Veritas Storage Foundation™ for Oracle® RAC Release Notes

HP-UX

5.0 Maintenance Pack 2

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Veritas Storage Foundation for Oracle RAC Release Notes

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Product version 5.0 Maintenance Pack 2

Document version 5.0MP2.0

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- Operating system

- Version and patch level
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- Router, gateway, and IP address information
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  - Troubleshooting that was performed before contacting Symantec
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About this release

This document includes the following topics:

About Veritas Storage Foundation for Oracle RAC

Veritas Storage Foundation™ for Oracle® RAC (SF Oracle RAC) leverages proprietary storage management and high availability technologies to enable robust, manageable, and scaleable deployment of Oracle RAC on UNIX platforms. The solution uses cluster file system technology that provides the dual advantage

of easy file system management as well as the use of familiar operating system tools and utilities in managing databases.

The solution stack comprises the Veritas Cluster Server (VCS), Veritas Cluster Volume Manager (CVM), Veritas Cluster File System (CFS), and Veritas Storage Foundation, which includes the base Veritas Volume Manager (VxVM) and Veritas File System (VxFS).

Benefits of SF Oracle RAC

SF Oracle RAC provides the following benefits:

- Support for file system-based management. SF Oracle RAC provides a generic clustered file system technology for storing and managing Oracle data files as well as other application data.

- Support for high-availability of cluster interconnects. The combination of LMX/LLT protocols and the PrivNIC/MultiPrivNIC agents provides maximum bandwidth as well as high availability of the cluster interconnects, including switch redundancy.

- Use of clustered file system for placement of Oracle Cluster Registry and voting disks. Clustered file system and volume management technologies provide robust shared block and raw interfaces for placement of Oracle Cluster Registry and voting disks. In the absence of SF Oracle RAC, separate LUNs need to be configured for OCR and voting disks.

- Support for a standardized approach toward application and database management. A single-vendor solution for the complete SF Oracle RAC software stack lets you devise a standardized approach toward application and database management. Further, administrators can apply existing expertise of Veritas technologies toward SF Oracle RAC.

- Increased availability and performance using dynamic multi-pathing (DMP). DMP provides wide storage array support for protection from failures and performance bottlenecks in the HBAs and SAN switches.

- Easy administration and monitoring of SF Oracle RAC clusters from a single web console.

- Support for many types of applications and databases.

- Improved file system access times using Oracle Disk Manager (ODM).

- Ability to configure ASM disk groups over CVM volumes to take advantage of dynamic multi-pathing (DMP).

- Enhanced scalability and availability with access to multiple Oracle RAC instances per database in a cluster.

■ Support for backup and recovery solutions using volume-level and file system-level snapshot technologies. SF Oracle RAC enables full volume-level snapshots for off-host processing and file system-level snapshots for efficient backup and rollback.

■ Ability to failover applications without downtime using clustered file system technology.

■ Prevention of data corruption in split-brain scenarios with robust SCSI-3 Persistent Reservation (PGR) based I/O fencing.

■ Support for sharing all types of files, in addition to Oracle database files, across nodes.

■ Fast disaster recovery with minimal downtime and interruption to users. Users can transition from a local high availability site to a wide-area disaster recovery environment with primary and secondary sites. If a node fails, clients that are attached to the failed node can reconnect to a surviving node and resume access to the shared database. Recovery after failure in the SF Oracle RAC environment is far quicker than recovery for a failover database.

■ Verification of disaster recovery configuration using fire drill technology without affecting production systems.

■ Support for a wide range of hardware replication technologies as well as block-level replication using VVR.

■ Optimized I/O performance through storage mapping technologies and tunable attributes.

About SF Oracle RAC Release Notes

This document provides important information regarding SF Oracle RAC 5.0 Maintenance Pack 2 for HP-UX 11i version 2.0 operating environment.

Review this document before you install or upgrade SF Oracle RAC.

For the latest information on updates, patches, and software issues of this release, see the TechNote on the Symantec Enterprise Support website:

http://entsupport.symantec.com/docs/319349

For the latest information on updates, patches, and software issues of 5.0 release, see the TechNote on the Symantec Enterprise Support website:

http://entsupport.symantec.com/docs/281875

For information regarding software limitations, fixed issues, and known issues of Veritas Cluster Server (VCS):

See *Veritas Cluster Server Release Notes (5.0 Maintenance Pack 2)*.

For information regarding software limitations, fixed issues, and known issues of Storage Foundation (SF):

See *Veritas Storage Foundation Release Notes (5.0 Maintenance Pack 2)*.

For information regarding software limitations, fixed issues, and known issues of Storage Foundation Cluster File System (SFCFS):

See *Veritas Storage Foundation Cluster File System Release Notes (5.0 Maintenance Pack 2)*.

Changes in this release

This section describes the list of changes in SF Oracle RAC 5.0 MP2.

For the latest information on support for Oracle database versions, see the Veritas Technical Support TechNote:

http://entsupport.symantec.com/docs/280186

Support for MultiPrivNIC

MultiPrivNIC monitors multiple IP addresses configured over multiple private links. When a private link breaks down, it fails over the configured IP addresses on these links to another link with maximum node visibility. This ability to manage multiple links by configuring a single resource reduces the number of active agents and resources within SF Oracle RAC.

Support for MultiPrivNIC agent

The MultiPrivNIC agent provides resources for UDP/IP support for Oracle RAC 11g cache fusion capabilities. Symantec recommends adding all LLT private interfaces to the MultiPrivNIC resource.

Support for Oracle RAC 11g Release 1

SF Oracle RAC now supports Oracle RAC 11g Release 1.

See "Supported software" on page 13.

Support for Oracle RAC 11g Release 1 on Storage Foundation database components

Oracle RAC 11g Release 1 is now supported on Storage Foundation database components.

The other Oracle versions already supported are as follows:

- Oracle RAC 10g Release 2
- Oracle RAC 10g Release 1
- Oracle RAC 9i Release 2 (R2)

Changes in SF Oracle RAC 5.0 MP1

SF Oracle RAC 5.0 MP1 includes the following changes:

- VCS FEN error messages are now VXFEN error messages
- For the latest information on support for Oracle database versions, see the following TechNote:
  http://entsupport.symantec.com/docs/280186

Features introduced in SF Oracle RAC 5.0

The following features were introduced in SF Oracle RAC 5.0:

- Fencing with DMP disks
- Support for Oracle RAC 10g Release 2

Installation requirements

Make sure that each node on which you want to install or upgrade SF Oracle RAC meets the following installation requirements:

- Hardware requirements
- Supported software
- Supported operating systems

Hardware requirements

Make sure that you have the correct equipment to install SF Oracle RAC:

- Review the current compatibility list to confirm compatibility of your hardware:
  http://entsupport.symantec.com/docs/283161
- Review the Oracle documentation for additional requirements pertaining to your version of Oracle.

Table 1-1   Hardware requirements

Item	Description
SF Oracle RAC systems	Two to eight HP-UX systems that are connected to the public network. HP-UX 11i version 2.0 must be installed on these systems.
DVD drive	One drive that is accessible to all nodes in the cluster.
Disks	SF Oracle RAC requires that all 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. DMP devices are mandatory for use as coordinator disks.
Disk space	You can evaluate your systems for available disk space by running the following command: `# ./installsfrac -precheck node_name` For details on the additional space that is required for Oracle, see the Oracle documentation.
RAM	Each SF Oracle RAC system requires at least 2 GB. Symantec recommends additional amount of at least twice the Oracle SGA size.
Swap space	Symantec recommends two times the size of RAM for swap space. For Oracle RAC 11g, the minimum requirement is 8 GB of swap space. For Oracle RAC 10g and earlier versions, the minimum requirement is 4 GB of swap space.
Network links	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.
Fibre Channel or SCSI host bus adapters	At least one built-in SCSI adapter per system to access the operating system disks. At least one additional SCSI or Fibre Channel Host Bus Adapter per system for shared data disks.

Supported software

Caution: SF Oracle RAC and all component software must be at the same version across all nodes in an SF Oracle RAC cluster, in this case 5.0 Maintenance Pack 2. Symantec strongly recommends upgrading all SF Oracle RAC component products to the same version at the same time.

Remove other versions before you install the software from the SF Oracle RAC product disc.

Table 1-2 lists supported software versions.

Table 1-2   Supported software

Software	Version
Oracle RAC	■ Oracle 9i Release 2 ■ Oracle RAC 10g Release 1 ■ Oracle RAC 10g Release 2 ■ Oracle RAC 11g Release 1
HP-UX operating system	See "Supported operating systems" on page 13.

To verify the latest information on support for Oracle database versions, see the Technical Support TechNote:

http://entsupport.symantec.com/docs/280186

Supported operating systems

SF Oracle RAC 5.0 MP2 can be installed on the following operating systems:

■ June 2007 release of HP-UX 11i version 2.0 or later releases of version 2.0

The following operating environments (OEs) are supported for SF Oracle RAC on HP-UX:

HPUX11i-OE   HP-UX 11i v2 Foundation OE

HPUX11i-OE-Ent   HP-UX 11i v2 Enterprise OE

HPUX11i-OE-MC   HP-UX 11i v2 Mission Critical OE

Required HP-UX patches

SF Oracle RAC requires the following HP-UX depots and patches to be installed on each node:

Table 1-3   List of required patches

Patch number	Patch name
Patch PHSS_33903	LIBCL patch
	Required for HP-UX (PA) and HP-UX (IA) systems
Patch PHSS_38526	Aries cumulative patch
	Required for HP-UX (IA) systems
Patch PHCO_36522	Cumulative patch for bcheckrc
	Required for HP-UX (PA) and HP-UX (IA) systems

You may run the following command to verify that these patches are installed:

```
# swlist -l patch -a supersedes patch_name
```

where patch_name is the name of the patch.

Installation and upgrade notes for SF Oracle RAC

This section contains instructions for installing and upgrading SF Oracle RAC. Before you install or upgrade, make sure that SSH or RSH is set up for passwordless communication.

Topics include:

■ SF Oracle RAC patches and licensing

■ Installing SF Oracle RAC 5.0 MP2

■ Upgrading to SF Oracle RAC 5.0 MP2

■ Uninstalling SF Oracle RAC 5.0 MP2

SF Oracle RAC patches and licensing

SF Oracle RAC is a licensed product. The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* describes how to obtain a license that applies for SF Oracle RAC, Veritas Volume Manager, Veritas File System, and Veritas Cluster Server.

Table 1-4 lists the patches that are installed for SF Oracle RAC 5.0 MP2.

Table 1-4   List of SF Oracle RAC 5.0 MP2 patches

Patch number	Patch name
PHCO_35217	VRTS 5.0 MP1 VRTSmh Command Patch (MP2)
PHCO_37077	VRTS 5.0 MP1RP2 VRTSdcli Command Patch (MP2)
PHCO_38381	VRTSob Command Patch (MP2)
PHCO_38383	VRTSobgui Command Patch (MP2)
PHCO_38384	VRTSaa Command Patch (MP2)
PHCO_38385	VRTSccg Command Patch (MP2)
PHCO_38740	VRTS 5.0 MP1 RP2 VRTSvxfen Command Patch (MP2)
PHCO_38830	VRTS 5.0 MP1RP6 VRTSvxvm Command Patch 06 (MP2)
PHCO_38831	VRTS 5.0 MP1RP6 VRTSvmpro Command Patch 04 (MP2)
PHCO_38834	VRTS 5.0 MP2 VRTSddlpr Command Patch (MP2)
PHCO_38836	VRTS 5.0 MP1RP5 VRTSfsman Command Patch (MP2)
PHCO_38850	VRTS 5.0 MP1RP5 VRTSvxfs Command Patch (MP2)
PHCO_38859	VRTS 5.0 MP1RP2 VRTSfspro Command Patch (MP2)
PHCO_38909	VRTS 5.0 MP1RP1 VRTSdbed Command Patch (MP2)
PHCO_38910	VRTS 5.0 MP1RP2 VRTSdbcom Command Patch (MP2)
PHCO_38981	VRTS 5.0 MP2 VRTSalloc Command Patch (MP2)
PHCO_38997	VRTSobc33 Command Patch (MP2)
PHKL_38743	VRTS 5.0 MP1 RP2 VRTSvxfen Kernel Patch (MP2)
PHKL_38794	VRTS 5.0 MP1RP5 VRTSvxfs Kernel Patch (MP2)
PHKL_38795	VRTS 5.0 MP1RP1 VRTSodm Kernel Patch (MP2)
PHKL_38796	VRTS 5.0 MP1RP1 VRTSglm Kernel Patch (MP2)
PHKL_38829	VRTS 5.0 MP1RP6 VRTSvxvm kernel Patch 06 (MP2)
PHKL_38970	VRTS 5.0 GARP1 VRTSgms Kernel Patch (MP2)
PHNE_38738	VRTS 5.0 MP1 RP2 VRTSgab Kernel Patch (MP2)
PHNE_38739	VRTS 5.0 MP1 RP2 VRTSllt Kernel patch (MP2)

Table 1-4   List of SF Oracle RAC 5.0 MP2 patches *(continued)*

Patch number	Patch name
PHSS_35962	Symantec JRE Redistribution (MP2)
PHSS_35963	Symantec JRE Redistribution (MP2)
PVCO_03671	VRTS 5.0 MP1 VRTSvrpro Command Patch (MP2)
PVCO_03672	VRTS 5.0 MP1 VRTSvrw GUI Patch (MP2)
PVCO_03678	VRTS 5.0 MP1 VRTScscm Command Patch (MP2)
PVCO_03680	VRTS 5.0 MP1 VRTScssim Command Patch (MP2)
PVCO_03686	VRTS 5.0 MP1 VRTScmccc Command Patch (MP2)
PVCO_03689	VRTS 5.0 MP1 VRTScmcs Command Patch (MP2)
PVCO_03690	VRTS 5.0 MP1 VRTScscw Command Patch (MP2)
PVCO_03697	VRTS 5.0 MP1 SYMClma Command Patch (MP2)
PVCO_03698	VRTS 5.0 MP1 VRTSsmf Command Patch (MP2)
PVCO_03797	VRTS 5.0 MP1 RP2 VRTSvcs/VRTSvcsag Command Patch (MP2)
PVCO_03798	VRTS 5.0 MP1 RP2 VRTSvcsor/VRTScsocw Command Patch (MP2)
PVCO_03850	VRTS 5.0 MP1RP1 CAVF Commands Patch (MP2)
PVKL_03852	VRTS 5.0 MP1RP3 VRTSdbac Patch (MP2)

Installing SF Oracle RAC 5.0 MP2

This section provides instructions for installing and configuring SF Oracle RAC.

Note: The installation program installs both the base version 5.0 and the patch 5.0 MP2.

Installing SF Oracle RAC 5.0 MP2 involves the following tasks:

■ Preparing to install SF Oracle RAC
  For instructions:
  See the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*, "Preparing to install and configure SF Oracle RAC" on page 71.

■ Installing SF Oracle RAC 5.0 MP2

■ Configuring SF Oracle RAC

To install SF Oracle RAC 5.0 MP2

1 Log in as root on one of the systems for installation.

2 Insert the disc containing the SF Oracle RAC 5.0 MP2 software into the disc drive, and mount the disc on a suitable mount point.

3 Navigate to the directory that contains the installation program:

SF Oracle RAC installer	`# ./installsfrac [-rsh] -installonly galaxy nebula`
Veritas product installer	`# ./installer [-rsh] galaxy nebula`
	From the opening Selection Menu, choose: "I" for "Install/Upgrade a Product."
	From the displayed list of products to install, choose Veritas Storage Foundation for Oracle RAC.

The `-rsh` option is required if you are using the remote shell (RSH) rather than the secure shell (SSH) to install the software simultaneously on several systems.

4 After the initial system checks and the requirement checks are complete, press Return to start the installation.

5 When the installation is complete, note the location of the summary file, the log file, and the response file indicated by the installer.

6 Restart all systems in the cluster.

`# /usr/sbin/shutdown -r now`

7 Change to /opt/VRTS/install directory.

8   Configure the SF Oracle RAC software:

SF Oracle RAC installer	# **./installsfrac [-rsh] -configure *galaxy nebula***
Veritas product installer	# **./installer [-rsh] *galaxy nebula***
	From the opening Selection Menu, choose C for "Configure an Installed Product."
	From the displayed list of products, choose "Veritas Storage Foundation for Oracle RAC".

See the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*, "Installing and configuring SF Oracle RAC components" on page 83.

9   Install and configure the correct version of Oracle.

To install Oracle RAC 9i	■ Preparing to install Oracle RAC: See Chapter 6, "Preparing to install Oracle9i RAC" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*. ■ Installing Oracle RAC: See Chapter 7, "Installing Oracle9i RAC" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.
To install Oracle RAC 10g	■ Preparing to install Oracle RAC: See Chapter 12, "Preparing to install Oracle 10g RAC" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*. ■ Installing Oracle RAC: See "Installing Oracle RAC 10g and Oracle RAC 11g" on page 19.

To install Oracle RAC
11g

- Preparing to install Oracle RAC:
  See Chapter 12, "Preparing to install Oracle 10g RAC" in
  the *Veritas Storage Foundation for Oracle RAC 5.0
  Installation and Configuration Guide*.

  Most of the Oracle RAC 10g preparatory steps are valid
  for Oracle RAC 11g, with the exception of the disk space
  information for OCR, Vote disk volumes, CRS_HOME,
  and the oracle user home directory. The Oracle RAC 11g
  information for the above-listed exceptions are as follows:
  - The OCR volume must have a minimum disk space of
    256 MB.
  - The Voting disk volume must have a minimum disk
    space of 256 MB.
  - The oracle user home directory for the primary groups
    (oracle user and Oracle Inventory group) and the
    secondary group (OS DBA group) must be
    /home/oracle.
  - The CRS_HOME volume must have a minimum disk
    space of 5 GB.
  - Create separate volumes for OCR and Vote disk, with
    minimum 300 MB disk space:

    ```
    # vxassist -g ocrvotedg make votevol 300M
    ```

    ```
    # vxassist -g ocrvotedg make ocrvol 300M
    ```

- Installing Oracle RAC:
  See "Installing Oracle RAC 10g and Oracle RAC 11g"
  on page 19.

10 To use Checkpoints, FlashSnap, or Storage Mapping, you must configure the
    repository database.

    See Chapter 20, "Configuring the repository database for Oracle" in the *Veritas
    Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

Installing Oracle RAC 10g and Oracle RAC 11g

This section provides instructions for installing Oracle RAC 10g and Oracle RAC
11g.

For installing Oracle RAC 9i:

See the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and
Configuration Guide*.

Topics in this section include:

- About installing Oracle RAC
- Setting Oracle environment variables and invoking the Oracle installer
- Installing Oracle Clusterware (CRS)
- Installing Oracle RAC database binaries
- Completing Oracle RAC post-installation tasks

About installing Oracle RAC

Before you install Oracle RAC 10g and Oracle RAC 11g, complete the necessary preparatory tasks.

For pre-installation instructions:

See Chapter 12, "Preparing to install Oracle 10g RAC" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

After completing the Oracle RAC pre-installation tasks, proceed to install Oracle RAC software locally on each node.

Note: Review your Oracle installation manuals and the appropriate Oracle support websites, before installing Oracle RAC.

When you install Oracle, do not create a database or install a pre-created database. For example, when you choose to use the Enterprise Edition or the Standard Edition displayed by the Oracle installer, select the Software only option to install the binaries without creating a database. If you choose Custom installation, do not create a database when prompted. Create the database after installing Oracle and relinking the SF Oracle RAC libraries to Oracle.

Setting Oracle environment variables and invoking the Oracle installer

Review the following procedure to set the environment variables using the SF Oracle RAC configuration program. You must perform the procedure before installing Oracle Clusterware and before installing Oracle binaries.

To set the Oracle environment variables and invoke the Oracle installer

1 If you want to pass any arguments to Oracle installer, then set up the OUI_ARGS environment variable. You must perform this step before you start the SF Oracle RAC configuration program.

   Refer to the Oracle documentation for details on the arguments that you can pass to the Oracle installer.

   For example:

   ```
   # export OUI_ARGS=-ignoreSysPrereqs
   ```

2 Launch the SF Oracle RAC configuration program.

   ```
   # installsfrac -configure
   ```

   When you are prompted to enter license information, enter **n**.

3 Select **Install or relink Oracle** from the Main Menu.

4 Review the latest SF Oracle RAC support matrix as the installer instructs.

5 Choose the appropriate version of the Oracle software.

6 Depending on what you want to install, select one of the following:

CRS	**Install Oracle Clusterware (CRS)**
Oracle binaries	**Install Oracle RDBMS server**

7 Set the DISPLAY environment variable that is required for the Oracle Universal Installer.

   ```
   Enter DISPLAY environment variable: 10.20.12.150:0.0
   ```

8 Enter the Oracle UNIX user name. Select the default option (oracle).

   The Oracle UNIX user name was set up in the "Preparing to install Oracle RAC 10g" chapter:

   ```
   Enter Oracle UNIX user name: (oracle) oracle
   ```

9   Enter the Oracle group name. Select the default option (oinstall).

The Oracle UNIX group name was set up in the "Preparing to install Oracle RAC 10g" chapter:

For example:

```
CRS              Enter Oracle UNIX group name: (oinstall)

Oracle binaries  Enter Oracle UNIX group name: (oinstall) dba
```

10 Enter the absolute path of the Oracle CRS or database software install image.

This is the path to the software disc where the installer resides.

```
CRS              Enter absolute path of CRS install image: [b]
                 /var/Oracle10g/clusterware/Disk1



Oracle binaries  Enter absolute path of Database install image:
                  /var/Oracle10g/database/Disk1
```

11 Enter the Oracle base directory.

```
Enter Oracle base directory: /app/oracle
```

12 Enter the absolute path of the CRS home directory.

```
Enter absolute path of CRS Home directory: [b] /app/crshome
```

13 If the CRS home directory you specified does not exist, the SF Oracle RAC configuration program provides guidelines to create one.

```
Do you wish to create this directory? [y,n,q,b] (n) y
mkdir -p /app/crshome
chown -R oracle:oinstall /app/crshome
chmod -R 744 /app/crshome
Run above command on all systems? [y,n,q,b] (n) y
```

Now, enter the absolute path.

See step 12.

14 Review the output as the SF Oracle RAC configuration program verifies the CRS health status.

```
Verifying CRS health status
CRS check succeeded on galaxy.
CRS check succeeded on nebula.
```

Proceed to install CRS when the program launches the Oracle RAC CRS utility runInstaller.

15 If you chose **Install Oracle RDBMS server**, enter the absolute path of the database home directory.

```
Enter absolute path of Database Home directory: [b]
 /app/oracle/orahome
```

Proceed to install Oracle RAC software when the program launches the Oracle Universal Installer.

16 If the database home directory you specified does not exist, the SF Oracle RAC configuration program provides guidelines to create one.

```
Do you wish to create this directory? [y,n,q,b] (n) y
mkdir -p /app/oracle/orahome
chown -R oracle:oinstall /app/oracle/orahome
chmod -R 744 /app/oracle/orahome
Run above command on all systems? [y,n,q,b] (n) y
```

Now, enter the absolute path.

See step 15.

17 Proceed with the Oracle RAC installation.

Installing Oracle Clusterware (CRS)

If you chose Install Oracle Clusterware (CRS) in the SF Oracle RAC configuration program, then after you set the Oracle environment variables, the program launches the Oracle utility to install CRS.

Make sure any required HP-UX patches listed in the Oracle documentation are installed before you install the CRS software. You must install CRS in the $CRS_HOME location on each node that you created.

Note: For Oracle RAC 10g installation only: When the Oracle RAC 10g CRS installation prompts you to run the `root.sh` script, make sure to patch the `init.cssd` script before running `root.sh`.

To install CRS

1   Make sure that you set the environment variables using the configuration program.

    If your are installing Oracle RAC 10g R2 or Oarcle RAC 11g R1, go to step 3.

2   For Oracle RAC 10g R1 installation only:

    When the Oracle installer prompts you to run the `/oracle/oraInventory/orainstRoot.sh` script, make sure the script exists on each node before proceeding.

    If the `/oracle/oraInventory/orainstRoot.sh` script does not exist on each node, copy it from the first node to each of the other cluster nodes.

    Run the `/oracle/oraInventory/orainstRoot.sh` script on each node.

3   As you run the installer, be prepared with the following information required for the installation and configuration of the CRS component:

Specify File Locations dialog box	■ The installation destination ($CRS_HOME) on each node. For example, /app/crshome. ■ The path to $CRS_HOME.
Cluster Configuration dialog box	The names of the nodes and their associated host names. In this example CRS installation, the nodes and their associated host names are galaxy and nebula.
Private Interconnect Enforcement dialog box	The private NIC IP addresses you have set up for each node. For example, lan1 on subnet 1.0.0.0.
Oracle Cluster Registry dialog box	The name of a file in the OCR directory or raw volume. For example, a file named ocr_file in the directory /ocrvote/ocr.

Voting Disk dialog box   The name of a file in the Vote-disk
                                                    directory or raw volume.

                                                    For example, a file named vote_file in the
                                                    directory /ocrvote/vote.

4   When you arrive at the Install screen, click **Install**.

5   Follow the wizard instructions to install CRS.

    If you are installing Oracle RAC 10g R1, go to step 7.

6   For Oracle RAC 10g R2 and Oracle RAC 11g installation only:

    When the Oracle installer prompts you to run the
    /oracle/oraInventory/orainstRoot.sh script, make sure the script exists
    on each node before proceeding.

    Run the /oracle/oraInventory/orainstRoot.sh script on each node.

    If you are installing Oracle RAC 11g R1, go to step 8.

7   For Oracle RAC 10g R1 and Oracle RAC 10g R2 installation only:

    Before you run the root.sh script, you need to add the init.cssd patch.

    ■ Open another window on the system where you are running the installer.

    ■ Log in as superuser.

    ■ Change to the directory where the patch is to be copied:

        # **cd $CRS_HOME/css/admin**

        # **cp /opt/VRTSvcs/rac/patch/init.cssd-10gR2.patch .**

    ■ Run the following command as oracle user to install the patch:

        $ **patch < init.cssd-10gR2.patch init.cssd**

8   Run the root.sh script as the superuser. For example:

    # **cd $CRS_HOME**

    # **./root.sh**

    This starts the CRS daemons on the node where you enter the command.

9   For Oracle RAC 10g R1, run steps 2, 7, and 8 on each cluster node.

    For Oracle RAC 10g R2, run steps 6, 7, and 8 on each cluster node.

    For Oracle RAC 11g R1, run steps 6 and 8 on each cluster node.

Installing Oracle RAC database binaries

After installing the CRS component, proceed to install the Oracle RAC database software.

Review the preliminary procedures to install the Oracle RAC software in an SF Oracle RAC environment:

Note: Symantec recommends that you install Oracle binaries locally on each node.

Make sure any required HP-UX patches listed in the Oracle documentation are installed before you install the Oracle software. Follow the Oracle Universal Installer wizard instructions and complete the installation.

To install Oracle RAC database binaries

1   If you chose **Install Oracle RDBMS server** in the SF Oracle RAC configuration program, then after you set the Oracle RAC environment variables, the program launches the Oracle installer.

2   As you run the installer, be prepared with the following information required for the installation and configuration of the Oracle RAC binaries:

Specify File Locations dialog box	■ The installation destination ($ORACLE_HOME). Depending on where you install Oracle RAC binaries, this location is either on shared storage or an identical location on each of the local cluster nodes. For example, /app/oracle/orahome. ■ The path to $ORACLE_HOME.
Specify Hardware Cluster Installation Mode dialog box	The names of the cluster nodes and their associated host names. In this example Oracle installation, the nodes and their associated host names are galaxy and nebula.

3   Navigate to the Main Menu and select **Install and Relink Oracle**.

4   In the Choose Oracle version menu, select the appropriate version of Oracle.

5   In the Choose task menu, select **Install Oracle RDBMS server**.

6   In the Set DISPLAY dialog, enter the value for DISPLAY.

   Set the DISPLAY environment variable that is required for the Oracle Universal Installer (OUI). Enter an IP address in the specified format.

7   Enter Oracle user and group information.

- In the Oracle Username dialog, enter Oracle Unix User Account when prompted. The installer checks for the user on all systems.

- In the Oracle Groupname dialog, enter Oracle Inventory group when prompted. The installer checks for group existence on all systems.

- Press Enter to continue.

8   In the Database Install Image dialog, specify the location of Oracle Database Software install image.

9   In the Oracle base directory dialog, specify the base of the Oracle directory structure for OFA compliant databases.

   For example: /app/oracle

10 In the CRS Home directory dialog, specify the directory containing Oracle CRS Software.

   For example: /app/crshome

11 In the Database home directory dialog, specify the directory containing Oracle Database Software.

   For example: /app/oracle/orahome

12 The installer prints the oracle environment information for verification. If the information displayed by the installer is correct choose option "y" otherwise choose option "n."

   Press Enter to continue.

   The SF Oracle RAC installer invokes the Oracle User Interface (OUI) for Database Software Installation.

13 When you come to the Select Database Configuration dialog box, choose not to have a starter database created. Click **Do not create a starter database**.

   Symantec recommends you to create a database later.

14 When you arrive at the Install screen, click **Install**.

15 Follow the wizard instructions to install Oracle RAC binaries.

16 In the Setup Privileges Notice dialog box, click **OK**.

   The installer prompts you to run the root.sh script.

17 Run the root.sh script on each node. For example:

   ```
   # cd $ORACLE_HOME
   # ./root.sh
   ```

18 For Oracle RAC 10g R1 only:

When you start the script, a VIP Configuration Assistant window appears. Enter the virtual IP address you are configuring for the node on which you run root.sh.

19 Complete with the Oracle RAC installation.

20 After installing Oracle RAC software, perform the post-installation tasks.

Completing Oracle RAC post-installation tasks

After installing the Oracle software, complete the following tasks:

- Adding Oracle RAC patches
- Relinking the SF Oracle RAC libraries to Oracle RAC
- Creating Oracle RAC database
- Configuring Oracle RAC service group in a VCS configuration

Adding Oracle RAC patches

Before installing Oracle RAC patch software, perform the following tasks:

- Review the latest information on supported Oracle patches: http://entsupport.symantec.com/docs/280186
- You must have installed Oracle RAC 10g R1, Oracle RAC 10g R2, or Oracle RAC 11g R1 software.
- Review the patchset notes that accompany the patchset for instructions on installing the patchset and performing the post-installation operations.

Use the following procedure to add Oracle RAC patches to your node if you have installed Oracle, but have not yet configured Oracle in your cluster.

To install Oracle RAC patches

1 Log in as oracle user.

2 On one node, create the directory where you intend to copy the Oracle RAC patch software. For example:

```
$ mkdir /oracle/patch
```

```
$ cd /oracle/patch
```

3   Copy all files included with the downloaded Oracle RAC patch software to the /oracle/patch.

When you uncompress and untar the downloaded ZIP file, the software resides in a Disk1 directory.

4   On each node, edit the .rhosts file to provide the other node access to the local system during the installation.

Place a "+ +" character in the first line of the file. You can remove this permission after the patch installation is complete.

5   Set the DISPLAY variable. Do one of the following:

Bourne Shell (sh or ksh) $ DISPLAY=*host*:0.0;export DISPLAY

C Shell (csh or tcsh) $ setenv DISPLAY *host*:0.0

6   Run the Oracle RAC `runInstaller` utility.

    $ **$/ORACLE/patch/Disk1/runInstaller**

7   Select products.xml from the /oracle/patch/Disk1/stage directory.

8   In the Node Selection dialog box, select all nodes for installation to install the patches on local disks of each node.

If you are installing Oracle RAC patches on a local file system, install the software by invoking the installer on each node, one node at a time.

9   Proceed with the installation.

10   After installing the Oracle RAC patches, you must perform the following tasks:

   ■   Preparatory tasks to relink the SF Oracle RAC libraries

   ■   Relink the SF Oracle RAC libraries to Oracle

Relinking the SF Oracle RAC libraries to Oracle RAC

If you added or upgraded the Oracle patches, you must relink the SF Oracle RAC libraries to Oracle. You must link Oracle with the Veritas IPC library and enable Oracle to use the Veritas ODM and cluster membership (VCSMM) libraries. You can relink the libraries using the SF Oracle RAC configuration program.

Note: Symantec recommends you to relink the SF Oracle RAC libraries only after completing all the required patch additions.

To prepare to relink the SF Oracle RAC libraries on HP-UX

1   Back up the following files, if present:

```
$ORACLE_HOME/lib/libskgxpu.a
$ORACLE_HOME/lib/libskgxpg.a
$ORACLE_HOME/lib/libskgxpu.so
```

You can restore these backed up files if the linking is canceled or interrupted during execution.

2   Remove the following files, if present:

```
$ORACLE_HOME/lib/libskgxpu.oracle.a
$ORACLE_HOME/lib/libskgxpg.oracle.a
$ORACLE_HOME/lib/libskgxpu.oracle.so
```

To relink the SF Oracle RAC libraries to Oracle RAC:

1   Launch the SF Oracle RAC configuration program.

```
# installsfrac -configure
```

2   Select **Install or relink** Oracle from the menu.

3   Choose the appropriate version of the Oracle software.

4   Select **Relink** Oracle.

5   Enter the following information as the configuration program prompts you:

```
Enter Oracle UNIX user name: [b] (oracle)
Enter Oracle UNIX group name: [b] (oinstall)
Enter Oracle base directory: [b] (/app/oracle)
Enter absolute path of CRS Home directory: [b] (/app/crshome)
Enter absolute path of Database Home directory: [b]
(/app/oracle/orahome)
```

6   Confirm the Oracle environment information that you entered.

7   Review the output as the SF Oracle RAC configuration program relinks the libraries.

The configuration program links Oracle with Veritas libraries on each cluster node.

Creating Oracle RAC database

Refer to the *Oracle Real Application Clusters Installation and Configuration Guide* for instructions on how to install the Oracle RAC database. Create the Oracle RAC

database on shared storage. Use your own tools or review the guidelines on using the Oracle dbca (Database Creation Assistant) tool to create a database on shared raw VxVM volumes or shared VxFS file systems.

For instructions on creating a starter database:

See Appendix D, "Creating a starter database" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

Upgrading the databases

If you currently have Oracle databases running and want to migrate them to the latest Oracle patch level, refer to the README.html file downloaded with the patch. The file is located in the /oracle/patch directory.

Configuring Oracle RAC service group in a VCS configuration

After installing Oracle RAC and creating a database, proceed to modify the VCS configuration file. Review the sample VCS configurations and details on configuring service groups in an Oracle RAC environment.

For instructions on configuring VCS service groups for Oracle RAC 10g and Oracle RAC 11g:

See Chapter 15, "Configuring VCS service groups for Oracle 10g" in the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

Upgrading to SF Oracle RAC 5.0 MP2

You can upgrade to SF Oracle RAC 5.0 MP2 from any of the following SF Oracle RAC versions:

- SF Oracle RAC 5.0 MP1 for HP-UX 11i v2

- SF Oracle RAC 5.0 for HP-UX 11i v2

- SF Oracle RAC 4.1 MP2 for HP-UX 11i v2

- SF Oracle RAC 4.1 MP1 for HP-UX 11i v2

- SF Oracle RAC 4.1 for HP-UX 11i v2

Overview of tasks for upgrading SF Oracle RAC

Table 1-5 lists the tasks necessary to upgrade to SF Oracle RAC 5.0 MP2 from the supported versions:

Table 1-5   Task overview

Supported upgrade options	Tasks
SF Oracle RAC 5.0 MP1 and 5.0	The tasks for upgrading include: ■ Preparing to upgrade to SF Oracle RAC 5.0 MP2 ■ Upgrading to SF Oracle RAC 5.0 MP2 using the installmp installer ■ Performing post-upgrade tasks
SF Oracle RAC 4.1 MP2, 4.1 MP1, and 4.1	The tasks for upgrading include: ■ Upgrading from pre-5.0 versions to SF Oracle RAC 5.0 MP2

Preparing to upgrade to SF Oracle RAC 5.0 MP2

Depending on the version of Oracle RAC, do one of the following:

■ See "To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 9i instances" on page 32.

■ See "To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 10g instances" on page 33.

To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 9i instances

1 Perform the following tasks on each node in the cluster to stop the gsd processes:

   ■ Determine if the gsd processes are running.

       $ **$ORACLE_HOME/bin/gsdctl stat**

   ■ If the processes are running, stop the processes.

       $ **$ORACLE_HOME/bin/gsdctl stop**

2 Stop all applications using the CFS mounts not under VCS control:

   ■ Ensure that no processes are using the CFS mount point.

       # **fuser -c mount_point**

   ■ Stop any processes using a CFS mount point.

       # **fuser -ck mount_point**

3 Unmount any CFS file systems that are not under VCS control on all nodes:

- Determine the file systems to unmount by checking the /etc/mnttab file. For example:

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

  The output shows each line of the /etc/mnttab file that contains an entry for a VxFS file system mounted in the cluster mode.

- By specifying the mount point for the file system, unmount each file system listed in the output:

  `# umount mount_point`

4 If you are preparing to upgrade from pre-5.0 versions, make sure that VCS is running.

If you are preparing to upgrade from version 5.0 or 5.0 MP1, stop VCS to take the service groups on all nodes offline:

- Log in as superuser on one cluster node.

- Stop VCS on all nodes:

  `# /opt/VRTSvcs/bin/hastop -all`

To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 10g instances

1 Stop all applications using the CFS mounts not under VCS control.

- Ensure that no processes are using the CFS mount point.

  `# fuser -c mount_point`

- Stop any processes using a CFS mount point.

  `# fuser -ck mount_point`

2 Unmount any CFS file systems that are not under VCS control on all nodes.

- Determine the file systems to unmount by checking the /etc/mnttab file. For example:

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

  The output shows each line of the /etc/mnttab file that contains an entry for a VxFS file system mounted in the cluster mode.

- By specifying the mount point for the file system, unmount each file system listed in the output:

  ```
  # umount mount_point
  ```

3 If you are preparing to upgrade from pre-5.0 versions, make sure that VCS is running.

  If you are preparing to upgrade from version 5.0 or 5.0 MP1, stop VCS to take the service groups on all nodes offline:

  - Log in as superuser on one cluster node.

  - Stop VCS on all nodes:

    ```
    # /opt/VRTSvcs/bin/hastop -all
    ```

Upgrading to SF Oracle RAC 5.0 MP2 using the installmp installer

If you have a working SF Oracle RAC 5.0 or 5.0 MP1 cluster you can add the patches using the installmp installer.

To upgrade to SF Oracle RAC 5.0 MP2 using the installmp installer

1 Insert the disc containing the SF Oracle RAC 5.0 MP2 software in a disc drive connected to one of the nodes for installation.

2 Log in as superuser on one of the systems for installation.

3 Mount the software disc.

  ```
  # mkdir /dvdrom
  ```

  ```
  # mount -F cdfs /dev/dsk/c0t6d0 /dvdrom
  ```

4 Browse to the directory containing the installation program.

5 Install SF Oracle RAC 5.0 MP2. Make sure that communication between systems exists.

  Invoke the installmp script from one of your cluster nodes using the following command:

  ```
  # ./installmp [-rsh]
  ```

6 Review the output as the installer checks that the systems are ready for installation. At the conclusion of these initial checks, and before installing any software, the installer does the following:

- Creates a log file (installmp-xxxxxx) on each system in the directory /var/tmp.

- Specifies the utilities it uses to communicate with the remote systems; typically this is ssh -x and scp

- Lists the depots that it will install on each system

```
installmp is now ready to install MP2.
Required 5.0 processes that are currently running will be
stopped.
Are you sure you want to install MP2? [y,n,q] (y)
```

Press Enter to continue.

7 Note the location of the summary and log files for future reference.

8 Restart each system in the cluster.

    # **/usr/sbin/shutdown -r now**

9 Make sure that all eight GAB ports are up after the restart.

    # **gabconfig -a**
    ```
    GAB Port Memberships
    ================================================================
    Port a gen ada401 membership 0123
    Port b gen ada40d membership 0123
    Port d gen ada409 membership 0123
    Port f gen ada41c membership 0123
    Port h gen ada40f membership 0123
    Port o gen ada406 membership 0123
    Port v gen ada416 membership 0123
    Port w gen ada418 membership 0123
    ```

    If the ports are not up, check the following log files for related error messages:

    /var/adm/syslog/syslog.log

    /var/VRTSvcs/log/engine_A.log

10 Make sure that all the resources configured under VCS come online.

Performing post-upgrade tasks

If you want to upgrade Oracle, refer to the Oracle documentation. You must relink Oracle to the Veritas libraries after upgrading to SF Oracle RAC 5.0 MP2.

For instructions:

See *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide.*

Upgrading the repository database

After you have completed the SF Oracle RAC upgrade, if you plan to use the commands for Checkpoints, FlashSnap, Database Dynamic Storage Tiering , or Storage Mapping, you must:

- Change permissions
- Upgrade the repository database

Note: Do not recursively change permissions, groups, or owners.

To change permissions

1   Change permissions for the following directory:

    # **chmod 750 /opt/VRTSdbed**

2   Reset owner and group settings to the appropriate owner and group for the database administrators on your system.

    For example, to change owner to the user oracle and the group dba, run the following command:

    # **chown oracle:dba /opt/VRTSdbed**

To upgrade the repository in a cluster environment

1   Save the repository disk group name, mount point, and other attributes.

2   Unconfigure the SFUA repository from the VCS configuration:

    # **/opt/VRTSdbcom/bin/sfua_db_config -o unconfig_cluster**

    This command:

    - Removes the repository information from the VCS configuration
    - Unmounts the repository
    - Deports the disk group
    - Takes the volumes offline

3   Reconfigure the repository:

    # **vxdg import sfua_rep**
    # **vxvol -g dbed_rep startall**

4   Mount the repository file system manually.

    # **`mount -F vxfs /dev/vx/dsk/sfua_rep/dbed_rep /sfua_rep`**

5   Run the repository upgrade command again without any options:

    # **`/opt/VRTSdbcom/bin/sfua_db_config`**

    The following is required to configure the repository for SF Oracle RAC:

    ■   A mount point of already mounted Veritas Volume on a shared storage, with Veritas File system

    ■   A public NIC used by each system in the cluster

    ■   A Virtual IP address and netmask

Upgrading from pre-5.0 versions to SF Oracle RAC 5.0 MP2

You can upgrade to SF Oracle RAC 5.0 MP2 from the following pre-5.0 versions:

■   SF Oracle RAC 4.1 MP2 for HP-UX 11i v2

■   SF Oracle RAC 4.1 MP1 for HP-UX 11i v2

■   SF Oracle RAC 4.1 for HP-UX 11i v2

Note: The installation program installs both the base version 5.0 and the patch 5.0 MP2, thus upgrading the systems directly to SF Oracle RAC 5.0 MP2.

To upgrade from pre-5.0 versions to SF Oracle RAC 5.0 MP2

1   Perform the necessary pre-upgrade tasks.

    Depending on the version of Oracle RAC, do one of the following:

    ■   See "To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 9i instances" on page 32.

    ■   See "To prepare to upgrade SF Oracle RAC on a cluster having Oracle RAC 10g instances" on page 33.

2   Browse to the directory containing the installation program.

3 Start the installation program. Make sure that communication between systems exists.

SF Oracle RAC installer	# **./installsfrac [-rsh] -installonly *galaxy nebula***
Veritas product installer	# **./installer [-rsh] *galaxy nebula***
	From the opening Selection Menu, choose: "I" for "Install/Upgrade a Product."
	From the displayed list of products to install, choose Veritas Storage Foundation for Oracle RAC.

4 Enter y to upgrade to SF Oracle RAC 5.0 MP2.

```
Do you want to upgrade to version 5.0 on these systems using the
current configuration? [y,n,q,?] (y)
```

5 After the initial system checks and the requirement checks are complete, press Return to start the installation.

6 When the upgrade is complete, note the location of the summary file, the log file, and the response file indicated by the installer.

7 Restart all systems in the cluster.

```
# /usr/sbin/shutdown -r now
```

8 Perform the post-upgrade steps:

If any VCS service groups were frozen during the upgrade, unfreeze them.

As root user, enter:

```
# haconf -makerw
```

```
# hagrp -unfreeze group_name -persistent
```

```
# haconf -dump -makero
```

For the remaining post-upgrade instructions:

See *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*, "Performing the post-upgrade tasks" on page 130.

Upgrading with minimum downtime to SF Oracle RAC 5.0 MP2

This procedure is valid only for upgrading from SF Oracle RAC 5.0 and 5.0 MP1 to SF Oracle RAC 5.0 MP2. For upgrades from previous versions of SF Oracle RAC:

See *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Upgrade Guide*.

Caution: There is a potential for dependency problems between product components that no longer match when upgrading part of a cluster at a time. Following the minimum downtime procedures carefully will enable you to avoid these problems.

Upgrading clusters with Oracle RAC 10g

Note: There will be some downtime involved. Review the entire procedure and carefully plan your downtime before proceeding with any steps.

The following assumptions are made for this procedure:

- SF Oracle RAC 5.0 or 5.0 MP1 is installed

- Oracle RAC 10g is installed

- Oracle RAC binaries are installed on local file systems for each node in the cluster

The minimum downtime methodology involves upgrading half of the nodes in the cluster at a time.

The examples for this procedure assumes a four-node SF Oracle RAC cluster with nodes *galaxy*, *nebula*, *jupiter* and *mercury*.

To prepare the first half of the Oracle RAC 10g cluster for minimum downtime upgrade

◆ On the first half of the cluster nodes, for example *galaxy* and *nebula*, back up the configuration files:

```
# cp /etc/VRTSvcs/conf/config/main.cf \
/etc/VRTSvcs/conf/config/main.cf.save
# cp /etc/VRTSvcs/conf/config/types.cf \
/etc/VRTSvcs/conf/config/types.cf.save
# cp /etc/VRTSvcs/conf/config/OracleTypes.cf \
 /etc/VRTSvcs/conf/config/OracleTypes.cf.save

# cp /kernel/drv/vcsmm.conf /kernel/drv/vcsmm.conf.save
```

To upgrade the first half of an Oracle RAC 10g cluster

1   Log in to a node in the first half of the cluster, for example, *galaxy*, as root user, set the Oracle group and CSSD resource AutoStart 0.

```
# haconf -makerw
# hagrp -modify oracle_resource AutoStart 0
# hares -modify cssd_resource AutoStart 0
# haconf -dump -makero
```

2   If the Oracle RAC instance is not under VCS control, log in as Oracle user and shut down all the instances on *galaxy* and *nebula*.

For example:

```
$ srvctl stop instance -d database_name -i instance_name -n
galaxy
$ srvctl stop instance -d database_name -i instance_name -n
nebula
$ srvctl stop nodeapps -n galaxy
$ srvctl stop nodeapps -n nebula
```

3   Switch Failover groups from the first half of the cluster, for example, from *galaxy*, to the second half of the cluster, for example to *jupiter* and *mercury*.

```
# hagrp -switch failover_group -to jupiter/mercury
```

4   Unmount all the VxFS file system which is not under VCS control.

```
# mount |grep vxfs
# fuser -c /mount_point

# umount /mount_point
```

5   Log in to the nodes of the first half of the cluster, for example, *galaxy* and *nebula*, as root user and stop VCS.

```
# hastop -local
```

6   Comment out CRS-specific lines in /etc/inittab file to prevent the system from starting the CRS daemons during system startup. On each system, prefix the CRS lines with a colon (":") to comment them out.

For example:

```
:h1:2:respawn:/etc/init/evmd run >/dev/null 2>&1 /null
:h2:2:respawn:/etc/init/cssd fatal >/dev/null 2>&1 /null
:h3:2:respawn:/etc/init.crsd run >/dev/null 2>&1 /null
```

7   On the nodes of the first half of the cluster, for example *galaxy* and *nebula*, stop VEA if it is running.

```
# /opt/VRTSob/bin/vxsvcctrl stop
```

8   Navigate to the directory that contains the installmp program:.

```
# cd /dvdrom
```

9   Start the installer.

```
# ./installmp [-rsh] galaxy nebula
```

10 Restart each system in the cluster when prompted.

```
# /usr/sbin/shutdown -r now
```

11 When the nodes of the first half of the cluster, for example *galaxy* and *nebula*, come up, make sure these nodes join the second half of the cluster, for example *jupiter* and *mercury*, at GAB/LLT/VXFEN level. CVM/CFS/HAD will not come up due to mismatch versions.

Verify the ports a, b, d, and o all have 0123 membership.

For example, enter on node *galaxy*:

```
# /sbin/gabconfig -a
GAB Port Memberships
===============================================================
Port a gen 5c3d0b membership 0123
Port b gen 5c3d10 membership 0123
Port d gen 5c3d0c membership 0123
Port o gen 5c3d0f membership 0123
```

Enter on *jupiter*:

```
# /sbin/gabconfig -a
GAB Port Memberships
===============================================================
Port a gen 5c3d0b membership 0123
Port b gen 5c3d10 membership 0123
Port d gen 5c3d0c membership 0123
Port f gen 5c3d15 membership ; 23
Port f gen 5c3d15 visible 01
Port h gen 5c3d2a membership ; 23
Port h gen 5c3d2a visible 01
Port o gen 5c3d0f membership 0123
Port v gen 5c3d12 membership ; 23
Port v gen 5c3d12 visible 01
Port w gen 5c3d13 membership ; 23
Port w gen 5c3d13 visible 01
```

To relink Oracle libraries on the first half of the Oracle RAC 10g cluster

1 Before relinking, verify CRS is offline on the nodes you are relinking.

2 Invoke `installsfrac`:

```
# cd /opt/VRTS/install
# ./installsfrac [-rsh] -configure galaxy nebula
```

3 Navigate to the "Install or Relink Oracle" menu.

- Select the appropriate Oracle RAC version:

```
1) Oracle 9iR2
2) Oracle 10gR1
3) Oracle 10gR2
4) Oracle 11gR1
```

- Select "Relink Oracle" from the menu.

```
1) Install Oracle Clusterware (CRS)
2) Install Oracle RDBMS server
3) Relink Oracle
b) [Go to previous menu]
```

4 In the "Install or Relink Oracle" menu, enter the required information. For example:

```
Enter Oracle UNIX user name: [b] (oracle) oracle
Enter Oracle UNIX group name: [b] (oinstall) oinstall
Enter Oracle base directory: [b] /app/oracle
Enter absolute path of Database Home directory: [b] /app/oracle/
orahome
```

5 Confirm your responses in the verification screen. The installer copies the SF Oracle RAC libraries to /opt/ORCLcluster, where it expects libskgxn.

```
Oracle environment information verification
Oracle Unix User: oracle
Oracle Unix Group: oinstall
Oracle Clusterware (CRS) Home: /app/crshome
Oracle Release: 10.2

Oracle Base: /app/oracle
```

When you relink the Oracle libraries for the first half of your cluster you can:

- Switch applications to the upgraded nodes in the first half of the cluster

- Upgrade the second half of your cluster

To switch applications to the upgraded half of the Oracle RAC 10g cluster

1 On the second half of the cluster nodes, for example *jupiter* and *saturn*, back up the configuration files:

```
# cp /etc/VRTSvcs/conf/config/main.cf \
/etc/VRTSvcs/conf/config/main.cf.save
# cp /kernel/drv/vcsmm.conf /kernel/drv/vcsmm.conf.save
```

2 If the Oracle RAC instance is not under VCS control, log in as Oracle user and shut down all the instances on the nodes of the second half of the cluster. For example:

```
$ srvctl stop instance -d database_name -i instance_name \
-n jupiter
$ srvctl stop instance -d database_name -i instance_name \
-n mercury
$ srvctl stop nodeapps -n jupiter
$ srvctl stop nodeapps -n mercury
```

Note: Your downtime begins now.

3 Offline Failover groups on *jupiter* and *mercury*.

```
# hagrp -offline failover_group -sys jupiter
# hagrp -offline failover_group -sys mercury
```

4 Unmount all the VxFS file system which is not under VCS control.

```
# mount |grep vxfs

# fuser -c /mount_point

# umount /mount_point
```

5 Log in on a node in the second half of the cluster, for example *jupiter*, as root user, and stop VCS:

```
# hastop -all
```

6 On the first half of the cluster, for example on *galaxy* and *nebula*, as root user, remove the prefix ":" to uncomment the CRS-specific lines in the /etc/inittab file.

```
h1:2:respawn:/etc/init/evmd run >/dev/null 2>&1 /null
h2:2:respawn:/etc/init/cssd fatal >/dev/null 2>&1 /null
h3:2:respawn:/etc/init.crsd run >/dev/null 2>&1 /null
```

7 On the first half of the cluster, restore the configuration files from the backups created in an earlier procedure.

See "To prepare the first half of the Oracle RAC 10g cluster for minimum downtime upgrade" on page 39.

■ Restore the original main.cf file:

   ```
   # cp /etc/VRTSvcs/conf/config/main.cf.save \
   /etc/VRTSvcs/conf/config/main.cf
   ```

■ Merge any changes you made to the original types.cf file and backed up in a previous procedure at:

   ```
   /etc/VRTSvcs/conf/config/types.cf.save
   ```

   with the new types.cf file at:

   ```
   /etc/VRTSvcs/conf/types.cf
   ```

8 Start VCS on *galaxy* and *nebula*.

```
# hastart
```

9 Start the CRS daemon on nodes in the first half of the cluster, for example *galaxy* and *nebula*:

```
# hares -online cssd_resource -sys galaxy
# hares -online cssd_resource -sys nebula
```

10 Bring Oracle RAC online on *galaxy* and *nebula*.

■ If the Oracle RAC instance is under VCS control:

   ```
   # hagrp -online oracle_resource -sys galaxy
   # hagrp -online oracle_resource -sys nebula
   ```

■ If the Oracle RAC instance is not under VCS control, log in as Oracle user and start all the instances on *galaxy* and *nebula*. For example:

```
$ srvctl start instance -d database_name -i instance_name \
-n galaxy
$ srvctl start instance -d database_name -i instance_name \
-n nebula
```

11 Bring online all the applications on the first half of the cluster, for example on *galaxy* and *nebula* which were offline before upgrade.

> **Note:** Your downtime ends now. You have Oracle RAC instances running on the first half of your cluster, for example one Oracle RAC instance running on *galaxy* and one instance running on node *nebula*.

To upgrade the second half of the Oracle RAC 10g cluster

1 Log into the nodes on the second half of the cluster, for example *jupiter* and *mercury*.

2 Comment out CRS-specific lines in /etc/inittab file to prevent the system from starting the CRS daemons during system startup. On each system, prefix the CRS lines with a colon (":") to comment them out. For example:

```
:h1:2:respawn:/etc/init/evmd run >/dev/null 2>&1 /null
:h2:2:respawn:/etc/init/cssd fatal >/dev/null 2>&1 /null
:h3:2:respawn:/etc/init.crsd run >/dev/null 2>&1 /null
```

3 Log in to the nodes on the second half of the cluster, for example *jupiter* and *mercury*.

4 Stop VEA if it is running:

```
# /opt/VRTSob/bin/vxsvcctrl stop
```

5 Upgrade SF Oracle RAC on *jupiter* and *mercury*.

```
# cd /dvdrom
For ssh
# ./installmp jupiter mercury
```

For rsh:

```
# ./installmp -rsh jupiter mercury
```

6 Restart each system in the cluster when prompted.

```
# /usr/sbin/shutdown -r now
```

7   When *jupiter* and *mercury* come back online, they will join *galaxy* and *nebula* to form a four-node SF Oracle RAC 5.0 MP2 cluster.

```
# /sbin/gabconfig -a
GAB Port Memberships
===============================================================
Port a gen 5c3d0d membership 0123
Port b gen 5c3d13 membership 0123
Port d gen 5c3d0e membership 0123
Port f gen 5c3d33 membership 0123
Port h gen 5c3d2d membership 0123
Port o gen 5c3d12 membership 0123
Port v gen 5c3d2f membership 0123
Port w gen 5c3d31 membership 0123
```

8   Relink the Oracle RAC libraries on the second half of the Oracle RAC 10g cluster:

To bring up applications on the second half of the Oracle RAC 10g cluster

1   On the nodes of the second half of the cluster, for example, *jupiter* and *mercury*, as root user, remove the prefix ":" to uncomment the CRS-specific lines in the /etc/inittab file.

```
h1:2:respawn:/etc/init/evmd run >/dev/null 2>&1 /null
h2:2:respawn:/etc/init/cssd fatal >/dev/null 2>&1 /null
h3:2:respawn:/etc/init.crsd run >/dev/null 2>&1 /null
```

2   If CRS is configured under VCS control, log in as superuser and enter the following command for each system in the cluster:

```
# hares -online cssd_resource -sys jupiter
# hares -online cssd_resource -sys mercury
```

3   Bring Oracle RAC online on the nodes of the second half of the cluster, for example, *jupiter* and *mercury*.

■   If the Oracle RAC instance is under VCS control:

```
# hagrp -online oracle_grp \
-sys jupiter
# hagrp -online oracle_grp \
-sys mercury
```

■ If the Oracle RAC instance is not under VCS control, log in as Oracle user and start all the instances on the nodes of the second half of the cluster, for example, *jupiter* and *mercury*. For example:

```
$ srvctl start instance -d database_name -i instance_name \
-n jupiter
$ srvctl start instance -d database_name -i instance_name \
-n mercury
```

4 Bring up all the applications which were offline before the upgrade on the nodes of the second half of the cluster, for example, *jupiter* and *mercury*.

5 Change the Oracle group and CSSD AutoStart attribute to 1:

```
# haconf -makerw
# hares -modify oracle_resource AutoStart 1
# hares -modify cssd_resource AutoStart 1
# haconf -dump -makero
```

If you are using the repository database, you must upgrade it after upgrading SF Oracle RAC.

Upgrading clusters with Oracle RAC 9iR2

Note: There will be some downtime involved. Review the entire procedure and carefully plan your downtime before proceeding with any steps.

The following assumptions are made for this procedure:

■ SF Oracle RAC 5.0 or 5.0 MP1 is installed

■ Oracle RAC 9iR2 is installed

■ Oracle RAC binaries are installed on separate nodes for each node in the cluster

The minimum downtime methodology involves upgrading half of the nodes in the cluster at a time.

The examples for this procedure assumes a four-node SF Oracle RAC 5.0 cluster with nodes *galaxy*, *nebula*, *jupiter* and *mercury*.

To prepare the first half of the Oracle RAC 9iR2 cluster for minimum downtime upgrade

◆   On the first half of the cluster nodes, back up the configuration files:

```
# cp /etc/VRTSvcs/conf/config/main.cf \
/etc/VRTSvcs/conf/config/main.cf.save
# cp /etc/VRTSvcs/conf/config/types.cf \
/etc/VRTSvcs/conf/config/types.cf.save
# cp /etc/VRTSvcs/conf/config/OracleTypes.cf \
 /etc/VRTSvcs/conf/config/OracleTypes.cf.save
```

To upgrade the first half of the Oracle RAC 9iR2 cluster

1   Set the Oracle group to AutoStart 0.

```
# haconf -makerw
# hagrp -modify oracle_group AutoStart 0
# haconf -dump -makero
```

2   Stop the GSD daemon:

```
$ gsdctl stop
```

3   Switch Failover groups from the nodes of the first half of the cluster, for example, *galaxy* to the other nodes, for example, *jupiter* and *mercury*.

```
# hagrp -switch failover_group -to jupiter/mercury
```

4   Unmount all the vxfs file systems which are not under VCS control.

```
# mount | grep vxfs
# fuser -c /mount_point

# fuser -m /mount_point

# umount /mount_point
```

5   Stop VCS on the nodes of the first half of the cluster, for example, *galaxy* and *nebula*

```
# hastop -local
```

6   Stop VEA if it is running:

```
# /opt/VRTSob/bin/vxsvcctrl status
```

```
# /opt/VRTSob/bin/vxsvcctrl stop
```

7   Navigate to the directory that contains the installmp program::

```
# cd /dvdrom
```

```
# ./installmp [-rsh] galaxy nebula
```

8   Restart each system in the cluster when prompted.

```
# /usr/sbin/shutdown -r now
```

9   Make sure the nodes of the first half of the cluster, for example, *galaxy* and
    nebula, join the nodes of the second half of the cluster, for example, *jupiter*
    and *mercury*, at GAB/LLT/VXFEN level, however CVM/CFS/HAD will not
    come up due to mismatch versions.

    Verify the ports a, b, d, o all have 0123 membership.

    For example: Enter on node *galaxy*:

```
# /sbin/gabconfig -a
GAB Port Memberships
===================================================================
Port a gen 5c3d0b membership 0123
Port b gen 5c3d10 membership 0123
Port d gen 5c3d0c membership 0123
Port o gen 5c3d0f membership 0123
```

    Enter on node *jupiter*

```
# /sbin/gabconfig -a
GAB Port Memberships
===================================================================
Port a gen 5c3d0b membership 0123
Port b gen 5c3d10 membership 0123
Port d gen 5c3d0c membership 0123
Port f gen 5c3d15 membership ; 23
Port f gen 5c3d15 visible 01
Port h gen 5c3d2a membership ; 23
Port h gen 5c3d2a visible 01
Port o gen 5c3d0f membership 0123
Port v gen 5c3d12 membership ; 23
Port v gen 5c3d12 visible 01
Port w gen 5c3d13 membership ; 23
Port w gen 5c3d13 visible 01
```

To relink Oracle RAC 9iR2 libraries

1 Invoke `installsfrac`:

```
# cd /opt/VRTS/install
# ./installsfrac [-rsh] -configure galaxy nebula
```

2 Navigate to the "Install or Relink Oracle" menu.

■ Select the Oracle RAC 9iR2 version:

```
1) Oracle 9iR2
2) Oracle 10gR1
3) Oracle 10gR2
4) Oracle 11gR1
```

■ Select "Relink Oracle" from the menu:

```
1) Install Oracle RDBMS server
2) Relink Oracle
b) [Go to previous menu]
```

3 In the "Install or Relink Oracle" menu, enter the required information. For example:

```
Enter Oracle UNIX user name: [b] (oracle) oracle
Enter Oracle UNIX group name: [b] (oinstall) oinstall
Enter Oracle base directory: [b] /app/oracle
Enter absolute path of Database Home directory: [b] /app/oracle/
orahome
```

4 Confirm your responses in the verification screen. The installer copies the SF Oracle RAC 5.0 MP2 Oracle RAC libraries to /opt/ORCLcluster, where it expects libskgxn.

```
Oracle environment information verification
Oracle Unix User: oracle
Oracle Unix Group: oinstall
Oracle Release: 9.2

Oracle Base: /app/oracle
Oracle Home: /app/oracle/orahome
Is this information correct? [y,n,q](y)
```

To switch applications to the upgraded half of the Oracle RAC 9i cluster

1   Stop the GSD daemon.

```
$ gsdctl stop
```

Note: Your downtime starts now.

---

2   Offline Failover groups on the nodes of the second half of the cluster, for example, *jupiter* and *mercury*.

```
# hagrp -offline failover_group -sys jupiter
```

```
# hagrp -offline failover_group -sys mercury
```

3   Unmount all the vxfs file systems which are not under VCS control.

```
# mount | grep vxfs
```

```
# fuser -c /mount_point
```

```
# umount /mount_point
```

4   Stop VCS on the nodes of the second half of the cluster, for example, *jupiter* and *mercury*.

```
# hastop -all
```

5   On the first half of the cluster, restore the configuration files from the backups created in an earlier procedure.

See "To prepare the first half of the Oracle RAC 9iR2 cluster for minimum downtime upgrade" on page 49.

■ Restore the original main.cf file:

```
# cp /etc/VRTSvcs/conf/config/main.cf.save \
/etc/VRTSvcs/conf/config/main.cf
```

■ Merge any changes you made to the original types.cf file and backed up in a previous procedure at:

```
/etc/VRTSvcs/conf/config/types.cf.save
```

with the new types.cf file at:

```
/etc/VRTSvcs/conf/types.cf
```

■ Merge any changes you made to the original OracleTypes.cf file and backed up in a previous procedure at:

```
/etc/VRTSvcs/conf/config/OracleTypse.cf.save
```

with the new types.cf file at:

```
/etc/VRTSvcs/conf/config/OracleTypes.cf
```

6 Start VCS on the nodes of the first half of the cluster, for example, *galaxy* and *nebula*.

```
# hastart
```

7 Start GSD. Bring Oracle RAC online on the nodes of the second half of the cluster, for example, *galaxy* and *nebula*.

```
$ gsdctl start
# hagrp -online oracle_group -sys galaxy/nebula
```

Note: Your downtime ends now. You have Oracle RAC instances running on the nodes of the first half of the cluster, for example, *galaxy* and *nebula*.

To upgrade the second half of the Oracle RAC 9iR2 cluster

1 Log in to the nodes of the second half of the cluster, for example, *jupiter* and *mercury*.

2 Stop VEA if it is running:

```
# /opt/VRTSob/bin/vxsvcctrl status
```

```
# /opt/VRTSob/bin/vxsvcctrl stop
```

3 Navigate to the directory that contains the installmp program::

```
# cd /dvdrom
# ./installmp [-rsh] jupiter mercury
```

4   Restart each system in the cluster when prompted.

    ```
    # /usr/sbin/shutdown -r now
    ```

    When the nodes of the second half of the cluster, for example, *jupiter* and
    mercury come back online, they will join the nodes of the first half of the
    cluster, for example, *galaxy* and *nebula* to form a four-node SF Oracle RAC
    5.0 MP2 cluster.

5   Relink the Oracle RAC libraries on the second half of the Oracle RAC 9iR2
    cluster:

    See " To relink Oracle RAC 9iR2 libraries" on page 51.

6   Bring online the Oracle RAC resources configured under VCS.

    ```
    # hares -online listener_res -sys galaxy

    # hares -online listener_res -sys nebula

    # hagrp -online group_name -sys galaxy

    # hagrp -online group_name -sys nebula
    ```

7   Verify that the Oracle RAC instances are up and running.

8   Reset the VCS resource attribute AutoStart to 1 for all resources that manage
    Oracle RAC and database instances. As root user on any system in the cluster,
    enter:

    ```
    # haconf -makerw
    # hares -modify oracle_resource AutoStart 1
    # haconf -dump -makero
    ```

If you are using the repository database, you must upgrade it after upgrading SF
Oracle RAC.

See "Upgrading the repository database" on page 36.

Uninstalling SF Oracle RAC 5.0 MP2

This section provides instructions for removing the SF Oracle RAC 5.0 MP2
packages.

If you need to uninstall SF Oracle RAC 5.0, use the SF Oracle RAC 5.0 MP2
uninstallation program and follow the instructions from the version 5.0 guide:

See *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration
Guide*.

Caution: Uninstallation of version 5.0 removes all the SF Oracle RAC binaries without restoring any previously installed versions.

Note: Before uninstalling, verify the supported Oracle versions for version 5.0.

The following table lists the SF Oracle RAC version that is restored after uninstalling SF Oracle RAC 5.0 MP2.

Upgrade from	Version restored after uninstallation
SF Oracle RAC 5.0 MP1	SF Oracle RAC 5.0 MP1
SF Oracle RAC 5.0	SF Oracle RAC 5.0
SF Oracle RAC 4.1 MP2, 4.1 MP1, 4.1	SF Oracle RAC 5.0

The tasks for uninstallation include:

- Preparing to uninstall SF Oracle RAC 5.0 MP2

- Removing SF Oracle RAC 5.0 MP2 patches

- Performing the post-uninstallation tasks

Preparing to uninstall SF Oracle RAC 5.0 MP2

Depending on the version of Oracle installed, do one of the following:

- See "To prepare for removing SF Oracle RAC 5.0 MP2 patches from a cluster with Oracle 9i instances" on page 55.

- See "To prepare for removing SF Oracle RAC 5.0 MP2 patches from a cluster with Oracle RAC 10g or Oracle RAC 11g instances" on page 57.

To prepare for removing SF Oracle RAC 5.0 MP2 patches from a cluster with Oracle 9i instances

1   Perform the following tasks on each node in the cluster to stop the gsd processes:

- Determine if the gsd processes are running.

   ```
   $ $ORACLE_HOME/bin/gsdctl stat
   ```

- If the processes are running, stop the processes.

```
$ $ORACLE_HOME/bin/gsdctl stop
```

2   Oracle must be set up to run with the SF Oracle RAC components after the update. This means you must prevent the Oracle resources from coming online after the systems reboot. Use the following commands to make the cluster writable and to disable the Oracle resource:

```
# haconf -makerw
# hagrp -disable oracle_group -sys node_name
```

For example:

```
# /opt/VRTSvcs/bin/hagrp -disable Oracle1 -sys galaxy
```

If the change is made successfully, save the configuration:

```
# haconf -dump -makero
```

3   Stop all applications using the CFS mounts not under VCS control.

■   Ensure that no processes are using the CFS mount point.

```
# fuser -c mount_point
```

■   Stop any processes using a CFS mount point.

```
# fuser -ck mount_point
```

4   Unmount any CFS file systems that are not under VCS control on all nodes.

■   Determine the file systems to unmount by checking the /etc/mnttab file. For example:

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

■   The output shows each line of the /etc/mnttab file that contains an entry for a VxFS file system mounted in the cluster mode.

■   By specifying the mount point for the file system, unmount each file system listed in the output:

```
# umount mount_point
```

5   Stop VCS to take the service groups on all nodes offline.

■   Log in as root on one cluster node.

■   Stop VCS on all nodes.

```
# /opt/VRTSvcs/bin/hastop -all
```

To prepare for removing SF Oracle RAC 5.0 MP2 patches from a cluster with Oracle RAC 10g or Oracle RAC 11g instances

1   Stop all applications using the CFS mounts not under VCS control.

   ■ Ensure that no processes are using the CFS mount point.

   ```
   # fuser -c mount_point
   ```

   ■ Stop any processes using a CFS mount point.

   ```
   # fuser -ck mount_point
   ```

2   Unmount any CFS file systems that are not under VCS control on all nodes.

   ■ Determine the file systems to unmount by checking the /etc/mnttab file. For example:

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

   The output shows each line of the /etc/mnttab file that contains an entry for a VxFS file system mounted in the cluster mode.

   ■ Unmount each file system listed in the output by specifying the mount point for the file system:

   ```
   # umount mount_point
   ```

3   Oracle must be set up to run with the SF Oracle RAC components after the update. This means you must prevent the Oracle service group from coming online after the systems reboot. Use the following commands to make the cluster writable and to disable the Oracle service group:

   ```
   # haconf -makerw
   # hagrp -disable oracle_group -sys node_name
   ```

   For example:

   ```
   # /opt/VRTSvcs/bin/hagrp -disable Oracle1 -sys galaxy
   ```

   If the change is made successfully, save the configuration:

   ```
   # haconf -dump -makero
   ```

4   Stop VCS to take the service groups on all nodes offline.

   ■ Log in as root on one cluster node.

■ Stop VCS on all nodes.

```
 # /opt/VRTSvcs/bin/hastop -all
```

■ On all the nodes, stop VxFEN and ODM processes:

```
# /sbin/init.d/vxfen stop
# /sbin/init.d/odm stop
```

Removing SF Oracle RAC 5.0 MP2 patches

After you have completed the preparatory tasks, remove the SF Oracle RAC 5.0 MP2 patches.

Note: Using the swremove command to uninstall patches related to Cluster Management Console PVCO_03686 (VRTScmccc) or PVCO_03689 (VRTScmcs) does not restore those software selections to their original 5.0 versions. If the cluster is configured with either the Cluster Management Console or the cluster connector, neither component functions after the attempted reversion. The workaround is to uninstall and then reinstall the CMC cluster component packages (VRTScmccc and/or VRTScmcs) using the original version 5.0 installation media. [865666, 865627]

To remove SF Oracle RAC 5.0 MP2 patches

1   Log in as the root user.

2   Determine the list of SF Oracle RAC 5.0 MP2 patches installed on all the nodes:

```
# swlist -a title P* | grep "(MP2)"
```

3   Remove the patches listed by the command in step 2:

```
# swremove -x autoreboot=true \
-x enforce_dependencies=false patch1 patch2 patchn
```

Performing the post-uninstallation tasks

You must relink the Veritas libraries and enable Oracle to use Oracle with SF Oracle RAC 5.0 MP2.

To perform the post-uninstallation tasks

1 Relink Veritas libraries to Oracle.

See the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide.*

2 If Oracle is under VCS control, do the following depending on the version of Oracle.

For Oracle9i:

■ Enable the Oracle service group.

```
# haconf -makerw
# hagrp -enable oracle_group -sys node_name
# haconf -dump -makero
```

■ Bring the Oracle service group online.

```
# hagrp -online oracle_group -sys node_name
```

For Oracle RAC 10g and Oracle RAC 11g:

■ Enable the Oracle service group.

```
# haconf -makerw
# hagrp -enable oracle_group -sys node_name
# haconf -dump -makero
```

■ Bring the Oracle service group online.

```
# hagrp -online oracle_group -sys node_name
```

Operation notes

The following information includes guidelines, tips, and other considerations for operating the product.

For complete procedures:

See the *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide.*

Enabling fencing

When the product installer completes installation of SF Oracle RAC, I/O fencing is disabled on all cluster nodes.

Symantec does not support using SF Oracle RAC with I/O fencing disabled. For details on configuring I/O fencing in a cluster environment:

See the *Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide*

Preventing automatic database startup for Oracle RAC 10g R2

Oracle Clusterware and Oracle agent might attempt to start the instance at the same time if the database mount is available. To prevent automatic database starting, you must change the Management policy for the database (automatic, manual) to MANUAL using the SRVCTL command. The command will change the AUTO_START attribute of CRS database and instance resources. [838841]

To prevent automatic database starting

◆ Depending on the status of the database:

■ If the database is already registered and running, change it to manual by executing the following commands as Oracle user:

```
$ srvctl stop database -d db-name
$ srvctl modify database -d db-name -y manual
```

■ If the database is not registered, use the following command to register database:

```
$ srvctl add database -d db-name -p \
location-of-parameter-file -y manual
```

Fixed issues

This section describes the list of issues fixed in SF Oracle RAC. The list includes the issues fixed in version 5.0 and later releases upto the current version. The issues are categorized on the basis of the release version and are referenced by the incident number.

■ See "Issues fixed in SF Oracle RAC 5.0 MP2" on page 61.

■ See "Issues fixed in SF Oracle RAC 5.0 MP1" on page 62.

■ See "Issues fixed in SF Oracle RAC 5.0" on page 63.

For the list of issues fixed in Veritas Cluster Server:

See *Veritas Cluster Server Release Notes (5.0 Maintenance Pack 2)*.

For the list of issues fixed in Storage Foundation:

See *Veritas Storage Foundation Release Notes (5.0 Maintenance Pack 2)*.

For the list of issues fixed in Storage Foundation Cluster File System:

See *Veritas Storage Foundation Cluster File System Release Notes (5.0 Maintenance Pack 2)*.

Issues fixed in SF Oracle RAC 5.0 MP2

Table 1-6 lists the issues fixed in SF Oracle RAC 5.0 MP2.

Table 1-6   SF Oracle RAC 5.0 MP2 fixed issues

Incident number	Description
965232	The tunable lmx_update_enabled is now initialized to disable the LMX helper thread by default.
1014281	Oracle instances no longer crash under high interconnect traffic.
1053546	The cssd-monitor script now recognizes that CSSD is up and running in the cluster, in Oracle Version 10.2.0.3. If the pid file is not seen in the traditional location, cssd monitor script attempts to get the pid from system process list by issuing a 'ps' command with appropriate options.
1068813	The PrivNIC agent is now modified to fail over the private IP address if the link on which the IP address was configured was not an LLT link.
1068824	The linkrac script now links Oracle with VCSMM library after upgrading from Oracle 10.2.0.2 to Oracle 10.2.0.3.
1068827	The main.cf file is now updated to support multiple Oracle 10g database instances.
1068838	The cssd-monitor script is now updated to display the correct online/offline status for the CRS deamons on Oracle 10g R1.
1069631	If a node in the SF Oracle RAC cluster crashes, the Oracle RAC instances on the remaining nodes now continue to function successfully. The Membership Module (VCSMM) detects the change in node membership and appropriately cleans up the stale requests.
1069682	The vcsmmconfig -c command now successfully configures VCSMM (Veritas Cluster Server Multiplexing Module).

Table 1-6   SF Oracle RAC 5.0 MP2 fixed issues *(continued)*

Incident number	Description
1069656	For SKGXP version 2.4 and above, for any failed /completed asynchronous requests on a disconnected wire, if skgxpdis() is called by Oracle, then after the completion of skgxpdis() the request handles for the connections are not queued in the memory.
	However, if VCS IPC calls skgxpdis(), then VCS IPC adds the request handles corresponding to the connection handle to the memory queue, but leaves the connection handle as it is. The request handles on the memory queue that are associated with this connection handle are now deleted when Oracle calls skgxpdis().
1121569	VCSMM no longer causes Oracle processes to crash under heavy workload.
1161581	When VCSIPC receives the message LMX_POLLSEND_NOTCONN from LMX, it now calls the function skgxpdis(). The function closes the connections and handles all associated requests. A subsequent call made by Oracle into skgxpdis() is treated as a 'no operation'.
1220479	The linkrac script is now modified to determine the format of the shared library that must be used with the installed version of Oracle.
1242220	A check has now been enforced on the length of the spfile parameter 'instance_groups', to ensure that even if Oracle appends the 'group_name' index, the length of the parameter value is within the allocated 18 bytes of space.
1265308	Oracle clusterware now detects Veritas Cluster Server as a vendor clusterware.
1460677	Usually, the timeout value is calculated using the variable "lbolt", which is reset after 410 days. SF Oracle RAC now uses the 64 bit variable, ticks_since_boot_whole. This variable is not reset for years as opposed to the lbolt variable.
1474536	If the private IP address (configured in MultiPrivNIC) is found on any inactive interface, SF Oracle RAC now removes the IP address, assigns it to the correct interface and enables the IP address.

Issues fixed in SF Oracle RAC 5.0 MP1

Table 1-7 lists the issues fixed in SF Oracle RAC 5.0 MP1.

Table 1-7   SF Oracle RAC 5.0 MP1 fixed issues

Incident	Description
635646	Linkrac fails when you apply Oracle patchset and execute the patch.
626451	The installer sometimes does not display the global clustering configuration option.
595453	IPC errors while running OCE Oracle RAC 10g R2 on HP-UX (PA) systems.
583747	In the PrivNIC agent section of the Installation and Configuration Guide, the number of links to be used is not mentioned correctly.

Issues fixed in SF Oracle RAC 5.0

Table 1-8 lists the issues fixed in SF Oracle RAC 5.0.

Table 1-8   SF Oracle RAC 5.0 fixed issues

Incident	Description
596047	During CONFIG_STATE, if there is a mismatch between the snapshot of the local node with that of the remote node (because of MAJOR_VERSION, MINOR_VERSION or mm_slave_max value), "vcsmmconfig -c" hangs.
595651	The vcsmmdebug -s commands result in segmentation fault errors.
587999	Heavy LMX buffer transfers may result in system panic.
579175	Oracle instance hangs during peak traffic.
568762	IPC throws "NCON" messages in Oracle alert logs.
544172	Utility required to automatically obtain the Oracle IPC version number at the time of configuration.
538897	The vcsmm_dump_list() functions panics when process registers as slave with two primaries.
535866	Port 'o' does not join after the reboot since module fails to load.
534950	Fencing shuts down the larger cluster after a split brain condition.
525049	The VCSMM module may panic the machine due to a defect in its kernel logging.
520819	An issue with VCSMM can cause Oracle to hang or malfunction.

Table 1-8   SF Oracle RAC 5.0 fixed issues *(continued)*

Incident	Description
509099	The VCSMM unconfiguration process fails with "Device busy" error.
506182	Require support for CRS online/offline through VCS.

Known issues

For Oracle issues:

See "Oracle issues" on page 64.

For SF Oracle RAC issues:

See "SF Oracle RAC issues" on page 66.

For Veritas Cluster Server issues:

See *Veritas Cluster Server Release Notes (5.0 Maintenance Pack 2)*.

For Storage Foundation issues:

See *Veritas Storage Foundation Release Notes (5.0 Maintenance Pack 2)*.

For Storage Foundation Cluster File System issues:

See *Veritas Storage Foundation Cluster File System Release Notes (5.0 Maintenance Pack 2)*.

Oracle issues

This section describes the known issues of Oracle in this release.

Oracle VIP Configuration Assistant fails with an error message

During Oracle RAC 10g Release 2 installation, the VIP Configuration Assistant may fail with the following error message:

```
The given interface(s), "lan0" is not public.
Public interfaces should be used to configure virtual IPs.
```

This message appears only when the VIP is not from the regular public IP range (for example, 200.). [1182220]

Workaround: Invoke the vipca utility manually as the superuser.

```
# export DISPLAY=nebula:0.0
# $CRS_HOME/bin/vipca
```

Oracle Cluster Verification utility displays a warning message

During the final stage of Oracle RAC 10g Release 2 installation, you may receive a warning message with the Oracle Cluster Verification utility.

For example:

```
Utility
============================================================
OUI-25031: Some of the configuration assistants failed. It is
strongly recommended that you retry the configuration
assistants at this time. Not successfully running any "
Recommended" assistants means your system will not be correctly
configured.
1. Check the Details panel on the Configuration Assistant Screen
to see the errors resulting in the failures.
2. Fix the errors causing these failures.
3. Select the failed assistants and click the 'Retry' button
to retry them.
============================================================
```

Workaround: You may safely ignore this message if the cluster is operating satisfactorily.

Simultaneous startup and shutdown of Oracle processes

Continuous startup and shutdown of the database instances at the same time on all the nodes in an eight node SF Oracle RAC cluster can cause the cluster to hang. [856071]

Workaround: Do not start up and shut down repeatedly at the same time on all the eight nodes in an SF Oracle RAC cluster.

Changing the Veritas agent for Oracle error handling

The Veritas agent for Oracle provides enhanced handling of Oracle errors encountered during detailed monitoring. The agent uses the reference file, oraerror.dat, which provides a list of Oracle errors and actions to address the errors.

For a description of the actions:

See the *Veritas High Availability Agent for Oracle Installation and Configuration Guide.*

Currently, the file specifies the NOFAILOVER action for the following Oracle errors: ORA-00061, ORA-02726, ORA-6108, ORA-06114

The NOFAILOVER action means that the agent sets the state of the resource to OFFLINE and freezes the service group. If you want to change this behavior, you can stop the agent, edit oraerror.dat, and change the NOFAILOVER action to another action that is appropriate for your environment. The changes go into effect when you restart the agent.

SQL REUSE clause mandatory for RAW files in Oracle RAC 10g

Oracle can use RAW files for data files, control files and redo logs. Previously, the SQL REUSE clause was ignored if the associated file was a RAW file. From Oracle RAC 10g onwards, the REUSE clause of SQL is mandatory when Oracle Disk Manager (ODM) is enabled. [540429]

Workaround: To create database files on raw volumes, you must set the REUSE option in the SQL commands. For examples of error messages and SQL workarounds, see the following Technical Support TechNote:

http://support.veritas.com/docs/283362

SF Oracle RAC issues

This section lists the known issues in SF Oracle RAC for this release.

Cluster file system on CVM mirrored volumes disabled on slave nodes when CVM master node crashes

The cluster file system on CVM mirrored data volumes is disabled on slave nodes if the CVM master node crashes. [1515855]

Workaround: Set the detach-policy to local as described in the following steps:

1. Log in to the CVM master node.

2. Determine the detach-policy setting of the CVM mirrored volumes:

    ```
    # vxdg list diskgroup_name | grep detach-policy
    detach-policy: global
    ```

3. If the detach-policy is global, change the detach-policy setting to local:

    ```
    # vxdg -g diskgroup_name set diskdetpolicy=local
    ```

4. Verify that the detach-policy is set to local:

    ```
    # vxdg list diskgroup_name | grep detach-policy
    detach-policy: local
    ```

Warning messages displayed during verification of VRTS packages

Warning messages are displayed for certain VRTS packages when you run the swverify command to verify the installation. These warnings may be ignored.

If you are upgrading from SF Oracle RAC 5.0 MP1, a warning message is displayed for the following VRTS package:

VRTSvrw
The following warning message is displayed:

```
WARNING: Fileset "VRTSvrw.VRW-FILESET,
l=/,r=5.0" had file warnings.
```

[1454379]

If you are upgrading from SF Oracle RAC 5.0, the warning messages are displayed for the following VRTS packages:

VRTSdbcom
The following warning messages are displayed:

```
WARNING: Directory "/opt/VRTS/man/man1m" should
have mode "755" but the actual mode is "555".
WARNING: Directory "/opt/VRTS/man/man1m" should have
group,gid "sys,3" but the actual group,gid is "other,1".
WARNING: Fileset "VRTSdbcom.DBCOM,l=/,r=5.0.00.00-GA"
had file warnings.
```

[1469234]

VRTSdbed	The following warning messages are displayed:

```
WARNING: Directory "/etc/vx" should have
mode "755" but the actual mode is "555".
WARNING: Directory "/etc/vx" should have
owner,uid "root,0" but the actual owner,uid
is "bin,2".
WARNING: Directory "/etc/vx" should have
group,gid "sys,3" but the actual group,gid
is "bin,2".
WARNING: Directory "/opt/VRTSdbed" should have
mode "700" but the actual mode is "750".
WARNING: Directory "/opt/VRTSdbed" should have
owner,uid "root,0" but the actual owner,uid
is "oracle,107".
WARNING: Directory "/opt/VRTSdbed" should have
group,gid "sys,3" but the actual group,gid
is "dba,105".
WARNING: Fileset "VRTSdbed.DBED,
l=/,r=5.0.00.00-GA" had file warnings.
```

[1469234]

VRTSacclib	The following warning message is displayed:

```
WARNING: Fileset "VRTSacclib.library,l=/,r=5.0.00.0"
had file warnings.
```

[1454382]

VRTSodm	The following warning message is displayed:

```
WARNING: Fileset "VRTSodm.ODM-KRN,l=/,r=5.0.01.00"
had file warnings.
```

[1501804]

Deporting issues with shared disk groups

If you manually deport a shared disk group, the CVMVolDg agent does not automatically reimport it as a shared group. You must manually reimport it as a shared group.

Accessing version 7 file system when removing VxFS

A disk layout version 7 file system created with VxFS 5.0 software is not accessible if you remove the VxFS 5.0 software and revert the system to VxFS 3.5 or 4.1. In addition, if a disk layout version 7 file system exists on a boot disk and you remove

the VxFS 5.0 software, the host does not reboot successfully and remains at the `bcheckrc` prompt. To reboot the host successfully, first edit the `fstab` file and comment out entries for disk layout Version 7 file system.

CVM disks get stuck in an error state

CVM disks might get into an error state in some scenarios. For instance, the disk might get into an error state after a reboot of the cluster nodes. It might also happen when a disk group is deported and then imported.

Workaround: Perform the following steps to bring the CVM disks online.

To bring CVM disks online

1   Run the following command on any of the cluster nodes to stop VCS.

    ```
    # /opt/VRTSvcs/bin/hastop -all
    ```

2   Run the following commands on each cluster node to clear the error state of the disks.

    ```
    # vxdisk -a online
    # vxdisk scandisks
    ```

3   Create a file that has all the VxVM disk names with the complete path. For example: /dev/rdsk/c4t1d2.

4   Check for SCSI keys on the VxVM devices.

    ```
    # vxfenadm -g all -f disk_filename
    ```

    where *disk_filename* is a file that contains all of the fully qualified path to each disk.

5   Register with the disks in the disk_filename.

    ```
    # vxfenadm -m -k <key> -f disk_filename
    ```

6   Remove the SCSI keys on the VxVM devices:

    ```
    # vxfenadm -p -k <key> -v victim_node_key  -f disk_filename
    ```

    where *victim_node_key* is the SCSI key listed while running the command in step 4.

7 Remove the key registered in step 5.

> # **vxfenadm -x -k <key> -f** *disk_filename*

8 Run the following command on each of the cluster nodes to start VCS.

> # **/opt/VRTSvcs/bin/hastart**

vxfentsthdw command requires "+ +" in /.rhosts file

If you use remsh for communication between the nodes including the one on which you run the command, then the vxfentsthdw requires that the /.rhosts file must contain a "+ +" character in the first line.

Stopping cluster nodes configured with I/O fencing

The I/O fencing feature protects against data corruption resulting from a failed cluster interconnect or "split brain."

For more information, see *Veritas Cluster Server User's Guide*.

I/O fencing uses SCSI-3 Persistent Reservation keys to implement data protection. The software places keys on I/O fencing coordinator and data disks. The administrator must be aware of several operational changes needed when working with clusters protected by I/O fencing. Specific shutdown procedures ensure keys are removed from coordinator disks and data disks to prevent possible difficulties with subsequent cluster startup. Using the reboot command rather than the shutdown command bypasses shutdown scripts and can leave keys on the coordinator and data disks. Depending on the order of reboot and subsequent startup events, the cluster might warn of a possible split brain condition and fail to start up.

Workaround: Use the shutdown command instead of the reboot command to perform a graceful reboot for systems.

```
# /usr/sbin/shutdown -r now
```

Number of links required for the PrivNIC agent

Interfaces specified in the PrivNIC configuration should be exactly the same in name and total number as those which have been used for LLT configuration. [587136]

The attribute table on page 537 of the *Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide* should be replaced with the following attribute definition table.

Table 1-9   Required attributes for PrivNIC agent

Attribute	Dimension	Description

Device	string - association	Specifies the network interface device as shown by the "ifconfig" command and the "network-id" associated with the interface. Network-ids of the interfaces connected to the same physical network must match. The interface with the lower network-id has the higher preference for failover. Interfaces specified in the PrivNIC configuration should be exactly the same in name and total number as those which have been used for LLT configuration.
		
		Example:
		
		`Device@galaxy = {lan0=0, lan1=1, lan2=2}`
		`Device@nebula = {lan0=0, lan1=1, lan2=2}`

Address	string-scalar	The numerical private IP address. For example: `Address = "192.168.12.1"`
NetMask	string - association	The numerical netmask for the private IP address. For example: `Address = "255.255.255.0"`

Stopping VCS does not unregister port f from GAB membership

In an SF Oracle RAC cluster with all the CFS resources under VCS control, when you stop VCS, all the CFS resources must go down cleanly and CFS must unregister port f from GAB membership. Oracle RAC 10g Clusterware does not clean up all its processes when it is stopped. Now, when you stop VCS, all the CFS resources go down. However, due to the left over Oracle processes, CFS does not unregister port f from GAB membership.

Workaround: Perform the following steps to bring down port f.

To bring down port f

1   Kill all the Oracle processes.

    ```
    # kill -9 'ps -u oracle|awk '{print $1}''
    ```

2   Verify that all CFS file systems are unmounted.

    ```
    # mount | grep cluster
    ```

3   Unregister port f from GAB membership.

    ```
    # fsclustadm cfsdeinit
    ```

Information about a managed host is not updated in the Central Server GUI

After upgrade from SF Oracle RAC 4.1MP2 to 5.0MP2, information about a managed host is not updated in the Central Server GUI. [1519607]

Workaround: If you use the Central Server GUI to manage some of the SF Oracle RAC components, you need to push the latest patch on the managed host, after which the host information is discovered correctly.

To push the latest patch on the managed host

1   Remove the UNOF patch of VRTSmh on the managed host. For example:

    ```
    # swremove UNOF_36026
    ```

2   From the central server, push the latest available patch to the managed host using the vxdompackage command. For example:

    ```
    # /opt/VRTScs/adm/vxdompackage add --hostfile \
    /hostfile --imagefile \
    /opt/VRTScs/adm/vxdom_images/hpux/VRTSMH_1.1.tar
    ```

    where `hostfile` is the file containing the managed host name.

Software limitations

The following limitations apply to this release.

Cluster File System (CFS) limitations

The following are the limitations of CFS:

- CFS supports only disk layout version 6 and 7.

- CFS does not support HSM/DMAPI.

- VxFS does not distribute its own versions of file utilities such as `cpio` or `mv`.

Volume Manager does not support RAID 5 in a cluster environment

Volume Manager does not support software RAID 5 in a shared disk environment.

Unsupported scenarios regarding volume location for SRVM, ocrvol, and votevol

The Oracle RAC wizard does not support the following scenarios:

- For Oracle RAC 9i, the SRVM volume can not exist in the same shared disk group as that of the Oracle datafiles.

- For Oracle RAC 10g and Oracle RAC 11g, the ocrvol volume and votevol volume cannot exist in the same shared disk group as that of the Oracle datafiles. However, you can allow for this scenario when you manually configure Oracle service groups.

Oracle Disk Manager (ODM) limitation

Oracle Disk Manager (ODM) uses the Quick I/O driver for asynchronous I/O. Do not turn off the Quick I/O mount option, which is the default.

Storage Checkpoint and Database FlashSnap limitation

The following are the limitations of Storage Checkpoint and Database FlashSnap:

- You cannot create a clone database using a mounted Storage Checkpoint.

- If you create an Oracle instance using the spfile option, you must run the `dbed_update` command before you can successfully perform any Storage Checkpoint or Database FlashSnap functions.

- Storage Checkpoints require file system layout version 6 or version 7. Use the vxupgrade(1M) command to check the current layout version and to change the layout version, if necessary. When upgrading a CFS file system, issue the command from the primary node. Note that after you upgrade a system to layout version 6 or version 7, the file system is no longer compatible with the older VxFS file systems.

- When cloning a database using Database FlashSnap, the Oracle database must have at least one mandatory archive destination. For more information about Oracle parameters for archiving redo logs, see your Oracle documentation.

- Only online snapshots are supported for an Oracle RAC database, when using the `dbed_vmsnap`, `dbed_vmclonedb`, and `dbed_vmchecksnap` commands.

- After running `dbed_vmsnap -o reverse_resync_commit`, your primary database is started using a pfile. If your original primary database used an spfile, you need to shut down the database and restart it using spfile. Then, run `dbed_update` to update the repository.

- The Storage Checkpoint and Database FlashSnap features of SF Oracle RAC do not support the graphical user interface of the Veritas Storage Foundation for Oracle product.

- The Database FlashSnap feature does not support RAID-5 volumes.

- SF Oracle RAC does not support the Veritas FlashSnap agent for Symmetrix (EMC TimeFinder) mapping functionality (package:`VRTSfas`).

LLT low priority heartbeat links not recommended

Symantec does not recommend using the public network as LLT low priority links for SF Oracle RAC. Low priority links reduce network overhead by reducing the frequency of heartbeats, but they are not suited for the typical volume of SF Oracle RAC data.

Documentation errata

Updates and corrections are required for the following topics in the *Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

Backing up the database from snapshot volumes (dbed_vmclonedb)

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains references to the vxdbavol option, which has been deprecated in SF Oracle RAC 5.0 and later versions. [1510922]

The option is replaced with the new option `server_name=svr_name`, where server_name is the host on which the primary Oracle instance runs in the SF Oracle RAC cluster.

On page 408, in the Usage Notes row, replace the following text:

In a two-host configuration, the `vxdbavol=vol_name` option is required.

With:

In a two-host configuration, the `server_name=svr_name` option is required.

Using Database FlashSnap to Clone a Database

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains references to the vxdbavol option, which has been deprecated in SF Oracle RAC 5.0 and later versions. [1510922]

- On page 410, in the last line of the second paragraph, replace the following text:
  When creating the clone off host, `-o vxdbavol=vol_name` is required.
  With:
  When creating the clone off host, `-o server_name=svr_name` is required.

- On page 412, in the Usage Notes row, replace the following text:
  In a two-host configuration, the `vxdbavol=vol_name` option is required.
  With:
  In a two-host configuration, the `server_name=svr_name` option is required.

- On page 412, in the first step of the procedure "To mount a database and recover it manually", replace the following command:

  ```
  $ /opt/VRTS/bin/dbed_vmclonedb -S ORACLE_SID -g snap_dg \
  -o mountdb,new_sid=new_sid[,vxdbavol=vol_name] -f SNAPPLAN \
  [-H ORACLE_HOME] [-r relocate_path]
  ```

  With:

  ```
  dbed_vmclonedb -S ORACLE_SID -g snap_dg \
  -o mount|mountdb|recoverdb|restartdb, \
  new_sid=new_sid,server_name=svr_name -f SNAPPLAN \
  [-H ORACLE_HOME] [-p pfile_modification_file] \
  [-r relocate_path]
  ```

  For the same host, -r relocate_path is required.
  For SNAPSHOT_MODE=offline|instant, -r relocate_path is not allowed.

- On page 413, in the first example of the section "Example: Mounting the file systems without recovering the clone database", replace the following command:

  ```
  $ /opt/VRTS/bin/dbed_vmclonedb -S -g SNAP_PRODdg \
  -o mountdb,new_sid=NEWPROD,vxdbavol=SNAP_arch -f snap2
  ```

  With:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S -g SNAP_PRODdg \
-o mountdb,new_sid=NEWPROD,server_name=svr_name -f snap2
```

- On page 414, in the procedure "To clone the database automatically", replace the following command:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S ORACLE_SID -g snap_dg \
-o recoverdb,new_sid=new_sid[,vxdbavol=vol_name] -f SNAPPLAN \
[-H ORACLE_HOME] [-r relocate_path]
```

  With:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S ORACLE_SID -g snap_dg \
-o recoverdb,new_sid=new_sid[,server_name=svr_name] -f SNAPPLAN \
[-H ORACLE_HOME] [-r relocate_path]
```

  where server_name represents any node in the SF Oracle RAC cluster.

- On page 415, in the last example of the procedure "To clone the database automatically", replace the following command:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S PROD -g SNAP_PRODdg \
-o recoverdb,new_sid=NEWPROD,vxdbavol=SNAP_arch -f snap2
```

  With:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S PROD -g SNAP_PRODdg \
-o recoverdb,new_sid=NEWPROD,server_name=svr_name -f snap2
```

Restarting a Clone Database

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains references to the vxdbavol option, which has been deprecated in SF Oracle RAC 5.0 and later versions. [1510922]

On page 416, in the last example of the procedure "To start the clone database", replace the following command:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S PROD -g SNAP_PRODdg \
-o restartdb,new_sid=NEWPROD,vxdbavol=SNAP_arch -f snap2
```

With:

```
$ /opt/VRTS/bin/dbed_vmclonedb -S PROD -g SNAP_PRODdg \
-o restartdb,new_sid=NEWPROD,server_name=svr_name -f snap2
```

Creating the coordinator disk group

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains text that is incorrect. [#794321]

On page 113, replace this procedure:

To create the coordinator disk group

1   On one node, create the disk group by specifying the device name of one of the disks; the option `coordinator=on` sets the coordinator attribute:

    # **vxdg -o coordinator=on init vxfencoorddg c1t1d0**

2   Add the other two disks to the disk group:

    # **vxdg -g vxfencoorddg adddisk c2t1d0**

    # **vxdg -g vxfencoorddg adddisk c3t1d0**

    Refer to the Veritas Volume Manager documentation for details on creating disk groups.

with this procedure:

To create the coordinator disk group

1   On one node, create the disk group by specifying the device name of one of the disks:

    # **vxdg init vxfencoorddg c1t1d0**

2   Add the other two disks to the disk group:

    # **vxdg -g vxfencoorddg adddisk c2t1d0**

    # **vxdg -g vxfencoorddg adddisk c3t1d0**

    Refer to the Veritas Volume Manager documentation for details on creating disk groups.

3   Set the option coordinator=on to set the coordinator attribute:

    # **vxdg -g vxfencoorddg set coordinator=on**

Setting permissions for database administration

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains text that is misleading in "Setting permissions for database administration," on page 104. [#989674]

Replace:

After installing SF Oracle RAC, the default settings allows only the superuser to access the /opt/VRTSdbed folder. If you want the database administrators (DBAs) to access SF Oracle RAC components, then you must set the required permissions. You can skip setting the database administration permission and advance to configuring the cluster volume manager.

With:

After SF Oracle RAC is installed, the default settings allow only the superuser to access the /opt/VRTSdbed folder.

■ If you already have an Oracle user and group, and you want database administrators (DBAs) to access SF Oracle RAC components, you must set the required permissions.

■ If you do not have an Oracle user and group, defer setting the database administration permission and advance to configuring the cluster volume manager. You can configure the database permmissions when setting up the database repository.

Configuring the cluster in secure mode

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*contains text that is incomplete. [#795590]

On pages 97-98:

■ For Step 1, replace:
"Would you like to configure VCS to use Symantec Security Services? [y,n,q] (n) y"
With:
"Would you like to configure SFRAC to use Symantec Security Services? [y,n,q] (n) y"
Add the Symantec Security Service choices to Step 1:

```
Security Menu
1) Configure security completely automatically
2) Provide AB credentials using BLOBs
3) Provide AB credentials without using BLOBs
Select the Security option you would like to perform [1-3,q,?]
```

■ For Step 2, Automatic configuration option, add the following example:

```
Security Menu
1) Configure security completely automatically
2) Provide AB credentials using BLOBs
3) Provide AB credentials without using BLOBs

Select the Security option you would like to perform [1-3,q,?]
(1)
Enter the name of the VxSS Root Broker system:
root_broker.pdx.symantecexample.com

Do you want this cluster to be managed by a management server?
Enter 'y' if you have set up a management server. [y,n,q] (y)
To configure the CMC cluster connector, the following is
required:
The management server address
Enter the network address used by the management server [?]
(mgmtserver1.pdx.symantecexample.com)
root_broker.pdx.symantecexample.com
Enter the password for the CMC service account:
******
Enter the hash of the management server's root broker [?]
1ae34f5eadfd7d3e129634
c18728a3c226347f6d
```

On pages 97-98:

■ Add SFMS login example:

To log in to the SFMS server:

■ Enter the URL in your browser, for example
https://SFMS_SERVER:8443/VEAWeb.

■ Enter user and password.

■ Add CMC login example:

To log in to the CMC server:

■ Enter the URL in your browser, for example
https://MGMTSERVER1:8443/cmc.

■ Enter user and password.

Adding and removing SF Oracle RAC on systems with Oracle 10g

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains incomplete information for adding a new node. The "Adding and removing SF Oracle RAC on systems with Oracle 10g" chapter is missing a step from following procedure. [#803809]

Add the following at the beginning of "To run the uninstall utility" on page 256.

To run the uninstall utility

1   Offline all Oracle parallel groups:

    # **hagrp -offline oracle_group -sys** *nebula*

2   Offline CRS:

    ■   If CRS is under VCS control:

        # **hares -offline cssd_resource -sys** *nebula*

    ■   If CRS is not under VCS control:

Preparing for global clustering

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* contains text in the "Preparing for global clustering" chapter that is not completely accurate. [#609566]

On page 276, under Installing SF Oracle RAC on the secondary site, add a bullet:

Make sure you use the same Oracle group and user IDs for both primary and secondary clusters.

Setting up the repository database for Oracle

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* is missing information from the "Configuring the repository database for Oracle" chapter. This information is required only for Oracle9i, since Oracle 10g is configured during installation [#565419]. Add the following at the end of the chapter.

Setting up Oracle 9i RAC objects with srvctl

When configured within an Oracle RAC environment, you must set up the Oracle srvctl service and register the name of the RAC database with srvctl, so that

Storage Foundation for Oracle RAC can learn the status of remote database instances. Otherwise, commands such as dbed_ckptcreate -o offline may fail.

To set up Oracle 9i RAC objects

1 Look in /var/opt/oracle/srvConfig.loc to learn the path name to the SRVM configuration file as defined by the variable srvconfig_loc. For example: srvconfig_loc=/orasrvm/srvm.ora

2 List the details of the SRVM configuration file with ls -l:

    # **ls -l /orasrvm/srvm.ora**

3 If the configuration file does not exist, create and initialize the file:

    # **touch /orasrvm/srvm.ora # srvconfig -init**

4 If the configuration file exists, note the size of the file shown by the output of ls -l.

    -rw-r--r-- 1 oracle dba 10569216 Jan 20 14:29 /orasrvm/srvm.ora

5 If the configuration file size is greater than zero (as shown in the example above), the file is initialized. If the file size is zero, initialize it:

    # **srvconfig -init**

6 Start the Oracle RAC Manageability daemon on each system:

    $ **gsdctl start**

7 Confirm the GSD daemon status:

    $ gsdctl stat

    GSD is running on the local node.

8 Add the database to the srvctl configuration:

    $ **srvctl add database -d vrts -o /app/oracle/orahome**
    $ **srvctl config database vrts**

9 Add each instance to the configuration. For example, in a two-instance configuration, add the first instance:

```
$ srvctl add instance -d vrts -i vrts1 -n galaxy
$ srvctl config database -d vrts
galaxy vrts /app/oracle/orahome
```

Then add the second instance:

```
$ srvctl add instance -d vrts -i vrts2 -n nebula
$ srvctl config database -d vrts
galaxy vrts1 /app/oracle/orahome
nebula vrts2 /app/oracle/orahome
```

10 Check the status of the instances to confirm they are running:

```
$ srvctl status database -d vrts
Instance vrts1 is running on node galaxy
Instance vrts2 is running on node nebula
```

Using single-host and two-host terminology

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* includes references to "single-host" and "two-host" configurations in the dbed_vmclonedb sections that are not correct in an SF Oracle RAC configuration. These terms were borrowed from the Storage Foundation for Oracle Database environment, but "single-host" is not valid for SF Oracle RAC, and "two-host" is not correct for three or more node SF Oracle RAC configurations. [#840198]

For SF Oracle RAC configurations, change these references:

- From "single-host" to "same-node"
- From "two-host" to "node in the cluster"

Using Checkpoint commands

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* includes instances of dbed commands in the "Using Checkpoints and Storage Rollback with Storage Foundation for Oracle RAC" chapter that are incorrect and must be changed. [#819369]

The following instances are incorrect.

Replace procedure in the guide with the following.

On page 346, under "Recovering the database using a Storage Checkpoint," replace the following procedure:

To recover the database using a Storage Checkpoint

1 As superuser, freeze the VCS service group for the database.

```
# hagrp -freeze Service_Group
```

2 Make sure that the affected datafiles, tablespaces, or database are offline.

3 Use storage rollback to roll back any datafiles in the database that contained the table data from the Storage Checkpoint you created at 11:00 a.m. 4 Start up the database instance if it is down.

4 Start up the database instance if it is down.

5 Unfreeze the service group.

```
# hagrp -unfreeze Service_Group
```

6 Use recover database until cancel, recover database until change, or recover database until time to re-apply archive logs to the point before the table was deleted to recover the database to 4:00 p.m.

7 Open the database with alter database open resetlogs.

8 Delete the Storage Checkpoint you created at 11:00 a.m. and any other Storage Checkpoints created before that time.

9 Create a new Storage Checkpoint.

Using FlashSnap commands

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* includes instances of dbed commands in the "Using database FlashSnap for backup and offhost processing" chapter that are incorrect.

Running dbed_vmchecksnap

Corrections for Running dbed_vmchecksnap. [#839442]

On page 398 in "Validating a snapplan (dbed_vmchecksnap)," replace:

Prerequisites:

■ The database must be up and running while executing the dbed_vmchecksnap command.

With:

Prerequisites:

- The database must be up and running while executing the `dbed_vmchecksnap` command.

- The `dbed_vmchecksnap -o validate` command must be run on the CVM master.

On the same page, in "To validate a snapplan," replace Step 1 with the following:

Change directories to the working directory you want to store your snapplan in.

```
$ cd /working_directory
```

With:

Change directories to the working directory in which you want to store your snapplan.

```
$ cd /working_directory
```

Make sure you run `dbed_vmchecksnap` from CVM master.

References to "single-host" and "secondary host" are not valid for SF Oracle RAC. Throughout this chapter, replace "single-host" with "primary cvm host" and "secondary host" with "another-host."

Using the dbed_vmchecksnap example -t PROD

The "Using database FlashSnap for backup and offhost processing" chapter includes an invalid `dbed_vmchecksnap` example: -t PROD; it should be: -t host2. [#839056]

On page 396, replace:

```
 dbed_vmchecksnap -S $ORACLE_SID -H $ORACLE_HOME -O setdefaults \
-p my_tag -f snap1 -t PROD
Snapplan snap1 for PROD
===================================================
SNAPSHOT_VERSION=5.0
PRIMARY_HOST=host1
SECONDARY_HOST=host2
```

With:

```
 dbed_vmchecksnap -S PROD -H $ORACLE_HOME -O setdefaults \
-p my_tag -f snap1 -t host2
^^^ NOTE: -S PROD and -t host2
Snapplan snap1 for PROD
```

```
=====================================================
SNAPSHOT_VERSION=5.0
PRIMARY_CVM_HOST=host1
ANOTHER_HOST=host2
```

Finding FlashSnap status information

For Database FlashSnap status information, see *Veritas Storage Foundation for Oracle Administrator's Guide*. [#855452] The 5.0 documentation disc contains the sf_ora_admin.pdf.

Sample configuration files for SF Oracle RAC

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* "Sample VCS configuration files for SF Oracle RAC" appendix is not completely accurate. The following information was missing from the appendix.

Locating sample main.cf files

The location of the sample configuration files is missing from the "Sample VCS configuration files for SF Oracle RAC" appendix. [#806008]

On page 4513, add the following:

Sample main.cf file locations:

■ /etc/VRTSvcs/conf/sample_rac/10g_main.cf

■ /etc/VRTSvcs/conf/sample_rac/10g_simple_main.cf

■ /etc/VRTSvcs/conf/sample_rac/cvmvvr_primary_main.cf

■ /etc/VRTSvcs/conf/sample_rac/cvmvvr_secondary_main.cf

■ /etc/VRTSvcs/conf/sample_rac/9i_main.cf

Modifying the csgnic definition in main.cf file

The sample main.cf files for the clusters that use the GCO option and for the clusters that are centrally managed using Cluster Management Console contain the following csgnic definition.

```
NIC csgnic (
    Device = lan0
    )
```

With this definition, the csgnic resource may fault intermittently. To overcome this issue, the NetworkHosts parameter must be provided. [#838660]

This correction also applies to the section "Modifying the global clustering configuration using the main.cf" on page 304 of the *Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide*.

Modify the `csgnic` definition to add NetworkHosts attribute.

The sample configuration must be as follows:

```
NIC csgnic (
    Device = lan0
    NetworkHosts = { "10.10.12.2", "10.10.12.3" }
    )
```

Configuring global clustering with Secure cluster and CMC

The *Veritas Storage Foundation for Oracle RAC 5.0 Installation and Configuration Guide* "Sample configuration files" appendix contains incomplete information for adding a for configuring a global cluster with Veritas Volume Replicator. [#806008]

On page 528, add:

After running `installsfrac` with Symantec Security Services, and Cluster Management Console input, the following changes are made:

Cluster attributes are changed from:

```
cluster rac_cluster101 (
UserNames = { admin = bopHo }
ClusterAddress = "10.10.10.101"
Administrators = { admin }
UseFence = SCSI3
)
```

to something like:

```
cluster clust04 (
UserNames = { "CMC_HAD@HA_SERVICES@toughy.pdx.veritas.com" =
Im,
"CMC_HAD@HA_SERVICES@timid.pdx.veritas.com" = Im,
"CMC_HAD@HA_SERVICES@nobody.pdx.veritas.com" = Im,
"CMC_HAD@HA_SERVICES@editor.pdx.veritas.com" = Im }
ClusterAddress = "10.140.89.204"
Administrators = {
"CMC_HAD@HA_SERVICES@toughy.pdx.veritas.com",
"CMC_HAD@HA_SERVICES@timid.pdx.veritas.com",
"CMC_HAD@HA_SERVICES@nobody.pdx.veritas.com",
```

```
"CMC_HAD@HA_SERVICES@editor.pdx.veritas.com" }
SecureClus = 1
HacliUserLevel = COMMANDROOT
)
```

This is what the cluster looks like after configuring Symantec Security Services and Cluster Management Console.

Add the CMC group; this gets added to the config after installing Symantec Security Services and CMC:

```
group CMC (
SystemList = { toughy = 0, timid = 1, nobody = 2, editor = 3 }
AutoStartList = { toughy, timid, nobody, editor }
OnlineRetryLimit = 3
OnlineRetryInterval = 120
)
ClusterConnectorConfig CMC_ClusterConfig (
MSAddress = "dopey.pdx.veritas.com" MSPort = 14145
ClusterId = 1159208019
ClusterType = vcs
Logging = "/opt/VRTScmccc/conf/cc_logging.properties"
)
Process CMC_ClusterConnector (
PathName = "/bin/sh"
Arguments = "/opt/VRTScmccc/bin/cluster_connector.sh"
)
CMC_ClusterConnector requires CMC_ClusterConfig
```

Add the VxSS group to the examples:

```
group VxSS (
SystemList = { toughy = 0, timid = 1, nobody = 2, editor = 3 }
Parallel = 1
OnlineRetryLimit = 3
OnlineRetryInterval = 120
)
Phantom phantom_vxss (
)
ProcessOnOnly vxatd (
IgnoreArgs = 1
PathName = "/opt/VRTSat/bin/vxatd"
)
```

The VxSS group gets added after answering yes to the symantec security services question during `installsfrac`.

Documentation

Product guides are available on the documentation disc in PDF and HTML formats. We recommend copying pertinent information, such as installation guides and release notes, from the disc to your system directory /opt/VRTS/docs for reference.

Table 1-10 lists the documentation for SF Oracle RAC.

Table 1-10   SF Oracle RAC documentation

Document title	File name
Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide	sfrac_install.pdf
Veritas Storage Foundation for Oracle RAC Administrator's Guide	sfrac_admin.pdf
Veritas Storage Foundation for Oracle RAC Release Notes	sfrac_notes.pdf

Table 1-11 lists the documentation for Veritas Cluster Server.

Table 1-11   Veritas Cluster Server documentation

Document title	File name
Veritas Cluster Server Installation Guide	vcs_install.pdf
Veritas Cluster Server Release Notes	vcs_notes.pdf
Veritas Cluster Server User's Guide	vcs_users.pdf
Veritas Cluster Server Bundled Agents Reference Guide	vcs_bundled_agents.pdf
Veritas Cluster Server Agent Developer's Guide	vcs_agent_dev.pdf
Veritas Cluster Server Enterprise Agent for Oracle Installation and Configuration Guide	vcs_oracle_install.pdf

Table 1-12 lists the documentation for Veritas Storage Foundation.

Table 1-12   Veritas Storage Foundation documentation

Document title	File name
Veritas Storage Foundation Release Notes	sf_notes.pdf
Veritas Storage Foundation Installation Guide	sf_install.pdf
Veritas Storage Foundation Cluster File System Release Notes	sfcfs_notes.pdf
Veritas Storage Foundation Cluster File System Administrator's Guide	sfcfs_admin.pdf
Veritas Storage Foundation Intelligent Storage Provisioning Solutions Guide	sf_isp_solutions.pdf
Veritas FlashSnap Point-in-Time Copy Solutions Administrator's Guide	flashsnap_admin.pdf

Table 1-13 lists the documentation for Veritas Volume Manager and Veritas File System.

Table 1-13   Veritas Volume Manager and Veritas File System documentation

Document title	File name
Veritas Volume Manager Administrator's Guide	vxvm_admin.pdf
Veritas Volume Manager Cross-platform Data Sharing Administrator's Guide	sf_cds_admin.pdf
Veritas Volume Manager Troubleshooting Guide	vxvm_tshoot.pdf
Veritas File System Administrator's Guide	vxfs_admin.pdf

Table 1-14 lists the documentation for Symantec Product Authentication Service.

Table 1-14   Symantec Product Authentication Service documentation

Document title	File name
Symantec Product Authentication Service Installation Guide	at_install.pdf
Symantec Product Authentication Service Administrator's Guide	at_admin.pdf