILDSRC/pkgs
```

If you downloaded the language pack:

```
# cd /path_to_language_pack_installation_media/pkgs
# cp -r * BUILDSRC/pkgs
```

2. In the finish script, copy the product package information and replace the product packages with language packages.
3. The finish script resembles:

```
. . .
for PKG in product_packages
do
...
done. . .
for PKG in language_packages
do
...
done. . .
```

Using a Flash archive to install Veritas InfoScale and the operating system

You can only use Flash archive on the Solaris 10 operating system. In the following outline, refer to Solaris documentation for Solaris-specific tasks.

Note: Symantec does not support Flash Archive installation if the root disk of the master system is encapsulated.

The following is an overview of the creation and installation of a Flash archive with Veritas InfoScale software.

- If you plan to start flar (flash archive) creation from bare metal, perform step 1 through step 10.
- If you plan to start flar creation from a system where you have installed, but not configured the product, perform step 1 through step 4. Skip step 5 and finish step 6 through step 10.
- If you plan to start flar creation from a system where you have installed and configured the product, perform step 5 through step 10.

Flash archive creation overview

1. Ensure that you have installed Solaris 10 on the master system.
2. Use JumpStart to create a clone of a system.
3. Restart the cloned system.
4. Install the Veritas InfoScale products on the master system.

   Perform one of the installation procedures from this guide.
5. If you have configured the product on the master system, create the `vrts_deployment.sh` file and the `vrts_deployment.cf` file and copy them to the master system.

   See "Creating the Veritas InfoScale post-deployment scripts" on page 73.
6. Use the `flarcreate` command to create the Flash archive on the master system.
7. Copy the archive back to the JumpStart server.
8. Use JumpStart to install the Flash archive to the selected systems.
9. Configure the Veritas InfoScale product on all nodes in the cluster.

   ```
   /opt/VRTS/install/installer -configure
   ```
10. Perform post-installation and configuration tasks.

    See the *Configuration and Upgrade guides* for performing configuration tasks.

Creating the Veritas InfoScale post-deployment scripts

The generated files vrts_deployment.sh and vrts_post-deployment.cf are customized Flash archive post-deployment scripts. These files clean up Veritas InfoScale product settings on a cloned system before you reboot it for the first time. Include these files in your Flash archives.

To create the post-deployment scripts

1. Mount the product disc.
2. From the prompt, run the `-flash_archive` option for the installer. Specify a directory where you want to create the files.

   ```
   # ./installer -flash_archive /tmp
   ```

3. Copy the vrts_postedeployment.sh file and the vrts_postedeployment.cf file to the golden system.
4. On the golden system perform the following:
   - Put the vrts_postdeployment.sh file in the /etc/flash/postdeployment directory.
   - Put the vrts_postdeployment.cf file in the /etc/vx directory.
5. Make sure that the two files have the following ownership and permissions:

   ```
   # chown root:root /etc/flash/postdeployment/vrts_postdeployment.sh
   # chmod 755 /etc/flash/postdeployment/vrts_postdeployment.sh
   # chown root:root /etc/vx/vrts_postdeployment.cf
   # chmod 644 /etc/vx/vrts_postdeployment.cf
   ```

   Note that you only need these files in a Flash archive where you have installed Veritas InfoScale products.

Manually installing Veritas InfoScale using the system command

The procedure to manually install Veritas InfoScale differs depending on the Solaris version.

See "Installing Veritas InfoScale on Solaris 10 using the pkgadd command" on page 74.

See "Installing Veritas InfoScale on Solaris 11 using the pkg install command" on page 76.

Installing Veritas InfoScale on Solaris 10 using the pkgadd command

On Solaris 10, the packages must be installed while in the global zone.

To install Veritas InfoScale on Solaris 10 using the pkgadd command

1. Mount the software disc.

2 Copy the supplied VRTS* files from the installation media to a temporary location. Modify them if needed.

```
# cp /cdrom/cdrom0/pkgs/VRTS* \
    /tmp/pkgs
```

3 Create the admin file in the current directory. Specify the `-a adminfile` option when you use the `pkgadd` command:

```
mail=
instance=overwrite
partial=nocheck
 runlevel=quit
idepend=quit
rdepend=nocheck
space=quit
setuid=nocheck
conflict=nocheck
action=nocheck
basedir=default
```

4 Use the product-specific install command with one of the following options to get a list of packages in the order to be installed:

- minpkgs
- recpkgs
- allpkgs

See "Installation script options" on page 110.

5 Install the packages listed in step 4.

```
#  pkgadd -a adminfile -d /tmp/pkgs pkgname.pkg
```

On Solaris 10, these packages must be installed while in the global zone. If a package's `pkginfo` file contains the variable SUNW_PKG_ALLZONES set not equal to true, the `-G` option should additionally be specified to the `pkgadd` command.

6 Verify that the packages are installed:

```
# pkginfo -l
     packagename
```

7 Start the processes.

Installing Veritas InfoScale on Solaris 11 using the pkg install command

To install Veritas InfoScale on Solaris 11 using the pkg install command

1. Copy the VRTSpkgs.p5p package from the pkgs directory from the installation media to the system at `/tmp/install` directory.
2. Disable the publishers that are not reachable as package install may fail if any of the already added repositories are unreachable.

   ```
   # pkg set-publisher --disable <publisher name>
   ```

3. Add a file-based repository in the system.

   ```
   # pkg set-publisher -p /tmp/install/VRTSpkgs.p5p Symantec
   ```

4. Install the required packages.
5. Remove the publisher from the system.

   ```
   # pkg unset-publisher Symantec
   ```

6. Clear the state of the SMF service if non-global zones are present in the system. In presence of non-global zones, setting the file-based repository causes SMF service `svc:/application/pkg/system-repository:default` to go into maintenance state.

   ```
   # svcadm clear svc:/application/pkg/system-repository:default
   ```

7. Enable the publishers that were disabled earlier.

   ```
   # pkg set-publisher --enable <publisher name>
   ```

Manually installing packages on Oracle Solaris 11 systems

To install packages on Solaris 11 system

1. Copy the `VRTSpkgs.p5p` package from the `pkgs` directory from the installation media to the the system at `/tmp/install directory`..
2. Disable the publishers that are not reachable, as package install may fail if any of the already added repositories are unreachable.

   ```
   # pkg set-publisher --disable <publisher name>
   ```

3 Add a file-based repository in the non-global zone.

```
# pkg set-publisher -p /tmp/install/VRTSpkgs.p5p Symantec
```

4 Install the required packages.

5 To configure an OracleVMServer logical domain for disaster recovery, install the following required packages inside the logical domain:

```
# pkg install --accept VRTSvcsnr
```

6 Remove the publisher on the non-global zone.

```
# pkg unset-publisher Symantec
```

7 Clear the state of the SMF service if non-global zones are present in the system. In presence of non-global zones, setting the file-based repository causes SMF service `svc:/application/pkg/system-repository:default` to go into maintenance state. .

```
# svcadm clear svc:/application/pkg/system-repository:default
```

8 Enable the publishers that were disabled earlier.

```
# pkg set-publisher --enable <publisher>
```

Manually installing packages on Solaris brand non-global zones

With Oracle Solaris 11, you must manually install Veritas InfoScale packages inside non-global zones. The native non-global zones are called Solaris brand zones.

To install packages manually on Solaris brand non-global zones

1 Ensure that the SMF service `svc:/application/pkg/system-repository:default` and `svc:/application/pkg/zones-proxyd:default` are online on the global zone.

```
global# svcs svc:/application/pkg/system-repository:default
global# svcs  svc:/application/pkg/zones-proxyd:default
```

2 Log on to the non-global zone as a super user.

3 Ensure that the SMF service `svc:/application/pkg/zones-proxy-client:default` is online inside non-global zone

```
non-global# svcs svc:/application/pkg/zones-proxy-client:default
```

4 Copy the `VRTSpkgs.p5p` package from the `pkgs` directory from the installation media to the global zone (for example at `/tmp/install` directory).

5 Disable the publishers that are not reachable, as package install may fail if any of the already added repositories are unreachable.

```
global# pkg set-publisher --disable <publisher name>
```

6 Add a file-based repository in the global zone.

```
global# pkg set-publisher -g /tmp/install/VRTSpkgs.p5p Symantec
```

7 Log on to the non-global zone as a super user and install the required packages.

```
non-global# pkg install --accept VRTSperl VRTSvlic VRTSvcs VRTSvcsag
VRTSvcsea VRTSvxfs VRTSodm
```

8 Remove the publisher on the global zone.

```
global# pkg unset-publisher Symantec
```

9 Enable the publishers that were disabled earlier.

```
global# pkg set-publisher --enable <publisher>
```

Manually installing packages on solaris10 brand zones

You need to manually install Veritas InfoScale 7.0 packages inside the solaris10 brand zones.

1 Boot the zone.

2 Logon to the solaris10 brand zone as a super user.

3 Copy the Solaris 10 packages from the pkgs directory from the installation media to the non-global zone (such as `/tmp/install` directory).

4 Install the following Veritas InfoScale packages on the brand zone.

Note: Perform all the above steps on each Solaris 10 brand zone.

For more information on the support for Branded Zones, refer the *Veritas InfoScale™ 7.0 Virtualization Guide*.

Section 4

Post-installation tasks

Chapter 8

Verifying the Veritas InfoScale installation

This chapter includes the following topics:

Verifying product installation

Verify that the Veritas InfoScale products are installed.

You can verify the version of the installed product. Use the following command:

```
# /opt/VRTS/install/installer -version
```

You can find out the about the installed packages and its versions by using the following command:

```
# /opt/VRTS/install/showversion
```

Use the following sections to further verify the product installation.

Installation log files

After every product installation, the installer creates three text files:

- Installation log file
- Response file
- Summary file

The name and location of each file is displayed at the end of a product installation, and are always located in the `/opt/VRTS/install/logs` directory. It is recommended that you keep the files for auditing, debugging, and future use.

Using the installation log file

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

Using the summary file

The summary file contains the results of the installation by the installer or product installation scripts. The summary includes the list of the packages, and the status (success or failure) of each package. The summary also indicates which processes were stopped or restarted during the installation. After installation, refer to the summary file to determine whether any processes need to be started.

Setting environment variables

Most of the commands which are used in the installation are present in the `/sbin` or `/usr/sbin` directory. Add these directories to your `PATH` environment variable as necessary.

After installation, Veritas InfoScale commands are in `/opt/VRTS/bin`. Veritas InfoScale manual pages are stored in `/opt/VRTS/man`.

Some VCS custom scripts reside in `/opt/VRTSvcs/bin`. If you want to install a high availability product, add `/opt/VRTSvcs/bin` to the `PATH` also.

Add the following directories to your `PATH` and `MANPATH` environment variable:

- If you want to use `Bourne` or `Korn` shell (`sh` or `ksh`), enter the following:

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

- If you want to use a C shell (`csh` or `tcsh`), enter the following:

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

Disabling the abort sequence on SPARC systems

The topic applies to VCS.

Most UNIX operating systems provide a method to perform a "break" or "console abort." The inherent problem when you abort a hung system is that it ceases to heartbeat in the cluster. When other cluster members believe that the aborted node is a failed node, these cluster members may begin corrective action.

Keep the following points in mind:

- The only action that you must perform following a system abort is to reset the system to achieve the following:
  - Preserve data integrity
  - Prevent the cluster from taking additional corrective actions
- Do not resume the processor as cluster membership may have changed and failover actions may already be in progress.
- To remove this potential problem on SPARC systems, you should alias the `go` function in the OpenBoot eeprom to display a message.

To alias the go function to display a message

1. At the ok prompt, enter:

   ```
   nvedit
   ```

2. Press Ctrl+L to display the current contents of the nvramrc buffer.
3. Press Ctrl+N until the editor displays the last line of the buffer.
4. Add the following lines exactly as shown. Press Enter after adding each line.

   ```
   ." Aliasing the OpenBoot 'go' command! "
   : go ." It is inadvisable to use the 'go' command in a clustered
   environment. " cr
   ." Please use the 'power-off' or 'reset-all' commands instead. "
   cr
   ." Thank you, from your friendly neighborhood sysadmin. " ;
   ```

5. Press Ctrl+C to exit the nvramrc editor.

6 To verify that no errors exist, type the `nvrun` command. You should see only the following text:

```
Aliasing the OpenBoot 'go' command!
```

7 Type the `nvstore` command to commit your changes to the non-volatile RAM (NVRAM) for use in subsequent reboots.

8 After you perform these commands, at reboot you see this output:

```
Aliasing the OpenBoot 'go' command! go isn't unique.
```

Checking installed product versions and downloading maintenance releases and patches

Use the `installer` command with the `-version` option to:

- Determine the product packages that are installed on your system.
- Download required maintenance releases or patches .

The `version` option or the `showversion` script in the `/opt/VRTS/install` directory checks the specified systems and discovers the following:

- Veritas InfoScale product versions that are installed on the system
- All the required packages and the optional packages installed on the system
- Any required or optional packages (if applicable) that are not present
- Installed patches
- Available base releases (major or minor)
- Available maintenance releases
- Available patch releases

To check your systems and download maintenance releases and patches

1 Mount the media, or navigate to the installation directory.

2 Start the installer with the `-version` option.

```
# ./installer -version sys1 sys2
```

For each system, the installer lists all of the installed base releases, maintenance releases, and patches, followed by the lists of available downloads.

3 If you have Internet access, follow the prompts to download the available maintenance releases and patches to the local system.

4 If you do not have Internet access, you can download any needed maintenance releases and patches from the Symantec Operations Readiness Tools (SORT) Patch Finder page at:

https://sort.symantec.com/patch/finder

You can obtain installer patches automatically or manually.

See "Obtaining installer patches" on page 28.

Downloading maintenance releases and patches requires the installer to make outbound networking calls. You can also disable external network connection attempts.

See "Disabling external network connection attempts" on page 29.

Chapter 9

After Installation

This chapter includes the following topics:

Next steps after installation

Once installation is complete, you can configure a component of your choice.

Table 9-1 lists the components and the respective Configuration and Upgrade guides that are available.

Table 9-1 Guides available for configuration

Component	Document name
Storage Foundation	See *Storage Foundation Configuration and Upgrade Guide* See *Storage Foundation Administrator's Guide*
Storage Foundation and High Availability	See *Storage Foundation and High Availability Configuration and Upgrade Guide*
Storage Foundation Cluster File System HA	See *Storage Foundation Cluster File System High Availability Configuration and Upgrade Guide* See *Storage Foundation Cluster File System High Availability Administrator's Guide*
Cluster Server	See *Cluster Server Configuration and Upgrade Guide* See *Cluster Server Administrator's Guide*

Table 9-1 Guides available for configuration *(continued)*

Component	Document name
Storage Foundation for Oracle RAC	See *Storage Foundation for Oracle RAC Configuration and Upgrade Guide* See *Storage Foundation for Oracle RAC Administrator's Guide*
Storage Foundation for Sybase SE	See *Storage Foundation for Sybase ASE CE Configuration and Upgrade Guide* See *Storage Foundation for Sybase ASE CE Administrator's Guide*

Section 5

Uninstallation of Veritas InfoScale

Chapter 10

Uninstalling Veritas InfoScale using the installer

This chapter includes the following topics:

About removing Veritas InfoScale

This section covers uninstallation requirements and steps to uninstall the Veritas software.

Only users with superuser privileges can uninstall Veritas InfoScale.

Warning: Failure to follow the instructions in the following sections may result in unexpected behavior.

Preparing to uninstall

Review the following before removing the Veritas software.

Remote uninstallation

You must configure remote communication to uninstall Veritas InfoScale on remote systems. In a High Availability environment, you must meet the prerequisites to uninstall on all nodes in the cluster at one time.

The following prerequisites are required for remote uninstallation:

- Communication protocols must exist between systems. By default, the uninstall scripts use ssh.
- You must be able to execute ssh or rsh commands as superuser on all systems.
- The ssh or rsh must be configured to operate without requests for passwords or pass phrases

Preparing to remove Veritas Volume Manager

This section describes the steps you need to take before you remove Veritas Volume Manager (VxVM) to preserve the contents of the volumes.

Warning: Failure to follow the preparations in this section might result in unexpected behavior.

On Solaris 11, the SMF service `vxvm-configure` must be online in order to uninstall VRTSvxvm successfully.

To verify that the vxvm-configure service is online

1. Check the state of the `vxvm-configure` service:

   ```
   # svcs -a | grep vxvm-configure
   ```

2. If the service is in disabled or maintenance state, use the following command to display information including the service log location:

   ```
   # svcs -xv vxvm-configure
   ```

3. If there are no issues, use the following command to bring the vxvm-configure service online:

   ```
   # svcadm enable vxvm-configure
   ```

Moving volumes from an encapsulated root disk

Use the following procedure to move volumes from an encapsulated root disk.

To uninstall VxVM if `root`, `swap`, `usr`, or `var` is a volume under Volume Manager control

1. Ensure that the `rootvol`, `swapvol`, `usr`, and `var` volumes have only one associated plex each.

   The plex must be contiguous, non-striped, non-spanned, and non-sparse. To obtain this information, enter the following:

   ```
   # vxprint -ht rootvol swapvol usr var
   ```

   If any of these volumes have more than one associated plex, remove the unnecessary plexes using the following command:

   ```
   # vxplex -g diskgroup -o rm dis plex_name
   ```

2. Run the `vxunroot` command:

   ```
   # /etc/vx/bin/vxunroot
   ```

   The `vxunroot` command changes the volume entries in `/etc/vfstab` to the underlying disk partitions for `rootvol`, `swapvol`, `usr`, and `var`. It also modifies `/etc/system` and prompts for a restart so that disk partitions are mounted instead of volumes for `root`, `swap`, `usr`, and `var`.

3. Once you have changed the `root`, `swap`, `usr`, and `var` volumes, move all remaining volumes to disk partitions.

   You can do this using one of the following 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 you create new file systems on disk partitions.
   - Move volumes incrementally to disk partitions.
     See "Moving volumes to disk partitions" on page 91.
     Otherwise, shut down VxVM.

Moving volumes to disk partitions

Use the following procedure to move volumes incrementally to disk partitions.

To move volumes incrementally to disk partitions

1. Evacuate disks using the `vxdiskadm` command, the VOM GUI, or the `vxevac` utility.

   Evacuation moves subdisks from the specified disks to target disks. The evacuated disks provide the initial free disk space for volumes to be moved to disk partitions.

2. Remove the evacuated disks from VxVM control 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 used as a raw partition for database applications, make sure that the application does not update the volume. Also make sure 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 that the removal of this first volume generates.

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. Stop and remove the volume from VxVM using the commands.

   ```
   # vxvol -g diskgroup stop volume_name
   # vxedit -rf -g diskgroup rm volume_name
   ```

10 Remove any free disks (those disks that have no subdisks defined on them) by removing the volumes from VxVM control.

To check if there are still some subdisks remaining on a particular disk, use the `vxprint` command.

```
# vxprint -g diskgroup -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 VxVM control.

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

Use the free space that is created for adding the data from the next volume you want to remove.

11 After you successfully convert all volumes into disk partitions, restart the system.

12 After the restart, make sure that none of the volumes are open by using the `vxprint` command.

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

13 If any volumes remain open, repeat the steps.

Example of moving volumes to disk partitions on Solaris

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 the `vxevac` command.

These are the contents of the disk group `voldg` 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 disk3-01l1       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 VxVM control.

```
# vxdisk -g voldg list
DEVICE       TYPE      DISK         GROUP        STATUS
c1t3d0s2     sliced    disk3        voldg        online
c1t12d0s2    sliced    disk1        voldg        online
c1t14d0s2    sliced    disk2        voldg        online

# vxdg rmdisk disk1
# vxdg rmdisk disk2
# vxdisk rm c1t12d0
# vxdisk rm c1t14d0
```

Verify that the evacuated disks have been removed from VxVM 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 VxVM.

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

To complete the procedure, follow the remaining steps.

Preparing to remove Veritas File System

The `VRTSvxfs` package cannot be removed if there are any mounted VxFS file systems or Storage Checkpoints. Unmount the VxFS file systems and Storage Checkpoints before uninstalling Veritas InfoScale. 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.

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

To unmount a Storage Checkpoint

1 Check if any Storage Checkpoints are mounted.

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

2 Unmount any Storage Checkpoints.

```
# umount /checkpoint_name
```

Removing the Replicated Data Set

If you use VVR, you need to perform the following steps. This section gives the steps to remove a Replicated Data Set (RDS) when the application is either active or stopped.

Note: If you are upgrading Volume Replicator, do not remove the Replicated Data Set.

To remove the Replicated Data Set

1 Verify that all RLINKs are up-to-date:

```
# vxrlink -g diskgroup status rlink_name
```

If the Secondary is not required to be up-to-date, proceed to 2 and stop replication using the `-f` option with the `vradmin stoprep` command.

2 Stop replication to the Secondary by issuing the following command on any host in the RDS:

The `vradmin stoprep` command fails if the Primary and Secondary RLINKs are not up-to-date. Use the `-f` option to stop replication to a Secondary even when the RLINKs are not up-to-date.

```
# vradmin -g diskgroup stoprep local_rvgname sec_hostname
```

The argument `local_rvgname` is the name of the RVG on the local host and represents its RDS.

The argument `sec_hostname` is the name of the Secondary host as displayed in the output of the `vradmin printrvg` command.

3 Remove the Secondary from the RDS by issuing the following command on any host in the RDS:

```
# vradmin -g diskgroup delsec local_rvgname sec_hostname
```

The argument local_rvgname is the name of the RVG on the local host and represents its RDS.

The argument sec_hostname is the name of the Secondary host as displayed in the output of the `vradmin printrvg` command.

4 Remove the Primary from the RDS by issuing the following command on the Primary:

```
# vradmin -g diskgroup delpri local_rvgname
```

When used with the `-f` option, the `vradmin delpri` command removes the Primary even when the application is running on the Primary.

The RDS is removed.

5 If you want to delete the SRLs from the Primary and Secondary hosts in the RDS, issue the following command on the Primary and all Secondaries:

```
# vxedit -r -g diskgroup rm srl_name
```

Uninstalling Veritas InfoScale packages using the product installer

Use the following procedure to remove Veritas InfoScale products.

Not all packages may be installed on your system depending on the choices that you made when you installed the software.

Note: After you uninstall the product, you cannot access any file systems you created using the default disk layout version in Veritas InfoScale 7.0 with a previous version of Veritas InfoScale.

Language packages are uninstalled when you uninstall the English language packages.

To shut down and remove the installed Veritas InfoScale packages

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 VxVM package (`VRTSvxvm`) is installed, read and follow the uninstallation procedures for VxVM.

   See "Preparing to remove Veritas Volume Manager" on page 90.
4. Make sure you have performed all of the prerequisite steps.
5. In an HA configuration, stop VCS processes on either the local system or all systems.

   To stop VCS processes on the local system:

   ```
   # hastop -local
   ```

   To stop VCS processes on all systems:

   ```
   # hastop -all
   ```

6. Move to the `/opt/VRTS/install` directory and run the uninstall script.

   ```
   # cd /opt/VRTS/install

   # ./installer -uninstall
   ```

7. The uninstall script prompts for the system name. Enter one or more system names, separated by a space, from which to uninstall Veritas InfoScale.

   ```
   Enter the system names separated by spaces: [q?] sys1 sys2
   ```

8. The uninstall script prompts you to stop the product processes. If you respond yes, the processes are stopped and the packages are uninstalled.

   The uninstall script creates log files and displays the location of the log files.
9. Most packages have kernel components. In order to ensure complete removal, a system reboot is recommended after all packages have been removed.

10 To verify the removal of the packages, use the following commands:

Solaris 10:

```
# pkginfo | grep VRTS
```

Solaris 11:

```
# pkg list VRTS\*
```

11 In case the uninstallation fails to remove any of the VRTS packages, check the installer logs for the reason for failure or try to remove the packages manually using the following command:

```
# pkgrm VRTSvxvm
```

Uninstalling Veritas InfoScale using the `pkgrm` or `pkg uninstall` command

Use the following procedure to uninstall Veritas InfoScale using the `pkgrm` command.

If you want to uninstall Veritas InfoScale using the `pkgrm` command, the packages must be removed in a specific order, or else the uninstallation fails. Removing the packages out of order results in some errors, including possible core dumps, although the packages are still removed.

To uninstall Veritas InfoScale

1 Unmount all mount points for file systems and Storage Checkpoints.

```
# umount /mount_point
```

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

---

2 Stop all applications from accessing VxVM volumes, and close all volumes.

3 For Solaris 11.1 or later, if DMP native support is enabled, DMP controls the ZFS root pool. Turn off native support before removing Veritas InfoScale.

```
# vxdmpadm settune dmp_native_support=off
```

Note: If you do not disable native support, the system cannot be restarted after you remove DMP.

4 Stop any Veritas daemons that are running.

5 Remove the packages in the following order:

- For Veritas InfoScale (Solaris 10):

```
# pkgrm VRTSodm VRTSdbed VRTSfssdk \
VRTSfsadv VRTSvxfs VRTSsfmh VRTSob VRTSaslapm VRTSvxvm \
VRTSspt VRTSperl VRTSvlic VRTSsfcpi
```

- For Veritas InfoScale (Solaris 11):

```
# pkg uninstall VRTSodm VRTSdbed VRTSfssdk VRTSfsadv\
VRTSvxfs VRTSsfmh VRTSob VRTSaslapm VRTSvxvm \
VRTSspt VRTSperl VRTSvlic VRTSsfcpi
```

Uninstalling the language packages using the `pkgrm` command

If you want to remove only the language packages, you can do so with the `pkgrm` command.

If you use the product installer menu or the uninstallation script, you can remove the language packages along with the English packages.

To remove the language packages

◆ Use the `pkgrm` command to remove the appropriate packages.

```
# pkgrm package_name package_name ...
```

Because the packages do not contain any dependencies, you can remove them in any order.

Manually uninstalling Veritas InfoScale packages on non-global zones on Solaris 11

1. Log on to the non-global zone as a super user.
2. Uninstall Veritas InfoScale packages from Solaris brand zones.

   ```
   # pkg uninstall VRTSperl VRTSvlic VRTSvcs VRTSvcsag VRTSvcsea
   VRTSvxfs
   ```

3. Uninstall Veritas InfoScale packages from Solaris 10 brand zones.

   ```
   # pkgrm VRTSperl VRTSvlic VRTSvcs VRTSvcsag VRTSvcsea
   ```

Note: If you have Veritas InfoScale packages installed inside non-global zones, perform the steps mentioned above to uninstall them from non-global zone before attempting to uninstall the packages from global zone.

Removing the Storage Foundation for Databases (SFDB) repository

After removing the product, you can remove the SFDB repository file and any backups.

Removing the SFDB repository file disables the SFDB tools.

To remove the SFDB repository

1. Identify the SFDB repositories created on the host.

   Oracle:

   ```
   # cat /var/vx/vxdba/rep_loc
   ```

   ```
   {
      "sfae_rept_version" : 1,
      "oracle" : {
         "SFAEDB" : {
            "location" : "/data/sfaedb/.sfae",
            "old_location" : "",
            "alias" : [
               "sfaedb"
            ]
         }
      }
   }
   ```

2. Remove the directory identified by the `location` key.

   Oracle:

   ```
   # rm -rf /data/sfaedb/.sfae
   ```

3. Remove the repository location file.

   ```
   # rm -rf /var/vx/vxdba/rep_loc
   ```

   This completes the removal of the SFDB repository.

Chapter 11

Uninstalling Veritas InfoScale using response files

This chapter includes the following topics:

Uninstalling Veritas InfoScale using response files

Typically, you can use the response file that the installer generates after you perform Veritas InfoScale uninstallation on one system to uninstall Veritas InfoScale on other systems.

To perform an automated uninstallation

1. Make sure that you meet the prerequisites to uninstall Veritas InfoScale.
2. Copy the response file to the system where you want to uninstall Veritas InfoScale.
3. Edit the values of the response file variables as necessary.

4 Start the uninstallation from the system to which you copied the response file. For example:

```
# /opt/VRTS/install/installer -responsefile
/tmp/response_file
```

Where `/tmp/response_file` is the response file's full path name.

Response file variables to uninstall Veritas InfoScale

Table 11-1 lists the response file variables that you can define to configure Veritas InfoScale.

Table 11-1 Response file variables for uninstalling Veritas InfoScale

Variable	Description
CFG{systems}	List of systems on which the product is to be installed or uninstalled. List or scalar: list Optional or required: required
CFG{prod}	Defines the product to be installed or uninstalled. List or scalar: scalar Optional or required: required
CFG{opt}{keyfile}	Defines the location of an ssh keyfile that is used to communicate with all remote systems. List or scalar: scalar Optional or required: optional
CFG{opt}{tmppath}	Defines the location where a working directory is created to store temporary files and the packages that are needed during the install. The default location is /var/tmp. List or scalar: scalar Optional or required: optional
CFG{opt}{logpath}	Mentions the location where the log files are to be copied. The default location is /opt/VRTS/install/logs. List or scalar: scalar Optional or required: optional

Table 11-1 Response file variables for uninstalling Veritas InfoScale *(continued)*

Variable	Description
CFG{opt}{uninstall}	Uninstalls Veritas InfoScale packages. List or scalar: scalar Optional or required: optional

Sample response file for Veritas InfoScale uninstallation

The following example shows a response file for uninstalling Veritas InfoScale

```
our %CFG;

$CFG{opt}{uninstall}=1;
$CFG{opt}{vr}=1;
$CFG{prod}="ENTERPRISE70";
$CFG{systems}=[ qw(system1 system2) ];

1;
```

Section 6

Installation reference

Appendix A

Installation scripts

This appendix includes the following topics:

Installation script options

Table A-1 shows command line options for the installation script. For an initial install or upgrade, options are not usually required. The installation script options apply to all Veritas InfoScale product scripts, except where otherwise noted.

Table A-1 Available command line options

Command Line Option	Function
-addnode	Adds a node to a high availability cluster.
-ai	The `-ai` option is supported on Solaris 11 only, and is used to generate Automated Installation manifest. This can be used by Solaris Automated Installation Server to install the Veritas InfoScale product, along with the Solaris 11 operation system.
-allpkgs	Displays all packages required for the specified product. The packages are listed in correct installation order. The output can be used to create scripts for command line installs, or for installations over a network.

Table A-1 Available command line options *(continued)*

Command Line Option	Function
-comcleanup	The `-comcleanup` option removes the secure shell or remote shell configuration added by installer on the systems. The option is only required when installation routines that performed auto-configuration of the shell are abruptly terminated.
-comsetup	The `-comsetup` option is used to set up the ssh or rsh communication between systems without requests for passwords or passphrases.
-configcps	The `-configcps` option is used to configure CP server on a running system or cluster.
-configure	Configures the product after installation.
-fencing	Configures I/O fencing in a running cluster.
-fips	The `-fips` option is used to enable or disable security with fips mode on a running VCS cluster. It could only be used together with `-security` or `-securityonenode` option.
–hostfile *full_path_to_file*	Specifies the location of a file that contains a list of hostnames on which to install.
-disable_dmp_native_support	Disables Dynamic Multi-pathing support for the native LVM volume groups and ZFS pools during upgrade. Retaining Dynamic Multi-pathing support for the native LVM volume groups and ZFS pools during upgrade increases package upgrade time depending on the number of LUNs and native LVM volume groups and ZFS pools configured on the system.
-online_upgrade	Used to perform online upgrade. Using this option, the installer upgrades the whole cluster and also supports customer's application zero down time during the upgrade procedure. Now this option only supports VCS and ApplicationHA.
-patch_path	Defines the path of a patch level release to be integrated with a base or a maintenance level release in order for multiple releases to be simultaneously installed .

Table A-1 Available command line options *(continued)*

Command Line Option	Function
-patch2_path	Defines the path of a second patch level release to be integrated with a base or a maintenance level release in order for multiple releases to be simultaneously installed.
-patch3_path	Defines the path of a third patch level release to be integrated with a base or a maintenance level release in order for multiple releases to be simultaneously installed.
-patch4_path	Defines the path of a fourth patch level release to be integrated with a base or a maintenance level release in order for multiple releases to be simultaneously installed.
-patch5_path	Defines the path of a fifth patch level release to be integrated with a base or a maintenance level release in order for multiple releases to be simultaneously installed.
–jumpstart *dir_path*	Produces a sample finish file for Solaris JumpStart installation. The *dir_path* indicates the path to the directory in which to create the finish file.
–keyfile *ssh_key_file*	Specifies a key file for secure shell (SSH) installs. This option passes `-I ssh_key_file` to every SSH invocation.
-license	Registers or updates product licenses on the specified systems.
–logpath *log_path*	Specifies a directory other than `/opt/VRTS/install/logs` as the location where installer log files, summary files, and response files are saved.
-noipc	Disables the installer from making outbound networking calls to Symantec Operations Readiness Tool (SORT) in order to automatically obtain patch and release information updates.
-nolic	Allows installation of product packages without entering a license key. Licensed features cannot be configured, started, or used when this option is specified.

Table A-1 Available command line options *(continued)*

Command Line Option	Function
–pkginfo	Displays a list of packages and the order of installation in a human-readable format. This option only applies to the individual product installation scripts. For example, use the -pkginfo option with the installer script to display VCS packages.
–pkgset	Discovers and displays the package group (minimum, recommended, all) and packages that are installed on the specified systems.
-pkgtable	Displays product's packages in correct installation order by group.
–postcheck	Checks for different HA and file system-related processes, the availability of different ports, and the availability of cluster-related service groups.
-precheck	Performs a preinstallation check to determine if systems meet all installation requirements. Symantec recommends doing a precheck before installing a product.
-prod	Specifies the product for operations.
-component	Specifies the component for operations.
-redirect	Displays progress details without showing the progress bar.
-require	Specifies an installer patch file.
-requirements	The `-requirements` option displays required OS version, required packages and patches, file system space, and other system requirements in order to install the product.
–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. You must edit the response file to use it for subsequent installations. Variable field definitions are defined within the file.

Table A-1 Available command line options *(continued)*

Command Line Option	Function
–rootpath *root_path*	Specifies an alternative root directory on which to install packages. On Solaris operating systems, `-rootpath` passes `-R path` to `pkgadd` command.
-rsh	Specify this option when you want to use RSH and RCP for communication between systems instead of the default SSH and SCP.
-security	The -security option is used to convert a running VCS cluster between secure and non-secure modes of operation.
-securityonenode	The `-securityonenode` option is used to configure a secure cluster node by node.
-securitytrust	The `-securitytrust` option is used to setup trust with another broker.
–serial	Specifies that the installation script performs install, uninstall, start, and stop operations on each system in a serial fashion. If this option is not specified, these operations are performed simultaneously on all systems.
-settunables	Specify this option when you want to set tunable parameters after you install and configure a product. You may need to restart processes of the product for the tunable parameter values to take effect. You must use this option together with the `-tunablesfile` option.
-start	Starts the daemons and processes for the specified product.
-stop	Stops the daemons and processes for the specified product.

Table A-1 Available command line options *(continued)*

Command Line Option	Function
-timeout	The `-timeout` option is used to specify the number of seconds that the script should wait for each command to complete before timing out. Setting the `-timeout` option overrides the default value of 1200 seconds. Setting the `-timeout` option to 0 prevents the script from timing out. The `-timeout` option does not work with the `-serial` option
–tmppath *tmp_path*	Specifies 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.
-tunables	Lists all supported tunables and create a tunables file template.
-tunables_file *tunables_file*	Specify this option when you specify a tunables file. The tunables file should include tunable parameters.
-upgrade	Specifies that an existing version of the product exists and you plan to upgrade it.
-version	Checks and reports the installed products and their versions. Identifies the installed and missing packages and patches where applicable for the product. Provides a summary that includes the count of the installed and any missing packages and patches where applicable. Lists the installed patches, patches, and available updates for the installed product if an Internet connection is available.

Appendix B

Tunable files for installation

This appendix includes the following topics:

About setting tunable parameters using the installer or a response file

You can set non-default product and system tunable parameters using a tunables file. With the file, you can set tunables such as the I/O policy or toggle native multi-pathing. The tunables file passes arguments to the installer script to set tunables. With the file, you can set the tunables for the following operations:

- When you install, configure, or upgrade systems.

  ```
  # ./installer -tunablesfile tunables_file_name
  ```

  See "Setting tunables for an installation, configuration, or upgrade" on page 117.

- When you apply the tunables file with no other installer-related operations.

```
# ./installer -tunablesfile tunables_file_name -settunables [
sys1 sys2 ...]
```

See "Setting tunables with no other installer-related operations" on page 118.

- When you apply the tunables file with an un-integrated response file.

```
# ./installer -responsefile response_file_name -tunablesfile
tunables_file_name
```

See "Setting tunables with an un-integrated response file" on page 119.

See "About response files" on page 58.

You must select the tunables that you want to use from this guide.

See "Tunables value parameter definitions" on page 121.

Setting tunables for an installation, configuration, or upgrade

You can use a tunables file for installation procedures to set non-default tunables. You invoke the installation script with the `tunablesfile` option. The tunables file passes arguments to the script to set the selected tunables. You must select the tunables that you want to use from this guide.

See "Tunables value parameter definitions" on page 121.

Note: Certain tunables only take effect after a system reboot.

To set the non-default tunables for an installation, configuration, or upgrade

1. Prepare the tunables file.

   See "Preparing the tunables file" on page 120.

2. Make sure the systems where you want to install Veritas InfoScale meet the installation requirements.
3. Complete any preinstallation tasks.
4. Copy the tunables file to one of the systems where you want to install, configure, or upgrade the product.
5. Mount the product disc and navigate to the directory that contains the installation program.

6 Start the installer for the installation, configuration, or upgrade. For example:

```
# ./installer -tunablesfile /tmp/tunables_file
 -settunables [sys1 sys2 ...]
```

Where /tmp/*tunables_file* is the full path name for the tunables file.

7 Proceed with the operation. When prompted, accept the tunable parameters.

Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.

8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

Setting tunables with no other installer-related operations

You can use the installer to set tunable parameters without any other installer-related operations. You must use the parameters described in this guide. Note that many of the parameters are product-specific. You must select the tunables that you want to use from this guide.

See "Tunables value parameter definitions" on page 121.

Note: Certain tunables only take effect after a system reboot.

To set tunables with no other installer-related operations

1 Prepare the tunables file.

See "Preparing the tunables file" on page 120.

2 Make sure the systems where you want to install Veritas InfoScale meet the installation requirements.

3 Complete any preinstallation tasks.

4 Copy the tunables file to one of the systems that you want to tune.

5 Mount the product disc and navigate to the directory that contains the installation program.

6 Start the installer with the `-settunables` option.

```
# ./installer -tunablesfile tunables_file_name -settunables [
sys123 sys234 ...]
```

Where /tmp/*tunables_file* is the full path name for the tunables file.

7 Proceed with the operation. When prompted, accept the tunable parameters.

Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.

8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

Setting tunables with an un-integrated response file

You can use the installer to set tunable parameters with an un-integrated response file. You must use the parameters described in this guide. Note that many of the parameters are product-specific. You must select the tunables that you want to use from this guide.

See "Tunables value parameter definitions" on page 121.

Note: Certain tunables only take effect after a system reboot.

To set tunables with an un-integrated response file

1 Make sure the systems where you want to install Veritas InfoScale meet the installation requirements.

2 Complete any preinstallation tasks.

3 Prepare the tunables file.

See "Preparing the tunables file" on page 120.

4 Copy the tunables file to one of the systems that you want to tune.

5 Mount the product disc and navigate to the directory that contains the installation program.

6 Start the installer with the `-responsefile` and `-tunablesfile` options.

```
# ./installer -responsefile response_file_name -tunablesfile
tunables_file_name
```

Where *response_file_name* is the full path name for the response file and *tunables_file_name* is the full path name for the tunables file.

7 Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.

8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

Preparing the tunables file

A tunables file is a Perl module and consists of an opening and closing statement, with the tunables defined between. Use the hash symbol at the beginning of the line to comment out the line. The tunables file opens with the line "our %TUN;" and ends with the return true "1;" line. The final return true line only needs to appear once at the end of the file. Define each tunable parameter on its own line.

You can use the installer to create a tunables file template, or manually format tunables files you create.

To create a tunables file template

- Start the installer with the `-tunables` option. Enter the following:

  ```
  # ./installer -tunables
  ```

  You see a list of all supported tunables, and the location of the tunables file template.

To manually format tunables files

- Format the tunable parameter as follows:

  ```
  $TUN{"tunable_name"}{"system_name"|"*"}=value_of_tunable;
  ```

For the *system_name*, use the name of the system, its IP address, or a wildcard symbol. The *value_of_tunable* depends on the type of tunable you are setting. End the line with a semicolon.

The following is an example of a tunables file.

```
#
# Tunable Parameter Values:
#
our %TUN;

$TUN{"tunable1"}{"*"}=1024;
$TUN{"tunable3"}{"sys123"}="SHA256";

1;
```

Setting parameters for the tunables file

Each tunables file defines different tunable parameters. The values that you can use are listed in the description of each parameter. Select the tunables that you want to add to the tunables file and then configure each parameter.

See "Tunables value parameter definitions" on page 121.

Each line for the parameter value starts with $TUN. The name of the tunable is in curly brackets and double-quotes. The system name is enclosed in curly brackets and double-quotes. Finally define the value and end the line with a semicolon, for example:

```
$TUN{"dmp_daemon_count"}{"node123"}=16;
```

In this example, you are changing the dmp_daemon_count value from its default of 10 to 16. You can use the wildcard symbol "*" for all systems. For example:

```
$TUN{"dmp_daemon_count"}{"*"}=16;
```

Tunables value parameter definitions

When you create a tunables file for the installer you can only use the parameters in the following list.

Prior to making any updates to the tunables, refer to the *Storage Foundation Cluster File System High Availability Administrator's Guide* for detailed information on product tunable ranges and recommendations.

Table B-1 describes the supported tunable parameters that can be specified in a tunables file.

Table B-1 Supported tunable parameters

Tunable	Description
autoreminor	(Veritas Volume Manager) Enable reminoring in case of conflicts during disk group import.
autostartvolumes	(Veritas Volume Manager) Enable the automatic recovery of volumes.
dmp_cache_open	(Dynamic Multi-Pathing) Whether the first open on a device performed by an array support library (ASL) is cached.
dmp_daemon_count	(Dynamic Multi-Pathing) The number of kernel threads for DMP administrative tasks.
dmp_delayq_interval	(Dynamic Multi-Pathing) The time interval for which DMP delays the error processing if the device is busy.

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
dmp_fast_recovery	(Dynamic Multi-Pathing) Whether DMP should attempt to obtain SCSI error information directly from the HBA interface. This tunable must be set after Dynamic Multi-Pathing is started.
dmp_health_time	(Dynamic Multi-Pathing) The time in seconds for which a path must stay healthy.
dmp_log_level	(Dynamic Multi-Pathing) The level of detail to which DMP console messages are displayed.
dmp_low_impact_probe	(Dynamic Multi-Pathing) Whether the low impact path probing feature is enabled.
dmp_lun_retry_timeout	(Dynamic Multi-Pathing) The retry period for handling transient errors.
dmp_monitor_fabric	(Dynamic Multi-Pathing) Whether the Event Source daemon (`vxesd`) uses the Storage Networking Industry Association (SNIA) HBA API. This tunable must be set after Dynamic Multi-Pathing is started.
dmp_monitor_osevent	(Dynamic Multi-Pathing) Whether the Event Source daemon (vxesd) monitors operating system events.
dmp_monitor_ownership	(Dynamic Multi-Pathing) Whether the dynamic change in LUN ownership is monitored.
dmp_native_multipathing	(Dynamic Multi-Pathing) Whether DMP will intercept the I/Os directly on the raw OS paths or not.
dmp_native_support	(Dynamic Multi-Pathing) Whether DMP does multi-pathing for native devices.
dmp_path_age	(Dynamic Multi-Pathing) The time for which an intermittently failing path needs to be monitored before DMP marks it as healthy.
dmp_pathswitch_blks_shift	(Dynamic Multi-Pathing) The default number of contiguous I/O blocks sent along a DMP path to an array before switching to the next available path.

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
dmp_probe_idle_lun	(Dynamic Multi-Pathing) Whether the path restoration kernel thread probes idle LUNs.
dmp_probe_threshold	(Dynamic Multi-Pathing) The number of paths will be probed by the restore daemon.
dmp_restore_cycles	(Dynamic Multi-Pathing) The number of cycles between running the check_all policy when the restore policy is check_periodic.
dmp_restore_interval	(Dynamic Multi-Pathing) The time interval in seconds the restore daemon analyzes the condition of paths.
dmp_restore_policy	(Dynamic Multi-Pathing) The policy used by DMP path restoration thread.
dmp_restore_state	(Dynamic Multi-Pathing) Whether kernel thread for DMP path restoration is started.
dmp_retry_count	(Dynamic Multi-Pathing) The number of times a path reports a path busy error consecutively before DMP marks the path as failed.
dmp_scsi_timeout	(Dynamic Multi-Pathing) The timeout value for any SCSI command sent via DMP.
dmp_sfg_threshold	(Dynamic Multi-Pathing) The status of the subpaths failover group (SFG) feature.
dmp_stat_interval	(Dynamic Multi-Pathing) The time interval between gathering DMP statistics.
fssmartmovethreshold	(Veritas Volume Manager) The file system usage threshold for SmartMove (percent). This tunable must be set after Veritas Volume Manager is started.
max_diskq	(Veritas File System) Specifies the maximum disk queue generated by a single file. The installer can only set the system default value of max_diskq. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
read_ahead	(Veritas File System) The 0 value disables read ahead functionality, the 1 value (default) retains traditional sequential read ahead behavior, and the 2 value enables enhanced read ahead for all reads. The installer can only set the system default value of read_ahead. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.
read_nstream	(Veritas File System) The number of parallel read requests of size read_pref_io that can be outstanding at one time. The installer can only set the system default value of read_nstream. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.
read_pref_io	(Veritas File System) The preferred read request size. The installer can only set the system default value of read_pref_io. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.
reclaim_on_delete_start_time	(Veritas Volume Manager) Time of day to start reclamation for deleted volumes. This tunable must be set after Veritas Volume Manager is started.
reclaim_on_delete_wait_period	(Veritas Volume Manager) Days to wait before starting reclamation for deleted volumes. This tunable must be set after Veritas Volume Manager is started.
same_key_for_alldgs	(Veritas Volume Manager) Use the same fencing key for all disk groups. This tunable must be set after Veritas Volume Manager is started.
sharedminorstart	(Veritas Volume Manager) Start of range to use for minor numbers for shared disk groups. This tunable must be set after Veritas Volume Manager is started.

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
storage_connectivity	(Veritas Volume Manager) The CVM storage connectivity type. This tunable must be set after Veritas Volume Manager is started.
usefssmartmove	(Veritas Volume Manager) Configure SmartMove feature (all, thinonly, none). This tunable must be set after Veritas Volume Manager is started.
vol_checkpt_default	(Veritas File System) Size of VxVM storage checkpoints (kBytes). This tunable requires a system reboot to take effect.
vol_cmpres_enabled	(Veritas Volume Manager) Allow enabling compression for Volume Replicator.
vol_cmpres_threads	(Veritas Volume Manager) Maximum number of compression threads for Volume Replicator.
vol_default_iodelay	(Veritas Volume Manager) Time to pause between I/O requests from VxVM utilities (10ms units). This tunable requires a system reboot to take effect.
vol_fmr_logsz	(Veritas Volume Manager) Maximum size of bitmap Fast Mirror Resync uses to track changed blocks (KBytes). This tunable requires a system reboot to take effect.
vol_max_adminio_poolsz	(Veritas Volume Manager) Maximum amount of memory used by VxVM admin I/O's (bytes). This tunable requires a system reboot to take effect.
vol_max_nmpool_sz	(Veritas Volume Manager) Maximum name pool size (bytes).
vol_max_rdback_sz	(Veritas Volume Manager) Storage Record readback pool maximum (bytes).
vol_max_wrspool_sz	(Veritas Volume Manager) Maximum memory used in clustered version of Volume Replicator .

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
vol_maxio	(Veritas Volume Manager) Maximum size of logical VxVM I/O operations (kBytes). This tunable requires a system reboot to take effect.
vol_maxioctl	(Veritas Volume Manager) Maximum size of data passed into the VxVM ioctl calls (bytes). This tunable requires a system reboot to take effect.
vol_maxparallelio	(Veritas Volume Manager) Number of I/O operations vxconfigd can request at one time. This tunable requires a system reboot to take effect.
vol_maxspecialio	(Veritas Volume Manager) Maximum size of a VxVM I/O operation issued by an ioctl call (kBytes). This tunable requires a system reboot to take effect.
vol_min_lowmem_sz	(Veritas Volume Manager) Low water mark for memory (bytes).
vol_nm_hb_timeout	(Veritas Volume Manager) Volume Replicator timeout value (ticks).
vol_rvio_maxpool_sz	(Veritas Volume Manager) Maximum memory requested by Volume Replicator (bytes).
vol_stats_enable	(Veritas Volume Manager) Enable VxVM I/O stat collection.
vol_subdisk_num	(Veritas Volume Manager) Maximum number of subdisks attached to a single VxVM plex. This tunable requires a system reboot to take effect.
voldrl_max_drtregs	(Veritas Volume Manager) Maximum number of dirty VxVM regions. This tunable requires a system reboot to take effect.
voldrl_max_seq_dirty	(Veritas Volume Manager) Maximum number of dirty regions in sequential mode. This tunable requires a system reboot to take effect.

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
voldrl_min_regionsz	(Veritas Volume Manager) Minimum size of a VxVM Dirty Region Logging (DRL) region (kBytes). This tunable requires a system reboot to take effect.
voldrl_volumemax_drtregs	(Veritas Volume Manager) Max per volume dirty regions in log-plex DRL.
voldrl_volumemax_drtregs_20	(Veritas Volume Manager) Max per volume dirty regions in DCO version 20.
voldrl_dirty_regions	(Veritas Volume Manager) Number of regions cached for DCO version 30.
voliomem_chunk_size	(Veritas Volume Manager) Size of VxVM memory allocation requests (bytes). This tunable requires a system reboot to take effect.
voliomem_maxpool_sz	(Veritas Volume Manager) Maximum amount of memory used by VxVM (bytes). This tunable requires a system reboot to take effect.
voliot_errbuf_dflt	(Veritas Volume Manager) Size of a VxVM error trace buffer (bytes). This tunable requires a system reboot to take effect.
voliot_iobuf_default	(Veritas Volume Manager) Default size of a VxVM I/O trace buffer (bytes). This tunable requires a system reboot to take effect.
voliot_iobuf_limit	(Veritas Volume Manager) Maximum total size of all VxVM I/O trace buffers (bytes). This tunable requires a system reboot to take effect.
voliot_iobuf_max	(Veritas Volume Manager) Maximum size of a VxVM I/O trace buffer (bytes). This tunable requires a system reboot to take effect.
voliot_max_open	(Veritas Volume Manager) Maximum number of VxVM trace channels available for vxtrace commands. This tunable requires a system reboot to take effect.
volpagemod_max_memsz	(Veritas Volume Manager) Maximum paging module memory used by Instant Snapshots (Kbytes).

Table B-1 Supported tunable parameters *(continued)*

Tunable	Description
volraid_rsrtransmax	(Veritas Volume Manager) Maximum number of VxVM RAID-5 transient reconstruct operations in parallel. This tunable requires a system reboot to take effect.
vx_era_nthreads	(Veritas File System) Maximum number of threads VxFS will detect read_ahead patterns on. This tunable requires a system reboot to take effect.
vx_bc_bufhwm	(Veritas File System) VxFS metadata buffer cache high water mark. This tunable requires a system reboot to take effect.
vxfs_ninode	(Veritas File System) Number of entries in the VxFS inode table. This tunable requires a system reboot to take effect.
write_nstream	(Veritas File System) The number of parallel write requests of size write_pref_io that can be outstanding at one time. The installer can only set the system default value of write_nstream. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.
write_pref_io	(Veritas File System) The preferred write request size. The installer can only set the system default value of write_pref_io. Refer to the tunefstab(4) manual page for setting this tunable for a specified block device.

Appendix C

Troubleshooting installation issues

This appendix includes the following topics:

Restarting the installer after a failed connection

If an installation is killed because of a failed connection, you can restart the installer to resume the installation. The installer detects the existing installation. The installer prompts you whether you want to resume the installation. If you resume the installation, the installation proceeds from the point where the installation failed.

About the VRTSspt package troubleshooting tools

The VRTSspt package provides a group of tools for troubleshooting a system and collecting information on its configuration. If you install and use the VRTSspt package, it will be easier for Symantec Support to diagnose any issues you may have.

The tools can gather Veritas File System and Veritas Volume Manager metadata information and establish various benchmarks to measure file system and volume manager performance. Although the tools are not required for the operation of any Veritas InfoScale product, Symantec recommends installing them should a support

case be needed to be opened with Symantec Support. Use caution when you use the VRTSspt package, and always use it in concert with Symantec Support.

Incorrect permissions for root on remote system

The permissions are inappropriate. Make sure you have remote root access permission on each system to which you are installing.

```
Failed to setup rsh communication on 10.198.89.241:
'rsh 10.198.89.241 <command>' failed
Trying to setup ssh communication on 10.198.89.241.
Failed to setup ssh communication on 10.198.89.241:
Login denied

Failed to login to remote system(s) 10.198.89.241.
Please make sure the password(s) are correct and superuser(root)
can login to the remote system(s) with the password(s).
If you want to setup rsh on remote system(s), please make sure
rsh with command argument ('rsh <host> <command>') is not
denied by remote system(s).

Either ssh or rsh is needed to be setup between the local node
and 10.198.89.241 for communication

Would you like the installer to setup ssh/rsh communication
automatically between the nodes?
Superuser passwords for the systems will be asked. [y,n,q] (y) n

System verification did not complete successfully

The following errors were discovered on the systems:

The ssh permission denied on 10.198.89.241
rsh exited 1 on 10.198.89.241
either ssh or rsh is needed to be setup between the local node
and 10.198.89.241 for communication
```

Suggested solution: You need to set up the systems to allow remote access using `ssh` or `rsh`.

Note: Remove remote shell permissions after completing the Veritas InfoScale installation and configuration.

Inaccessible system

The system you specified is not accessible. This could be for a variety of reasons such as, the system name was entered incorrectly or the system is not available over the network.

```
 Verifying systems: 12% .....................................
 Estimated time remaining: 0:10 1 of 8
 Checking system communication ............................. Done
System verification did not complete successfully
The following errors were discovered on the systems:
cannot resolve hostname host1
Enter the  system names separated by spaces: q,? (host1)
```

Suggested solution: Verify that you entered the system name correctly; use the `ping`(1M) command to verify the accessibility of the host.

Index

T

U

V