Storage Foundation 7.0 Configuration and Upgrade Guide - Linux

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VERITAS™

Storage Foundation Configuration and Upgrade Guide

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- Router, gateway, and IP address information
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Product guides are available on the media in PDF format. Make sure that you are using the current version of the documentation. The document version appears on page 2 of each guide. The latest product documentation is available on the Symantec website.

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http://www.symantec.com/connect/storage-management

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Section 1

Introduction and configuration of Storage Foundation

Chapter 1

Introducing Storage Foundation

This chapter includes the following topics:

About Storage Foundation

Storage Foundation includes Veritas File System (VxFS) and Veritas Volume Manager (VxVM) with various feature levels.

Veritas File System is a high-performance journaling file system that provides easy management and quick-recovery for applications. Veritas File System delivers scalable performance, continuous availability, increased I/O throughput, and structural integrity.

Veritas Volume Manager removes the physical limitations of disk storage. You can configure, share, manage, and optimize storage I/O performance online without interrupting data availability. Veritas Volume Manager also provides easy-to-use, online storage management tools to reduce downtime.

VxFS and VxVM are a part of all Veritas InfoScale products. Do not install or update VxFS or VxVM as individual components.

Storage Foundation Basic supports all Storage Foundation Standard features, however, there are deployment and technical support limitations.

About Veritas Replicator Option

Veritas Replicator Option is an optional, separately-licensable feature.

File Replicator enables replication at the file level over IP networks. File Replicator leverages data duplication, provided by Veritas File System, to reduce the impact of replication on network resources.

Volume Replicator replicates data to remote locations over any standard IP network to provide continuous data availability and disaster recovery.

Volume Replicator is available with Storage Foundation, Storage Foundation High Availability, Storage Foundation Cluster File System, Storage Foundation for Oracle RAC, and Storage Foundation for SybaseCE.

Before installing this option, read the Release Notes for the product.

To install the option, follow the instructions in the Installation Guide for the product.

About Veritas InfoScale Operations Manager

Veritas InfoScale Operations Manager provides a centralized management console for Veritas InfoScale products. You can use Veritas InfoScale Operations Manager to monitor, visualize, and manage storage resources and generate reports.

Symantec recommends using Veritas InfoScale Operations Manager to manage Storage Foundation and Cluster Server environments.

You can download Veritas InfoScale Operations Manager from http://go.symantec.com/vom.

Refer to the Veritas InfoScale Operations Manager documentation for installation, upgrade, and configuration instructions.

The Veritas Enterprise Administrator (VEA) console is no longer packaged with Veritas InfoScale products. If you want to continue using VEA, a software version is available for download from http://www.symantec.com/operations-manager/support. Storage Foundation Management Server is deprecated.

About Symantec Operations Readiness Tools

Symantec Operations Readiness Tools (SORT) is a website that automates and simplifies some of the most time-consuming administrative tasks. It helps you identify risks in your datacenters and improve operational efficiency, enabling you to manage the complexity that is associated with datacenter architectures and scale.

Table 1-1 lists three major datacenter tasks and the SORT tools that can help you accomplish them.

Table 1-1 Datacenter tasks and the SORT tools

Task	SORT tools
Prepare for installations and upgrades	■ Installation and Upgrade checklists Display system requirements including memory, disk space, and architecture. ■ Installation and Upgrade custom reports Create reports that determine if you're ready to install or upgrade a Veritas InfoScale product. ■ Array-specific Module Finder List the latest Array Support Libraries (ASLs) and Array Policy Modules (APMs) for UNIX servers, and Device Driver Installers (DDIs) and Device Discovery Layers (DDLs) for Windows servers. ■ High Availability Agents table Find and download the agents for applications, databases, replication, and Symantec partners.
Identify risks and get server-specific recommendations	■ Patch notifications Receive automatic email notifications about patch updates. (Sign in required.) ■ Risk Assessment check lists Display configuration recommendations based on your Veritas InfoScale product and platform. ■ Risk Assessment custom reports Create reports that analyze your system and give you recommendations about system availability, storage use, performance, and best practices. ■ Error code descriptions and solutions Display detailed information on thousands of error codes.

Table 1-1 Datacenter tasks and the SORT tools *(continued)*

Task	SORT tools
Improve efficiency	■ Patch Finder List and download patches for your Veritas InfoScale enterprise products. ■ License/Deployment custom reports Create custom reports that list your installed Veritas InfoScale products and license keys. Display licenses by product, platform, server tier, and system. ■ Symantec Performance Value Unit (SPVU) Calculator Use the calculator to assist you with the pricing meter transition. ■ Documentation List and download Veritas InfoScale product documentation, including manual pages, product guides, and support articles. ■ Related links Display links to Veritas InfoScale product support, forums, customer care, and vendor information on a single page.

SORT is available at no additional charge.

To access SORT, go to:

https://sort.symantec.com

Chapter 2

Configuring Storage Foundation

This chapter includes the following topics:

Configuring Storage Foundation using the installer

You can use the installer to configure Storage Foundation, although it requires minimal configuration.

To configure Storage Foundation

1. Go to the `/opt/VRTS/install/` installation directory.
2. Run the installer command with the configure option.

   ```
   # ./installer -configure
   ```

   Or run the `/opt/VRTS/install/installer` command, then select the configure option:

   ```
   Task Menu:
   C) Configure a Product Component
   U) Uninstall a Product
   L) License a Product
   S) Start a Product
   D) View Product Descriptions
   X) Stop a Product
   O) Perform a Post-Installation Check
   ?) Help

   Enter a Task: [C,U,L,S,D,X,O,?] C
   ```

Configuring SF manually

You can manually configure different products within SF.

Configuring Veritas Volume Manager

Use the following procedures to configure Veritas Volume Manager. If you have installed and configured VxVM using the product installer, you do not need to complete the procedures in this section.

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

Configuring Veritas File System

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

`/etc/fstab`

The specific commands are described in the Storage Foundation guides and online manual pages.

See the *Storage Foundation Administrator's Guide*.

Loading and unloading the file system module

The `vxfs` file system module automatically loads on the first reference to a VxFS file system; this occurs when a user tries to mount a VxFS file system.

In some instances, you may find it efficient to load the file system module manually. For example, some larger class systems can have many dual interface I/O cards with multiple disk chains attached. The device interrogation process when such a system is rebooted can be very time consuming, so to avoid doing a reboot, use the `modprobe` command to load the `vxfs` module:

```
# modprobe vxfs ; modprobe vxportal ; modprobe fdd
```

Do not use the `insmod` command to load the `vxfs` module as `insmod` does not examine the module configuration file `/etc/modprobe.conf`.

To determine if the modules successfully loaded, use the `lsmod` command as shown here:

```
# lsmod | grep vxportal
vxportal               2952           0
vxfs                   3427960        0    fdd vxportal
# lsmod | grep fdd
fdd                    67212          0    (unused)
vxfs                   3427960        0    [fdd vxportal]
# lsmod | grep vxfs
vxfs                   3427960        0    [fdd vxportal]
```

The first field in the output is the module name. You can unload the modules by entering:

```
# rmmod fdd
# rmmod vxportal
# rmmod vxfs
```

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

```
# df -T | grep vxfs
```

Configuring SFDB

By default, SFDB tools are disabled that is the vxdbd daemon is not configured. You can check whether SFDB tools are enabled or disabled using the`/opt/VRTS/bin/sfae_config status` command.

To enable SFDB tools

1. Log in as root.
2. Run the following command to configure and start the vxdbd daemon. After you perform this step, entries are made in the system startup so that the daemon starts on a system restart.

   ```
   #/opt/VRTS/bin/sfae_config enable
   ```

To disable SFDB tools

1. Log in as root.
2. Run the following command:

   ```
   #/opt/VRTS/bin/sfae_config disable
   ```

Section 2

Upgrade of Storage Foundation

Chapter 3

Planning to upgrade Storage Foundation

This chapter includes the following topics:

About the upgrade

This release supports upgrades from 6.0 and later versions. If your existing installation is from a pre-60 version, you must first upgrade to version 6.0, then follow the procedures mentioned in this document to upgrade the product.

The installer supports the following types of upgrade:

- Full upgrade
- Automated upgrade using response files

Table 3-1 describes the product mapping after an upgrade.

Table 3-1 Veritas InfoScale product mapping after upgrade

Product (6.2.x and earlier)	Product (7.0)	Component (7.0)
SF Basic	No upgrade supported	Not applicable

Table 3-1 Veritas InfoScale product mapping after upgrade *(continued)*

Product (6.2.x and earlier)	Product (7.0)	Component (7.0)
SF	Veritas InfoScale Storage	SF
DMP	Veritas InfoScale Foundation	SF

During the upgrade, the installation program performs the following tasks:

1. Stops the product before starting the upgrade
2. Upgrades the installed packages and installs additional packages

   If your current installation uses a permanent license key, you will be prompted to update the license to 7.0. If you choose not to update, you can continue to use the old license, limiting the capability of your product to the corresponding component. For example, if you choose not to update the permanent license of your existing SFCFSHA installation, the installer after upgrade will enable SFCFSHA component. The capabilities of other components in the product Veritas InfoScale Enterprise will not be available to you. If your installation uses a keyless license, the installer registers the new keys for the new product with full product capabilities.
3. Restores the existing configuration.

   For example, if your setup contains an SF installation, the installer upgrades and restores the configuration to SF. If your setup included multiple components, the installer upgrades and restores the configuration of the components.
4. Starts the configured components.

Note: If the root disk is encapsulated, you need not unencapsulate the root disk. Reboot the system after the upgrade.

Supported upgrade paths

If you are on an unsupported operating system version, ensure that you first upgrade to a supported verison of the operating system. Also, upgrades between major operating system versions are not supported, for example, from RHEL 6 to RHEL 7. If you plan to move between major operating system versions, you need to reinstall the product. For supported operating system versions, see the *Veritas InfoScale Release Notes*.

Table 3-2 lists the supported upgrade paths for upgrades on RHEL and Oracle Linux.

Table 3-2 Supported upgrade paths on RHEL and Oracle Linux

From product version	From OS version	To OS version	To product version	To Component
6.0 and 6.0 RP1	RHEL 6 Update 1, 2 Oracle Linux 6 Update 1	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.0.1	RHEL 6 Update 1, 2, 3 Oracle Linux 6 Update 1, 2, 3	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.0.2	RHEL 6 Update 1, 2 Oracle Linux 6 Update 1, 2	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.0.3	RHEL 6 Update 1, 2, 3, 4, 5 Oracle Linux 6 Update 1, 2, 3, 4, 5	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.0.5	RHEL 6 Update 1, 2, 3, 4, 5, 6 Oracle Linux 6 Update 1, 2, 3, 4, 5, 6	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.1	RHEL 6 Update 3, 4, 5 Oracle Linux 6 Update 3, 4, 5	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.1.1, 6.2	RHEL 6 Update 3, 4, 5, 6 Oracle Linux 6 Update 3, 4, 5	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF

Table 3-2 Supported upgrade paths on RHEL and Oracle Linux *(continued)*

From product version	From OS version	To OS version	To product version	To Component
6.2	RHEL 7 Oracle Linux 7	RHEL 7, Update 1 Oracle Linux 7, Update 1	Veritas InfoScale Storage 7.0	SF
6.2.1	RHEL 6 Update 4, 5, 6 Oracle Linux 6 Update 4, 5, 6	RHEL 6 Update 4 ,5, 6 Oracle Linux 6 Update 4, 5, 6	Veritas InfoScale Storage 7.0	SF
6.2.1	RHEL 7, Update 1 Oracle Linux 7, Update 1	RHEL 7, Update 1 Oracle Linux 7, Update 1	Veritas InfoScale Storage 7.0	SF

Table 3-3 lists the supported upgrade paths for upgrades on SLES.

Table 3-3 Supported upgrade paths on SLES

From product version	From OS version	To OS version	To product version	To component
6.0 and 6.0 RP1	SLES 11 SP1	SLES 11 SP3	Veritas InfoScale Storage 7.0	SF
6.0.1, 6.0.2, 6.0.3	SLES 11 SP1 SLES 11 SP2	SLES 11 SP3	Veritas InfoScale Storage 7.0	SF
6.0.4	SLES 11 SP2 SLES 11 SP3	SLES 11 SP3	Veritas InfoScale Storage 7.0	SF
6.0.5	SLES 11 SP1 SLES 11 SP2 SLES 11 SP3	SLES 11 SP3	Veritas InfoScale Storage 7.0	SF
6.1, 6.1.1, 6.2, 6.2.1	SLES 11 SP2 SLES 11 SP3	SLES 11 SP3	Veritas InfoScale Storage 7.0	SF

Table 3-3 Supported upgrade paths on SLES *(continued)*

From product version	From OS version	To OS version	To product version	To component
6.2.1	SLES 12	SLES 12	Veritas InfoScale Storage 7.0	SF

Preparing to upgrade SF

Before you upgrade, you need to prepare the systems and storage. Review the following procedures and perform the appropriate tasks.

Getting ready for the upgrade

Complete the following tasks before you perform the upgrade:

- Review the *Veritas InfoScale 7.0 Release Notes* for any late-breaking information on upgrading your system.
- Review the Symantec Technical Support website for additional information: http://www.symantec.com/techsupp/
- Make sure that the administrator who performs the upgrade has root access and a good knowledge of the operating system's administration.
- Make sure that all users are logged off and that all major user applications are properly shut down.
- Make sure that you have created a valid backup.
  See "Creating backups" on page 24.
- Ensure that you have enough file system space to upgrade. Identify where you want to copy the RPMs, for example `/packages/Veritas` when the root file system has enough space or `/var/tmp/packages` if the `/var` file system has enough space.
  Do not put the files under `/tmp`, which is erased during a system restart.
  Do not put the files on a file system that is inaccessible before running the upgrade script.
  You can use a Symantec-supplied disc for the upgrade as long as modifications to the upgrade script are not required.
  If `/usr/local` was originally created as a slice, modifications are required.
- For any startup scripts in `/etc/init.d/`, comment out any application commands or processes that are known to hang if their file systems are not present.

- Make sure that the current operating system supports version 7.0 of the product. If the operating system does not support it, plan for a staged upgrade.
- Schedule sufficient outage time and downtime for the upgrade and any applications that use the Veritas InfoScale products. Depending on the configuration, the outage can take several hours.
- Any swap partitions not in `rootdg` must be commented out of `/etc/fstab`. If possible, swap partitions other than those on the root disk should be commented out of `/etc/fstab` and not mounted during the upgrade. The active swap partitions that are not in `rootdg` cause `upgrade_start` to fail.
- Make sure that the file systems are clean before upgrading.
- Upgrade arrays (if required).
  See "Upgrading the array support" on page 28.
- To reliably save information on a mirrored disk, shut down the system and physically remove the mirrored disk. Removing the disk in this manner offers a failback point.
- Determine if the root disk is encapsulated.
  See "Determining if the root disk is encapsulated" on page 25.
- Make sure that DMP support for native stack is disabled (`dmp_native_support=off`). If DMP support for native stack is enabled (`dmp_native_support=on`), the installer may detect it and ask you to restart the system.

Creating backups

Save relevant system information before the upgrade.

To create backups

1. Log in as superuser.
2. Before the upgrade, ensure that you have made backups of all data that you want to preserve.
3. Back up information in files such as `/boot/grub/menu.lst`, `/etc/grub.conf` or `/etc/lilo.conf`, and `/etc/fstab`.
4. Installer verifies that recent backups of configuration files in VxVM private region have been saved in `/etc/vx/cbr/bk`.

   If not, a warning message is displayed.

Warning: Backup `/etc/vx/cbr/bk` directory.

---

5. Copy the `fstab` file to `fstab.orig`:

   ```
   # cp /etc/fstab /etc/fstab.orig
   ```

6. Run the `vxlicrep`, `vxdisk list`, and `vxprint -ht` commands and record the output. Use this information to reconfigure your system after the upgrade.
7. If you install Veritas InfoScale Enterprise 7.0 software, follow the guidelines that are given in the *Cluster Server Configuration and Upgrade Guide* for information on preserving your VCS configuration across the installation procedure.
8. Back up the external `quotas` and `quotas.grp` files.

   If you are upgrading from 6.0.3, you must also back up the `quotas.grp.64` and `quotas.64` files.
9. Verify that quotas are turned off on all the mounted file systems.

Determining if the root disk is encapsulated

Check if the system's root disk is under VxVM control by running this command:

```
# df -v /
```

The root disk is under VxVM control if `/dev/vx/dsk/rootdg/rootvol` is listed as being mounted as the root (`/`) file system.

If the root disk is encapsulated, follow the appropriate upgrade procedures.

Pre-upgrade planning for Volume Replicator

Before installing or upgrading Volume Replicator (VVR):

- Confirm that your system has enough free disk space to install VVR.
- Make sure you have root permissions. You must have root permissions to perform the install and upgrade procedures.
- If replication using VVR is configured, Symantec recommends that the disk group version is at least 110 prior to upgrading.
  You can check the Disk Group version using the following command:

  ```
  # vxdg list diskgroup
  ```

- If replication using VVR is configured, make sure the size of the SRL volume is greater than 110 MB.
  Refer to the *Veritas InfoScale™ 7.0 Replication Administrator's Guide*.

- If replication using VVR is configured, verify that all the Primary RLINKs are up-to-date on all the hosts.

  ```
  # /usr/sbin/vxrlink -g diskgroup status rlink_name
  ```

  Note: Do not continue until the primary RLINKs are up-to-date.

- If VCS is used to manage VVR replication, follow the preparation steps to upgrade VVR and VCS agents.

See the *Veritas InfoScale™ 7.0 Replication Administrator's Guide* for more information.

See the *Getting Started Guide* for more information on the documentation.

Planning an upgrade from the previous VVR version

If you plan to upgrade VVR from the previous VVR version, you can upgrade VVR with reduced application downtime by upgrading the hosts at separate times. While the Primary is being upgraded, the application can be migrated to the Secondary, thus reducing downtime. The replication between the (upgraded) Primary and the Secondary, which have different versions of VVR, will still continue. This feature facilitates high availability even when the VVR upgrade is not complete on both the sites. Symantec recommends that the Secondary hosts be upgraded before the Primary host in the Replicated Data Set (RDS).

See the *Veritas InfoScale™ 7.0 Release Notes* for information regarding VVR support for replicating across Storage Foundation versions.

Replicating between versions is intended to remove the restriction of upgrading the Primary and Secondary at the same time. VVR can continue to replicate an existing RDS with Replicated Volume Groups (RVGs) on the systems that you want to upgrade. When the Primary and Secondary are at different versions, VVR does not support changing the configuration with the `vradmin` command or creating a new RDS.

Also, if you specify TCP as the network protocol, the VVR versions on the Primary and Secondary determine whether the checksum is calculated. As shown in Table 3-4, if either the Primary or Secondary are running a version of VVR prior to 7.0, and you use the TCP protocol, VVR calculates the checksum for every data packet it replicates. If the Primary and Secondary are at VVR 7.0, VVR does not calculate the checksum. Instead, it relies on the TCP checksum mechanism.

Table 3-4 VVR versions and checksum calculations

VVR prior to 7.0 (DG version <= 140)	VVR 7.0 (DG version >= 150)	VVR calculates checksum TCP connections?
Primary	Secondary	Yes
Secondary	Primary	Yes
Primary and Secondary		Yes
	Primary and Secondary	No

Note: When replicating between versions of VVR, avoid using commands associated with new features. The earlier version may not support new features and problems could occur.

If you do not need to upgrade all the hosts in the RDS simultaneously, you can use replication between versions after you upgrade one host. You can then upgrade the other hosts in the RDS later at your convenience.

Note: If you have a cluster setup, you must upgrade all the nodes in the cluster at the same time.

Planning and upgrading VVR to use IPv6 as connection protocol

SF supports using IPv6 as the connection protocol.

This release supports the following configurations for VVR:

- VVR continues to support replication between IPv4-only nodes with IPv4 as the internet protocol
- VVR supports replication between IPv4-only nodes and IPv4/IPv6 dual-stack nodes with IPv4 as the internet protocol
- VVR supports replication between IPv6-only nodes and IPv4/IPv6 dual-stack nodes with IPv6 as the internet protocol
- VVR supports replication between IPv6 only nodes
- VVR supports replication to one or more IPv6 only nodes and one or more IPv4 only nodes from a IPv4/IPv6 dual-stack node
- VVR supports replication of a shared disk group only when all the nodes in the cluster that share the disk group are at IPv4 or IPv6

Upgrading the array support

The Veritas InfoScale 7.0 release includes all array support in a single RPM, `VRTSaslapm`. The array support RPM includes the array support previously included in the `VRTSvxvm` RPM. The array support RPM also includes support previously packaged as external Array Support Libraries (ASLs) and array policy modules (APMs).

See the 7.0 Hardware Compatibility List for information about supported arrays.

When you upgrade Storage Foundation products with the product installer, the installer automatically upgrades the array support. If you upgrade Storage Foundation products with manual steps, you should remove any external ASLs or APMs that were installed previously on your system. Installing the `VRTSvxvm` RPM exits with an error if external ASLs or APMs are detected.

After you have installed Veritas InfoScale 7.0, Symantec provides support for new disk arrays through updates to the `VRTSaslapm` RPM.

For more information about array support, see the *Storage Foundation Administrator's Guide*.

Using Install Bundles to simultaneously install or upgrade full releases (base, maintenance, rolling patch), and individual patches

Beginning with version 6.1, you can easily install or upgrade your systems directly to a base, maintenance, patch level or a combination of multiple patches and packages together in one step using Install Bundles. With Install Bundles, the installer has the ability to merge so that customers can install or upgrade directly to maintenance or patch levels in one execution. The various scripts, RPMs, and patch components are merged, and multiple releases are installed together as if they are one combined release. You do not have to perform two or more install actions to install or upgrade systems to maintenance levels or patch levels.

Releases are divided into the following categories:

Table 3-5 Release Levels

Level	Content	Form factor	Applies to	Release types	Download location
Base	Features	RPMs	All products	Major, minor, Service Pack (SP), Platform Release (PR)	FileConnect
Maintenance	Fixes, new features	RPMs	All products	Maintenance Release (MR), Rolling Patch (RP)	Symantec Operations Readiness Tools (SORT)
Patch	Fixes	RPMs	Single product	P-Patch, Private Patch, Public patch	SORT, Support site

When you install or upgrade using Install Bundles:

- Veritas InfoScale products are discovered and assigned as a single version to the maintenance level. Each system can also have one or more patches applied.
- Base releases are accessible from FileConnect that requires customer serial numbers. Maintenance and patch releases can be automatically downloaded from SORT.
- Patches can be installed using automated installers from the 6.0.1 version or later.
- Patches can now be detected to prevent upgrade conflict. Patch releases are not offered as a combined release. They are only available from Symantec Technical Support on a need basis.

You can use the `-base_path` and `-patch_path` options to import installation code from multiple releases. You can find RPMs and patches from different media paths, and merge RPM and patch definitions for multiple releases. You can use these options to use new task and phase functionality to correctly perform required operations for each release component. You can install the RPMs and patches in defined phases using these options, which helps you when you want to perform a single start or stop process and perform pre and post operations for all level in a single operation.

Four possible methods of integration exist. All commands must be executed from the highest base or maintenance level install script.

In the example below:

- 7.0 is the base version

- 7.0.1 is the maintenance version
- 7.0.1.100 is the patch version for 7.0.1
- 7.0.0.100 is the patch version for 7.0

1. Base + maintenance:

   This integration method can be used when you install or upgrade from a lower version to 7.0.1.

   Enter the following command:

   ```
   # installmr -base_path <path_to_base>
   ```

2. Base + patch:

   This integration method can be used when you install or upgrade from a lower version to 7.0.0.100.

   Enter the following command:

   ```
   # installer -patch_path <path_to_patch>
   ```

3. Maintenance + patch:

   This integration method can be used when you upgrade from version 7.0 to 7.0.1.100.

   Enter the following command:

   ```
   # installmr -patch_path <path_to_patch>
   ```

4. Base + maintenance + patch:

   This integration method can be used when you install or upgrade from a lower version to 7.0.1.100.

   Enter the following command:

   ```
   # installmr -base_path <path_to_base>
   -patch_path <path_to_patch>
   ```

Note: From the 6.1 or later release, you can add a maximum of five patches using *-patch_path <path_to_patch> -patch2_path <path_to_patch> ... -patch5_path <path_to_patch>*

Chapter 4

Upgrading Storage Foundation

This chapter includes the following topics:

Upgrading Storage Foundation from previous versions to 7.0

If you are running an earlier release of Storage Foundation, you can upgrade to the latest version using the procedures described in this chapter.

See "Upgrading Storage Foundation using the product installer" on page 31.

If you need to upgrade your kernel with Storage Foundation 7.0 already installed, use the kernel upgrade procedure.

See the *Storage Foundation Administrator's Guide* for information about upgrading the kernel.

Upgrading Storage Foundation using the product installer

Use this procedure to upgrade Storage Foundation (SF).

To upgrade SF from previous versions to 7.0

1. Log in as superuser.
2. Use the following command to check if any VxFS file systems or Storage Checkpoints are mounted:

   ```
   # df -k | grep vxfs
   ```

3. Unmount all Storage Checkpoints and file systems:

   ```
   # umount /checkpoint_name
   # umount /filesystem
   ```

4. Verify that all file systems have been cleanly unmounted:

   ```
   # echo "8192B.p S" | fsdb -t vxfs filesystem | grep clean
   flags 0 mod 0 clean clean_value
   ```

   A *clean_value* value of `0x5a` indicates the file system is clean, `0x3c` indicates the file system is dirty, and `0x69` indicates the file system is dusty. A dusty file system has pending extended operations.

   Perform the following steps in the order listed:

   - If a file system is not clean, enter the following commands for that file system:

     ```
     # fsck -t vxfs filesystem
     # mount -t vxfs filesystem mountpoint
     # umount mountpoint
     ```

     This should complete any extended operations that were outstanding on the file system and unmount the file system cleanly.
     There may be a pending large RPM clone removal extended operation if the `umount` command fails with the following error:

     ```
     file system device busy
     ```

     You know for certain that an extended operation is pending if the following message is generated on the console:

     ```
     Storage Checkpoint asynchronous operation on file_system
     file system still in progress.
     ```

   - If an extended operation is pending, you must leave the file system mounted for a longer time to allow the operation to complete. Removing a very large RPM clone can take several hours.

- Repeat this step to verify that the unclean file system is now clean.

5 If a cache area is online, you must take the cache area offline before you upgrade the VxVM RPM. Use the following command to take the cache area offline:

```
# sfcache offline cachename
```

6 Stop activity to all VxVM volumes. For example, stop any applications such as databases that access the volumes, and unmount any file systems that have been created on the volumes.

7 Stop all the volumes by entering the following command for each disk group:

```
# vxvol -g diskgroup stopall
```

To verify that no volumes remain open, use the following command:

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

8 Make a record of the mount points for VxFS file systems and VxVM volumes that are defined in the `/etc/fstab` file. You will need to recreate these entries in the `/etc/fstab` file on the freshly installed system.

9 Perform any necessary preinstallation checks.

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

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

11 Enter `G` to upgrade and press Return.

12 You are prompted to enter the system names (in the following example, "host1") on which the software is to be installed. Enter the system name or names and then press Return.

```
Enter the 64 bit <platform> system names separated
by spaces : [q, ?] host1 host2
```

where <platform> is the platform on which the system runs, such as RHEL6.

Depending on your existing configuration, various messages and prompts may appear. Answer the prompts appropriately.

During the system verification phase, the installer checks if the boot disk is encapsulated and the upgrade's path. If the upgrade is not supported, you need to un-encapsulate the boot disk.

13 The installer asks if you agree with the terms of the End User License Agreement. Press **y** to agree and continue.

14 The installer discovers if any of the systems that you are upgrading have mirrored and encapsulated boot disks. For each system that has a mirrored boot disk, you have the option to create a backup of the system's book disk group before the upgrade proceeds. If you want to split the boot disk group to create a backup, answer **y**.

15 The installer then prompts you to name the backup boot disk group. Enter the name for it or press **Enter** to accept the default.

16 You are prompted to start the split operation. Press **y** to continue.

Note: The split operation can take some time to complete.

---

17 Stop the product's processes.

```
Do you want to stop SF processes now? [y,n,q] (y) y
```

If you select `y`, the installer stops the product processes and makes some configuration updates before upgrading.

18 The installer stops, uninstalls, reinstalls, and starts specified RPMs.

19 If necessary, reinstate any missing mount points in the `/etc/fstab` file on each node that you recorded in step 8.

20 Restart all the volumes by entering the following command for each disk group:

```
# vxvol -g diskgroup startall
```

21 Remount all VxFS file systems and Storage Checkpoints on all nodes:

```
# mount /filesystem
# mount /checkpoint_name
```

22 You can perform the following optional configuration steps:

- If you want to use features of Storage Foundation 7.0 for which you do not currently have an appropriate license installed, obtain the license and run the `vxlicinst` command to add it to your system.
- To upgrade VxFS Disk Layout versions and VxVM Disk Group versions, follow the upgrade instructions.
  See "Upgrading VxVM disk group versions" on page 46.

23 Only perform this step if you have split the mirrored root disk to back it up. After a successful reboot, verify the upgrade and re-join the backup disk group. If the upgrade fails, revert to the backup disk group.

See "Re-joining the backup boot disk group into the current disk group" on page 44.

See "Reverting to the backup boot disk group after an unsuccessful upgrade" on page 44.

Upgrading Volume Replicator

If a previous version of Volume Replicator (VVR) is configured, the product installer upgrades VVR automatically when you upgrade the Storage Foundation products.

You have the option to upgrade without disrupting replication.

See "Upgrading VVR without disrupting replication" on page 35.

Upgrading VVR without disrupting replication

This section describes the upgrade procedure from an earlier version of VVR to the current version of VVR when replication is in progress, assuming that you do not need to upgrade all the hosts in the RDS simultaneously.

You may also need to set up replication between versions.

See "Planning an upgrade from the previous VVR version" on page 26.

When both the Primary and the Secondary have the previous version of VVR installed, the upgrade can be performed either on the Primary or on the Secondary. We recommend that the Secondary hosts be upgraded before the Primary host in

the RDS. This section includes separate sets of steps, for the Primary upgrade and for the Secondary upgrade.

Note: If you have a cluster setup, you must upgrade all the nodes in the cluster at the same time.

Upgrading VVR on the Secondary

Follow these instructions to upgrade the Secondary hosts.

To upgrade the Secondary

1. Stop replication to the Secondary host by initiating a Primary pause using the following command:

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

2. Upgrade from VVR 6.0 or later to VVR 7.0 on the Secondary.

3. Do one of the following:

   - Upgrade the disk group now. Enter the following:

     ```
     # vxdg upgrade dgname
     ```

   - Upgrade the disk group later.
     If you upgrade the disk group later, be sure to pause replication before you upgrade the disk group. Also, after pausing replication, upgrade the disk group on Primary as well as Secondary.

4. Resume the replication from the Primary using the following command:

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

Upgrading VVR on the Primary

After you upgrade the Secondary, use the product installer to upgrade the Primary.

To upgrade the Primary

1. Stop replication to the Primary host by initiating a Primary pause using the following command:

   ```
   # vradmin -g diskgroup pauserep local_rvgname
   ```

2. Upgrade from VVR 6.0 or later to VVR 7.0 on the Secondary.

3 Do one of the following:

- Upgrade the disk group now. Enter the following:

```
# vxdg upgrade dgname
```

- Upgrade the disk group later.
  If you upgrade the disk group later, be sure to pause replication before you upgrade the disk group. Also, after pausing replication, upgrade the disk group on Primary as well as Secondary.

4 Resume the replication from the Primary using the following command:

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

See "Planning an upgrade from the previous VVR version" on page 26.

Upgrading SFDB

While upgrading to 7.0, the SFDB tools are enabled by default, which implies that the vxdbd daemon is configured. You can enable the SFDB tools, if they are disabled.

To enable SFDB tools

1 Log in as root.

2 Run the following command to configure and start the vxdbd daemon.

```
# /opt/VRTS/bin/sfae_config enable
```

Note: If any SFDB installation with authentication setup is upgraded to 7.0, the commands fail with an error. To resolve the issue, setup the SFDB authentication again. For more information, see the *Veritas InfoScale™ Storage and Availability Management for Oracle Databases* or *Veritas InfoScale™ Storage and Availability Management for DB2 Databases*.

Chapter 5

Performing an automated SF upgrade using response files

This chapter includes the following topics:

Upgrading SF using response files

Typically, you can use the response file that the installer generates after you perform SF upgrade on one system to upgrade SF on other systems.

To perform automated SF upgrade

1. Make sure the systems where you want to upgrade SF meet the upgrade requirements.
2. Make sure the pre-upgrade tasks are completed.
3. Copy the response file to the system where you want to upgrade SF.
4. Edit the values of the response file variables as necessary.

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

6 Start the upgrade 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.

Response file variables to upgrade SF

Table 5-1 lists the response file variables that you can define to configure SF.

Table 5-1 Response file variables for upgrading SF

Variable	Description
CFG{accepteula}	Specifies whether you agree with the EULA.pdf file on the media. List or scalar: scalar 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{upgrade}	Upgrades all RPMs installed. List or scalar: list Optional or required: required
CFG{keys}{keyless} CFG{keys}{license}	`CFG{keys}{keyless}` gives a list of keyless keys to be registered on the system. `CFG{keys}{license}` gives a list of user defined keys to be registered on the system. List or scalar: list 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

Table 5-1 Response file variables for upgrading SF *(continued)*

Variable	Description
CFG{opt}{tmppath}	Defines the location where a working directory is created to store temporary files and the RPMs 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
CFG{mirrordgname}{system}	If the root dg is encapsulated and you select split mirror is selected: Splits the target disk group name for a system. List or scalar: scalar Optional or required: optional
CFG{splitmirror}{system}	If the root dg is encapsulated and you select split mirror is selected: Indicates the system where you want a split mirror backup disk group created. List or scalar: scalar Optional or required: optional
CFG{opt}{disable_dmp_native_support}	If it is set to 1, Dynamic Multi-pathing support for the native LVM volume groups and ZFS pools is disabled after upgrade. Retaining Dynamic Multi-pathing support for the native LVM volume groups and ZFS pools during upgrade increases RPM upgrade time depending on the number of LUNs and native LVM volume groups and ZFS pools configured on the system. List or scalar: scalar Optional or required: optional

Table 5-1 Response file variables for upgrading SF *(continued)*

Variable	Description
CFG{opt}{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 . List or scalar: scalar Optional or required: optional
CFG{opt}{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. List or scalar: scalar Optional or required: optional
CFG{opt}{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. List or scalar: scalar Optional or required: optional
CFG{opt}{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. List or scalar: scalar Optional or required: optional
CFG{opt}{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. List or scalar: scalar Optional or required: optional

Sample response file for SF upgrade

The following example shows a response file for upgrading Storage Foundation with keyless license key.

```
our %CFG;

our %CFG;
$CFG{accepteula}=1;
$CFG{keys}{keyless}=[ qw(STORAGE) ];
$CFG{prod}="STORAGE70";
$CFG{opt}{upgrade}=1;
$CFG{systems}=[ qw(sys1) ];
1;
```

The following example shows a response file for upgrading Storage Foundation with permanent license key.

```
our %CFG;

$CFG{accepteula}=1;
$CFG{keys}{license}=[ qw(7.0SF_PermanentKey) ];
$CFG{opt}{noipc}=1;
$CFG{opt}{upgrade}=1;
$CFG{prod}="STORAGE70";
$CFG{systems}=[ qw(sys1) ];

1;
```

Chapter 6

Performing post-upgrade tasks

This chapter includes the following topics:

Optional configuration steps

After the upgrade is complete, additional tasks may need to be performed.

You can perform the following optional configuration steps:

- If Volume Replicator (VVR) is configured, do the following steps in the order shown:
  - Reattach the RLINKs.
  - Associate the SRL.

- To encapsulate and mirror the boot disk, follow the procedures in the "Administering Disks" chapter of the *Storage Foundation Administrator's Guide*.
- To upgrade VxFS Disk Layout versions and VxVM Disk Group versions, follow the upgrade instructions.
  See "Upgrading VxVM disk group versions" on page 46.

Re-joining the backup boot disk group into the current disk group

Perform this procedure to rejoin the backup boot disk if you split the mirrored boot disk during upgrade. After a successful upgrade and reboot, you no longer need to keep the boot disk group backup.

To re-join the backup boot disk group

- Re-join the *backup_bootdg* disk group to the boot disk group.

  ```
  # /etc/vx/bin/vxrootadm -Y join backup_bootdg
  ```

  where the `-Y` option indicates a silent operation, and *backup_bootdg* is the name of the backup boot disk group that you created during the upgrade.

Reverting to the backup boot disk group after an unsuccessful upgrade

Perform this procedure if your upgrade was unsuccessful and you split the mirrored boot disk to back it up during upgrade. You can revert to the backup that you created when you upgraded.

To revert the backup boot disk group after an unsuccessful upgrade

1. To determine the boot disk groups, look for the *rootvol* volume in the output of the `vxprint` command.

   ```
   # vxprint
   ```

2. Use the `vxdg` command to find the boot disk group where you are currently booted.

   ```
   # vxdg bootdg
   ```

3 Boot the operating system from the backup boot disk group.

4 Join the original boot disk group to the backup disk group.

```
# /etc/vx/bin/vxrootadm -Y join original_bootdg
```

where the `-Y` option indicates a silent operation, and *original_bootdg* is the boot disk group that you no longer need.

Recovering VVR if automatic upgrade fails

If the upgrade fails during the configuration phase, after displaying the VVR upgrade directory, the configuration needs to be restored before the next attempt. Run the scripts in the upgrade directory in the following order to restore the configuration:

```
# restoresrl
# adddcm
# srlprot
# attrlink
# start.rvg
```

After the configuration is restored, the current step can be retried.

Upgrading disk layout versions

In this release, you can create and mount only file systems with disk layout Version 7, 8, 9, and 10. You can only local mount disk layout Version 6 only to upgrade to a later disk layout version.

Note: If you plan to use 64-bit quotas, you must upgrade to the latest disk layout Version 10. The use of 64-bit quota on earlier disk layout versions is deprecated in this release.

Disk layout Version 6 has been deprecated and you cannot cluster mount an existing file system that has disk layout Version 6. To upgrade a cluster file system with disk layout Version 6, you must local mount the file system and then upgrade the file system using the `vxupgrade` utility to a later version.

To upgrade the disk layout versions

- To get to disk layout Version 10 from Version 6. You must incrementally upgrade the disk layout of this file system. For example:

```
# vxupgrade -n 7 /mnt
# vxupgrade -n 8 /mnt
# vxupgrade -n 9 /mnt
# vxupgrade -n 10 /mnt
```

See the `vxupgrade`(1M) manual page.

You must upgrade any existing file systems with disk layout Version 4 to disk layout Version 7 or later using the `vxfsconvert` command.

See the `vxfsconvert`(1M) manual page.

Note: Symantec recommends that you upgrade existing file systems to the highest supported disk layout version prior to upgrading to this release. Once a disk layout version has been upgraded, it is not possible to downgrade to the previous version.

You can check which disk layout version your file system has by using the following command:

```
# fstyp -v /dev/vx/dsk/dg1/vol1 | grep -i version
```

For more information about disk layout versions, see the *Storage Foundation Administrator's Guide*.

Upgrading VxVM disk group versions

All Veritas Volume Manager disk groups have an associated version number. Each VxVM release supports a specific set of disk group versions. VxVM can import and perform tasks on disk groups with those versions. Some new features and tasks work only on disk groups with the current disk group version. Before you can perform the tasks or use the features, upgrade the existing disk groups.

For 7.0, the Veritas Volume Manager disk group version is different than in previous VxVM releases. Symantec recommends that you upgrade the disk group version if you upgraded from a previous VxVM release.

After upgrading to SF 7.0, you must upgrade any existing disk groups that are organized by ISP. Without the version upgrade, configuration query operations continue to work fine. However, configuration change operations will not function correctly.

For more information about ISP disk groups, refer to the *Storage Foundation Administrator's Guide*.

Use the following command to find the version of a disk group:

```
# vxdg list diskgroup
```

To upgrade a disk group to the current disk group version, use the following command:

```
# vxdg upgrade diskgroup
```

For more information about disk group versions, see the *Storage Foundation Administrator's Guide*.

Updating variables

In `/etc/profile`, update the `PATH` and `MANPATH` variables as needed.

`MANPATH` can include `/opt/VRTS/man` and `PATH` can include `/opt/VRTS/bin`.

Setting the default disk group

You may find it convenient to create a system-wide default disk group. The main benefit of creating a default disk group is that VxVM commands default to the default disk group. You do not need to use the `-g` option.

You can set the name of the default disk group after installation by running the following command on a system:

```
# vxdctl defaultdg diskgroup
```

See the *Storage Foundation Administrator's Guide*.

Verifying the Storage Foundation upgrade

Refer to the *Verifying the Veritas InfoScale installation* chapter in the *Veritas InfoScale Installation Guide*.

Section 3

Post configuration tasks

Chapter 7

Performing configuration tasks

This chapter includes the following topics:

Switching on Quotas

This turns on the group and user quotas once all the nodes are upgraded to 7.0, if it was turned off earlier.

To turn on the group and user quotas

- Switch on quotas:

```
# vxquotaon -av
```

Enabling DMP support for native devices

Dynamic Multi-Pathing (DMP) is a component of SF. DMP supports Veritas Volume Manager (VxVM) volumes on DMP metadevices, and Veritas File System (VxFS) file systems on those volumes.

DMP can also provide multi-pathing functionality for the native operating system volumes and file systems on DMP devices.

For more information on using DMP with native devices, see the *Dynamic Multi-Pathing Administrator's Guide*.

After you install SF for the first time, use the following procedure to enable DMP support for native devices.

If DMP native support for native devices is enabled on a system before you upgrade SF, DMP native support is maintained when SF is upgraded.

To enable DMP support for native devices

- Turn on the tunable parameter to enable DMP support:

  ```
  # vxdmpadm settune dmp_native_support=on
  ```

  The `dmp_native_support` parameter is persistent.

About configuring authentication for SFDB tools

To configure authentication for Storage Foundation for Databases (SFDB) tools, perform the following tasks:

Configure the `vxdbd` daemon to require authentication	See "Configuring vxdbd for SFDB tools authentication" on page 50.
Add a node to a cluster that is using authentication for SFDB tools	

Configuring vxdbd for SFDB tools authentication

To configure vxdbd, perform the following steps as the root user

1. Run the `sfae_auth_op` command to set up the authentication services.

   ```
   # /opt/VRTS/bin/sfae_auth_op -o setup
   Setting up AT
   Starting SFAE AT broker
   Creating SFAE private domain
   Backing up AT configuration
   Creating principal for vxdbd
   ```

2. Stop the `vxdbd` daemon.

   ```
   # /opt/VRTS/bin/sfae_config disable
   vxdbd has been disabled and the daemon has been stopped.
   ```

3 Enable authentication by setting the `AUTHENTICATION` key to `yes` in the `/etc/vx/vxdbed/admin.properties` configuration file.

If `/etc/vx/vxdbed/admin.properties` does not exist, then use`cp /opt/VRTSdbed/bin/admin.properties.example /etc/vx/vxdbed/admin.properties`.

4 Start the `vxdbd` daemon.

```
# /opt/VRTS/bin/sfae_config enable
vxdbd has been enabled and the daemon has been started.
It will start automatically on reboot.
```

The `vxdbd` daemon is now configured to require authentication.

Section 4

Configuration and Upgrade reference

Appendix A

Configuring the secure shell or the remote shell for communications

This appendix includes the following topics:

About configuring secure shell or remote shell communication modes before installing products

Establishing communication between nodes is required to install Veritas InfoScale software from a remote system, or to install and configure a system. The system from which the installer is run must have permissions to run `rsh` (remote shell) or `ssh` (secure shell) utilities. You need to run the installer with superuser privileges on the systems where you plan to install the Veritas InfoScale software.

You can install products to remote systems using either secure shell (ssh) or remote shell (rsh). Symantec recommends that you use ssh as it is more secure than rsh.

Note: When installing on an RHEL5 / OEL5 system with SELinux enabled, only ssh is supported due to RedHat's SELinux policy restrictions.

You can set up ssh and rsh connections in many ways.

- You can manually set up the ssh and rsh connection with UNIX shell commands.
- You can run the `installer -comsetup` command to interactively set up ssh and rsh connection.
- You can run the password utility, `pwdutil.pl`.

This section contains an example of how to set up ssh password free communication. The example sets up ssh between a source system (sys1) that contains the installation directories, and a target system (sys2). This procedure also applies to multiple target systems.

Note: The product installer supports establishing passwordless communication.

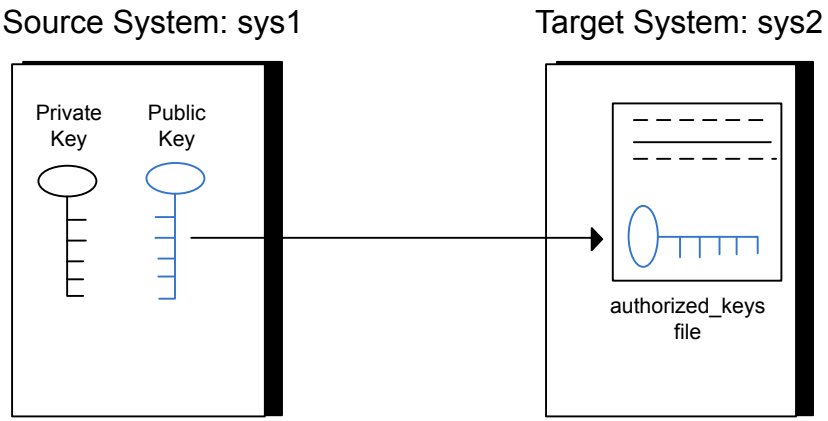
Manually configuring passwordless ssh

The ssh program enables you to log into and execute commands on a remote system. ssh enables encrypted communications and an authentication process between two untrusted hosts over an insecure network.

In this procedure, you first create a DSA key pair. From the key pair, you append the public key from the source system to the authorized_keys file on the target systems.

Figure A-1 illustrates this procedure.

Figure A-1 Creating the DSA key pair and appending it to target systems



Read the ssh documentation and online manual pages before enabling ssh. Contact your operating system support provider for issues regarding ssh configuration.

Visit the Openssh website that is located at: http://openssh.org to access online manuals and other resources.

To create the DSA key pair

1 On the source system (sys1), log in as root, and navigate to the root directory.

```
sys1 # cd /root
```

2 To generate a DSA key pair on the source system, type the following command:

```
sys1 # ssh-keygen -t dsa
```

System output similar to the following is displayed:

```
Generating public/private dsa key pair.
Enter file in which to save the key (/root/.ssh/id_dsa):
```

3 Press Enter to accept the default location of `/root/.ssh/id_dsa`.

4 When the program asks you to enter the passphrase, press the Enter key twice.

```
Enter passphrase (empty for no passphrase):
```

Do not enter a passphrase. Press Enter.

```
Enter same passphrase again:
```

Press Enter again.

5 Output similar to the following lines appears.

```
Your identification has been saved in /root/.ssh/id_dsa.
Your public key has been saved in /root/.ssh/id_dsa.pub.
The key fingerprint is:
1f:00:e0:c2:9b:4e:29:b4:0b:6e:08:f8:50:de:48:d2 root@sys1
```

To append the public key from the source system to the authorized_keys file on the target system, using secure file transfer

1 From the source system (sys1), move the public key to a temporary file on the target system (sys2).

Use the secure file transfer program.

In this example, the file name `id_dsa.pub` in the root directory is the name for the temporary file for the public key.

Use the following command for secure file transfer:

```
sys1 # sftp sys2
```

If the secure file transfer is set up for the first time on this system, output similar to the following lines is displayed:

```
Connecting to sys2 ...
The authenticity of host 'sys2 (10.182.00.00)'
can't be established. DSA key fingerprint is
fb:6f:9f:61:91:9d:44:6b:87:86:ef:68:a6:fd:88:7d.
Are you sure you want to continue connecting (yes/no)?
```

2 Enter `yes`.

Output similar to the following is displayed:

```
Warning: Permanently added 'sys2,10.182.00.00'
(DSA) to the list of known hosts.
root@sys2 password:
```

3 Enter the root password of sys2.

4 At the `sftp` prompt, type the following command:

```
sftp> put /root/.ssh/id_dsa.pub
```

The following output is displayed:

```
Uploading /root/.ssh/id_dsa.pub to /root/id_dsa.pub
```

5 To quit the SFTP session, type the following command:

```
sftp> quit
```

6 Add the `id_dsa.pub` keys to the `authorized_keys` file on the target system. To begin the `ssh` session on the target system (sys2 in this example), type the following command on sys1:

```
sys1 # ssh sys2
```

Enter the root password of sys2 at the prompt:

```
password:
```

Type the following commands on sys2:

```
sys2 # cat /root/id_dsa.pub >> /root/.ssh/authorized_keys
sys2 # rm  /root/id_dsa.pub
```

7 Run the following commands on the source installation system. If your ssh session has expired or terminated, you can also run these commands to renew the session. These commands bring the private key into the shell environment and make the key globally available to the user `root`:

```
sys1 # exec /usr/bin/ssh-agent $SHELL
sys1 # ssh-add

  Identity added: /root/.ssh/id_dsa
```

This shell-specific step is valid only while the shell is active. You must execute the procedure again if you close the shell during the session.

To verify that you can connect to a target system

1. On the source system (sys1), enter the following command:

   ```
   sys1 # ssh -l root sys2 uname -a
   ```

   where sys2 is the name of the target system.

2. The command should execute from the source system (sys1) to the target system (sys2) without the system requesting a passphrase or password.

3. Repeat this procedure for each target system.

Setting up ssh and rsh connection using the installer -comsetup command

You can interactively set up the ssh and rsh connections using the `installer -comsetup` command.

Enter the following:

```
# ./installer -comsetup

Input the name of the systems to set up communication:
Enter the <platform> system names separated by spaces:
[q,?] sys2
Set up communication for the system sys2:

  Checking communication on sys2 ..................... Failed

CPI ERROR V-9-20-1303 ssh permission was denied on sys2. rsh
permission was denied on sys2. Either ssh or rsh is required
to be set up and ensure that it is working properly between the local
node and sys2 for communication

Either ssh or rsh needs to be set up between the local system and
sys2 for communication

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

Enter the superuser password for system sys2:

     1)  Setup ssh between the systems
```

```
     2)  Setup rsh between the systems
     b)  Back to previous menu

Select the communication method [1-2,b,q,?] (1) 1

Setting up communication between systems. Please wait.
Re-verifying systems.

 Checking communication on sys2 ..................... Done

Successfully set up communication for the system sys2
```

Setting up ssh and rsh connection using the pwdutil.pl utility

The password utility, `pwdutil.pl`, is bundled under the `scripts` directory. The users can run the utility in their script to set up the ssh and rsh connection automatically.

```
# ./pwdutil.pl -h
Usage:

Command syntax with simple format:

    pwdutil.pl check|configure|unconfigure ssh|rsh <hostname|IP addr>
    [<user>] [<password>] [<port>]

Command syntax with advanced format:

    pwdutil.pl [--action|-a 'check|configure|unconfigure']
               [--type|-t 'ssh|rsh']
               [--user|-u  '<user>']
               [--password|-p '<password>']
               [--port|-P '<port>']
               [--hostfile|-f '<hostfile>']
               [--keyfile|-k '<keyfile>']
               [-debug|-d]
               <host_URI>

    pwdutil.pl -h | -?
```

Table A-1 Options with pwdutil.pl utility

Option	Usage
--action|-a 'check|configure|unconfigure'	Specifies action type, default is 'check'.
--type|-t 'ssh|rsh'	Specifies connection type, default is 'ssh'.
--user|-u '<user>'	Specifies user id, default is the local user id.
--password|-p '<password>'	Specifies user password, default is the user id.
--port|-P '<port>'	Specifies port number for ssh connection, default is 22
--keyfile|-k '<keyfile>'	Specifies the private key file.
--hostfile|-f '<hostfile>'	Specifies the file which list the hosts.
-debug	Prints debug information.
-h|-?	Prints help messages.
<host_URI>	Can be in the following formats: <hostname> <user>:<password>@<hostname> <user>:<password>@<hostname>: <port>

You can check, configure, and unconfigure ssh or rsh using the `pwdutil.pl`utility. For example:

- To check ssh connection for only one host:

  ```
  pwdutil.pl check ssh hostname
  ```

- To configure ssh for only one host:

  ```
  pwdutil.pl configure ssh hostname user password
  ```

- To unconfigure rsh for only one host:

  ```
  pwdutil.pl unconfigure rsh hostname
  ```

- To configure ssh for multiple hosts with same user ID and password:

```
pwdutil.pl -a configure -t ssh -u user -p password hostname1
hostname2 hostname3
```

- To configure ssh or rsh for different hosts with different user ID and password:

```
pwdutil.pl -a configure -t ssh user1:password1@hostname1
user2:password2@hostname2
```

- To check or configure ssh or rsh for multiple hosts with one configuration file:

```
pwdutil.pl -a configure -t ssh --hostfile /tmp/sshrsh_hostfile
```

- To keep the host configuration file secret, you can use the 3rd party utility to encrypt and decrypt the host file with password.
  For example:

```
### run openssl to encrypt the host file in base64 format
# openssl aes-256-cbc -a -salt -in /hostfile -out /hostfile.enc
enter aes-256-cbc encryption password: <password>
Verifying - enter aes-256-cbc encryption password: <password>

### remove the original plain text file
# rm /hostfile

### run openssl to decrypt the encrypted host file
# pwdutil.pl -a configure -t ssh `openssl aes-256-cbc -d -a
-in /hostfile.enc`
enter aes-256-cbc decryption password: <password>
```

- To use the ssh authentication keys which are not under the default $HOME/.ssh directory, you can use --keyfile option to specify the ssh keys. For example:

```
### create a directory to host the key pairs:
# mkdir /keystore

### generate private and public key pair under the directory:
# ssh-keygen -t rsa -f /keystore/id_rsa

### setup ssh connection with the new generated key pair under
the directory:
# pwdutil.pl -a configure -t ssh --keyfile /keystore/id_rsa
user:password@hostname
```

You can see the contents of the configuration file by using the following command:

```
# cat /tmp/sshrsh_hostfile
user1:password1@hostname1
user2:password2@hostname2
user3:password3@hostname3
user4:password4@hostname4

# all default: check ssh connection with local user
hostname5
The following exit values are returned:

0     Successful completion.
1     Command syntax error.
2     Ssh or rsh binaries do not exist.
3     Ssh or rsh service is down on the remote machine.
4     Ssh or rsh command execution is denied due to password is required.
5     Invalid password is provided.
255   Other unknown error.
```

Restarting the ssh session

After you complete this procedure, ssh can be restarted in any of the following scenarios:

- After a terminal session is closed
- After a new terminal session is opened
- After a system is restarted
- After too much time has elapsed, to refresh ssh

To restart ssh

1. On the source installation system (sys1), bring the private key into the shell environment.

   ```
   sys1 # exec /usr/bin/ssh-agent $SHELL
   ```

2. Make the key globally available for the user `root`

   ```
   sys1 # ssh-add
   ```

Enabling rsh for Linux

The following section describes how to enable remote shell.

Symantec recommends configuring a secure shell environment for Veritas InfoScale product installations.

See “Manually configuring passwordless ssh” on page 54.

See the operating system documentation for more information on configuring remote shell.

To enable rsh for rhel6/sles

1. To ensure that the `rsh` and `rsh-server` RPMs are installed, type the following command:

   ```
   # rpm -qa | grep -i rsh
   ```

   If it is not already in the file, type the following command to append the line "`rsh`" to the `/etc/securetty` file:

   ```
   # echo "rsh" >> /etc/securetty
   ```

2. Modify the line `disable = no` in the /etc/xinetd.d/rsh file.
3. In the `/etc/pam.d/rsh` file, change the "`auth`" type from "`required`" to "`sufficient`":

   ```
   auth     sufficient
   ```

4. Add the "promiscuous" flag into /etc/pam.d/rsh and /etc/pam.d/rlogin after item “pam_rhosts_auth.so”.
5. To enable the rsh server, type the following command:

   ```
   # chkconfig rsh on
   ```

6. Modify the `.rhosts` file. Each line of the `.rhosts` file contains a fully qualified domain name or IP address for each remote system. This file also contains the name of a user having access to the local system. For example, if the root user must remotely access `sys1` from `sys2`, add an entry for `sys2.`*`companyname`*`.com` to the `.rhosts` file on `sys1` by typing the following command:

   ```
   # echo "sys2.companyname.com" >> $HOME/.rhosts
   ```

7. Install the Veritas InfoScale product.

To disable rsh for rhel6/sles

1. Remove the "`rsh`" entry in the `/etc/securetty` file.
2. Disable the rsh server by typing the following command:

```
# chkconfig rsh off
```

3. After you complete an installation procedure, delete the `.rhosts` file from each user's `$HOME` directory to ensure security:

```
# rm -f $HOME/.rhosts
```

To enable rsh for rhel7

- Run the following commands to enable rsh passwordless connection:

```
# systemctl start rsh.socket
# systemctl start rlogin.socket
# systemctl enable rsh.socket
# systemctl enable rlogin.socket
# echo rsh >> /etc/securetty
# echo rlogin >> /etc/securetty
#echo "+ +" >> /root/.rhosts
```

To disable rsh for rhel7

- Run the following commands to disable rsh passwordless connection:

```
# systemctl stop rsh.socket
# systemctl stop rlogin.socket
# systemctl disable rsh.socket
# systemctl disable rlogin.socket
```

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