

Veritas Storage Foundation™ for Oracle® RAC Release Notes

Solaris

6.0.1

Veritas Storage Foundation™ for Oracle RAC Release Notes

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- Product release level

- Hardware information
- Available memory, disk space, and NIC information
- Operating system
- Version and patch level
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- Router, gateway, and IP address information
- Problem description:
 - Error messages and log files
 - Troubleshooting that was performed before contacting Symantec
 - Recent software configuration changes and network changes

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Documentation

Product guides are available on the media in PDF format. Make sure that you are using the current version of the documentation. The document version appears on page 2 of each guide. The latest product documentation is available on the Symantec Web site.

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Your feedback on product documentation is important to us. Send suggestions for improvements and reports on errors or omissions. Include the title and document version (located on the second page), and chapter and section titles of the text on which you are reporting. Send feedback to:

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For information regarding the latest HOWTO articles, documentation updates, or to ask a question regarding product documentation, visit the Storage and Clustering Documentation forum on Symantec Connect.

<https://www-secure.symantec.com/connect/storage-management/forums/storage-and-clustering-documentation>

About Symantec Connect

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Storage Foundation for Oracle RAC Release Notes

This document includes the following topics:

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About this document

This document provides important information about Veritas Storage Foundation for Oracle RAC (SF Oracle RAC) version 6.0.1 for Solaris. Review this entire document before you install or upgrade SF Oracle RAC.

The information in the Release Notes supersedes the information provided in the product documents for SF Oracle RAC.

This is "Document version: 6.0.1 Rev 0" of the *Veritas Storage Foundation for Oracle RAC Release Notes*. Before you start, make sure that you are using the latest version of this guide. The latest product documentation is available on the Symantec Web site at:

<https://sort.symantec.com/documents>

Component product release notes

Product guides are available at the following location on the software media in PDF formats:

`/docs/product_name`

Symantec recommends copying the files to the `/opt/VRTS/docs` directory on your system.

For information regarding software features, limitations, fixed issues, and known issues of component products:

- Veritas Cluster Server (VCS)
See *Veritas Cluster Server Release Notes (6.0.1)*.
- Storage Foundation (SF)
See *Veritas Storage Foundation Release Notes (6.0.1)*.
- Storage Foundation Cluster File System High Availability (6.0.1)
See *Veritas Storage Foundation Cluster File System High Availability Release Notes (6.0.1)*.

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 scalable deployment of Oracle RAC on UNIX platforms. The solution uses Veritas 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 Oracle Real Application Cluster Support (VRTSdbac), Veritas Oracle Disk Manager (VRTSodm), 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.

For Oracle RAC 10g Release 2:

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.

For Oracle RAC 11g Release 1/Oracle RAC 11g Release 2:

The PrivNIC/MultiPrivNIC agents provide maximum bandwidth as well as high availability of the cluster interconnects, including switch redundancy.

See the following Technote regarding co-existence of PrivNIC/MultiPrivNIC agents with Oracle RAC 11.2.0.2 and later versions:

<http://www.symantec.com/business/support/index?page=content&id=TECH145261>

- Use of Cluster File System and Cluster Volume Manager for placement of Oracle Cluster Registry (OCR) and voting disks. These technologies provide robust shared block interfaces (for all supported Oracle RAC versions) and raw interfaces (for Oracle RAC 10g Release 2) for placement of OCR and voting disks.
- Support for a standardized approach toward application and database management. Administrators can apply their expertise of Veritas technologies toward administering SF Oracle RAC.
- Increased availability and performance using Veritas Dynamic Multi-Pathing (DMP). DMP provides wide storage array support for protection from failures and performance bottlenecks in the Host Bus Adapters (HBA), Storage Area Network (SAN) switches, and storage arrays.
- Easy administration and monitoring of multiple SF Oracle RAC clusters using Veritas Operations Manager.
- VCS OEM plug-in provides a way to monitor SF Oracle RAC resources from the OEM console.
- Improved file system access times using Oracle Disk Manager (ODM).
- Ability to configure Oracle Automatic Storage Management (ASM) disk groups over CVM volumes to take advantage of Veritas 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, Storage Checkpoints, and Database Storage Checkpoints.
- Support for space optimization using periodic deduplication in a file system to eliminate duplicate data without any continuous cost.
For more information, see the Veritas Storage Foundation Administrator's documentation.
- Ability to fail over applications with minimum downtime using Veritas Cluster Server (VCS) and Veritas Cluster File System (CFS).
- Prevention of data corruption in split-brain scenarios with robust SCSI-3 Persistent Group Reservation (PGR) based I/O fencing or Coordination Point Server-based I/O fencing. The preferred fencing feature also enables you to specify how the fencing driver determines the surviving subcluster.
- Support for sharing application data, in addition to Oracle database files, across nodes.
- Support for policy-managed databases in Oracle RAC 11g Release 2.
- 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 site fails, clients that are attached to the failed site can reconnect to a surviving site and resume access to the shared database.
- Support for configuring and administering multiple non-global zones with high availability to Oracle RAC instances inside the non-global zone.
- 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.
- Support for campus clusters with the following capabilities:
 - Consistent detach with Site Awareness
 - Site aware reads with VxVM mirroring
 - Monitoring of Oracle resources
 - Protection against split-brain scenarios

About Symantec Operations Readiness Tools

Symantec Operations Readiness Tools (SORT) is a Web site that automates and simplifies some of the most time-consuming administrative tasks. SORT helps you manage your datacenter more efficiently and get the most out of your Symantec products.

SORT can help you do the following:

Prepare for your next installation or upgrade

- List product installation and upgrade requirements, including operating system versions, memory, disk space, and architecture.
- Analyze systems to determine if they are ready to install or upgrade Symantec products.
- Download the latest patches, documentation, and high availability agents from a central repository.
- Access up-to-date compatibility lists for hardware, software, databases, and operating systems.

Manage risks

- Get automatic email notifications about changes to patches, array-specific modules (ASLs/APMs/DDIs/DDDs), and high availability agents from a central repository.
- Identify and mitigate system and environmental risks.
- Display descriptions and solutions for hundreds of Symantec error codes.

Improve efficiency

- Find and download patches based on product version and platform.
- List installed Symantec products and license keys.
- Tune and optimize your environment.

Note: Certain features of SORT are not available for all products. Access to SORT is available at no extra cost.

To access SORT, go to:

<https://sort.symantec.com>

Important release information

- For important updates regarding this release, review the Late-Breaking News TechNote on the Symantec Technical Support website:
<http://www.symantec.com/docs/TECH164885>

- For the latest patches available for this release, go to:
<https://sort.symantec.com/>
- The hardware compatibility list contains information about supported hardware and is updated regularly. For the latest information on supported hardware visit the following URL:
<http://www.symantec.com/docs/TECH170013>
Before installing or upgrading Storage Foundation and High Availability Solutions products, review the current compatibility list to confirm the compatibility of your hardware and software.

Changes introduced in SF Oracle RAC 6.0.1

This section lists the changes in SF Oracle RAC 6.0.1.

New versioning process for SFHA Solutions products

Symantec made some changes to simplify the versioning process to ensure that customers have a unified experience when it comes to deploying our different products across Storage, Availability, Backup, Archiving and Enterprise Security products. With this change, all the products will have a 3 digit version, X.Y.Z. In complying with this approach the current SFHA Solutions release is available as version 6.0.1.

New directory location for the documentation on the software media

The PDF files of the product documentation are now located in the `/docs` directory on the software media. Within the `/docs` directory are subdirectories for each of the bundled products, which contain the documentation specific to that product. The `sfha_solutions` directory contains documentation that applies to all products.

Changes related to installation and upgrades

The product installer includes the following changes in SF Oracle RAC 6.0.1.

Locally-installed installation and uninstallation scripts now include the release version

When you run local scripts (`/opt/VRTS/install`) to configure Veritas products, the names of the installed scripts now include the release version.

Note: If you install your Veritas product from the install media, continue to run the `installsfrac` command without including the release version.

To run the script from the installed binaries, run the `installsfrac<version>` command.

Where `<version>` is the current release version with no periods or spaces.

For example, to configure the 6.0.1 version of your product, run this command:

```
# /opt/VRTS/install/installsfrac601 -configure
```

VxVM private region backup pre-checks for disk groups prior to upgrade

The installer verifies that recent backups of configuration files of all the disk groups in VxVM private region have been saved in the `/etc/vx/cbr/bk` directory prior to doing an upgrade. If not, a warning message is displayed.

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

Support for Solaris 11 Automated Installer

You can use the Oracle Solaris Automated Installer (AI) to install the Solaris 11 operating system on multiple client systems in a network. AI performs a hands-free installation (automated installation without manual interactions) of both x86 and SPARC systems. You can also use AI media (AI bootable image, provided by Oracle, which can be downloaded from the Oracle Web site) to install the Oracle Solaris OS on a single SPARC or x86 platform. All cases require access to a package repository on the network to complete the installation.

Additional installation postcheck options

The `postcheck` option has been enhanced to include additional checks.

You can use the installer's post-check option to perform the following checks:

- General checks for all products.
- Checks for Volume Manager (VM).
- Checks for File System (FS).
- Checks for Cluster File System (CFS).

Support for tunables file templates

You can use the installer to create a tunables file template. If you start the installer with the `-tunables` option, you see a list of all supported tunables, and the location of the tunables file template.

Installer support to configure Coordination Point servers

You can now use the `-configcps` option in the installer to configure CP servers. This functionality to configure CP servers is now integrated with the installer. The `configure_cps.pl` script used earlier to configure CP servers is now deprecated.

You can also configure CP servers by generating response files. You can use the `-responsefile '/tmp/sample1.res'` option in the installer to configure CP servers.

See the *Veritas Cluster Server Installation Guide* for more details.

Fast failover of failed links by PrivNIC and MultiPrivNIC agents

The PrivNIC and MultiPrivNIC agents can now fail over the IP address of a failed link to an available link when the link status is detected as `trouble`. If LLT is unable to reach the peer node in two seconds, the link status is marked trouble and the agents fail over the IP address to an available link if the value of the agent attribute `EnableUseTroubleState` is set to 1 in the type definition of the PrivNIC and MultiPrivNIC resource configuration files.

An additional enhancement includes reducing the value of the `MonitorInterval` attribute of the agents to the default value of 10 seconds.

Support for Oracle RAC in a zone environment

This release supports the installation and configuration of multiple non-global zones in a global zone.

SF Oracle RAC and the necessary agents run in the global zone. Oracle RAC runs in the non-global zone. You must configure non-global zones with an exclusive-IP zone. The exclusive-IP zone does not share the network interface with global-zone.

Using SF Oracle RAC, you can start, stop, and monitor a non-global zone and provide high availability to Oracle RAC instances inside the non-global zone.

SF Oracle RAC installation and configuration checks removed from installer

The option SF Oracle RAC installation and configuration checks is no longer available in the installer.

Changes related to SFDB tools

The following sections describe the changes related to Storage Foundation for Databases (SFDB) tools in SF Oracle RAC 6.0.1.

See "[Support for creation of Golden Image snapshots using FlashSnap for Oracle](#)" on page 15.

See "[Support for Flashsnap at the VVR Secondary site for Oracle](#)" on page 15.

See "[Introduction of the Compression Advisor tool for Oracle](#)" on page 15.

Support for creation of Golden Image snapshots using FlashSnap for Oracle

In this release, the SFDB tools support the creation of Golden Image snapshots using FlashSnap for Oracle databases.

Online mode, third-mirror-break-off type snapshot i.e. online FlashSnap snapshot of a database instance contains all the information needed to create a clone of the database instance. It can act as a template for creating clone database instances. You can thus allocate a FlashSnap snapshot that can be used as a master copy for creating one or more clone instances. The clone instances created from a FlashSnap image, termed as the 'golden image', are incremental copies of the master or the golden image. These depend on the FlashSnap image for their operations.

Support for Flashsnap at the VVR Secondary site for Oracle

In this release, the SFDB tools support Flashsnap operation at the VVR Secondary site for Oracle databases.

Online mode snapshots (i.e. traditional, third-mirror-break-off snapshots) are supported in VVR replication environment. Also, support for more than one secondary site is added. For online mode snapshots in VVR environment, IBC (In-Band Control) messages are used to synchronize activities on the Primary and Secondary sites. Snapshot is initiated from VVR Secondary site.

Introduction of the Compression Advisor tool for Oracle

In this release, the SFDB tools provide the Compression Advisor tool for Oracle databases.

Veritas File System (VxFS) provides the `vxcompress` utility that can be used to compress individual files transparent to the underlying applications. An application reading a compressed file automatically receives the uncompressed data that is uncompressed in memory only; the on-disk part of the data remains compressed. If an application writes to a compressed file, parts of the file are uncompressed on disk.

Compression Advisor provides extended compression functionality for Oracle database files in Oracle single instance and Oracle RAC environments. The Compression Advisor command `sfae_comp_adm` resides in the `/opt/VRTS/bin` directory, and it must be run by the DBA user.

Changes to LLT

This release includes the following change to LLT:

Setting the value of peerinact in the `/etc/l1ttab` file

Symantec recommends not to set the value of peerinact to 0. To achieve the infinite timeout functionality for peerinact, you must set peerinact to a large value. The supported range of value is between 1 through 2147483647.

Changes to I/O fencing

This section covers the new features and changes related to I/O fencing in this release.

Enhancement to the CoordPoint agent

The CoordPoint agent monitors changes to the Coordinator Disk Group constitution, such as when a disk is deleted from the Coordinator Disk Group due to accidental execution of a VxVM administrative command or if the VxVM private region of a disk is corrupted.

The agent performs detailed monitoring on the CoordPoint resource and reports faults. You can tune the frequency of the detailed monitoring by setting the `LevelTwoMonitorFreq` attribute introduced in this release. For example, if you set this attribute to 5, the agent monitors the Coordinator Disk Group constitution in every fifth monitor cycle.

For more information on the CoordPoint agent, see the *Veritas Cluster Server Bundled Agents Reference Guide*.

For information on configuring the CoordPoint agent using script-based installer and manually configuring the CoordPoint agent to monitor coordinator disks, see the *Veritas Cluster Server Installation Guide*.

For more information on replacing I/O fencing coordinator disks or coordinator diskgroup when the cluster is online, see the *Veritas Cluster Server Administrator's Guide*.

No longer supported

This section lists software versions and features that are no longer supported. Symantec advises customers to minimize the use of these features.

SF Oracle RAC does not support the following:

- Oracle RAC 11g Release 1 Clusterware
- Dissimilar version upgrades of SF Oracle RAC components
 - For example, if you have SF Oracle RAC 6.0 installed, you can not upgrade only VCS to version 6.0.1.
- Use of crossover cables
 - Oracle does not support the use of crossover cables for cluster interconnects due to the possibility of data corruption and other software limitations.

Note: Crossover cables are however known to function without any issues in SF Oracle RAC. While the SF Oracle RAC Technical support team may continue to provide support on related issues for existing deployments, this support may be constrained in some respects as it is no longer a supported configuration by Oracle.

The use of crossover cables is discouraged for new deployments.

- Bunker replication is not supported in a Cluster Volume Manager (CVM) environment.

Veritas Storage Foundation for Databases (SFDB) tools features which are no longer supported

The following Storage Foundation for Databases (SFDB) tools features are not supported in this release:

- FlashSnap reverse resync
- Checkpoint policy and Checkpoint quotas
- Interactive modes in clone and rollback

System requirements

This section describes the system requirements for this release.

Important preinstallation information

Before you install SF Oracle RAC, make sure you have reviewed the following information:

- Hardware compatibility list for information about supported hardware:
<http://www.symantec.com/docs/TECH170013>
- Latest information on support for Oracle database versions:
<http://www.symantec.com/docs/DOC5081>
- Oracle documentation for additional requirements pertaining to your version of Oracle.

Hardware requirements

Depending on the type of setup planned, make sure you meet the necessary hardware requirements.

For basic clusters See [Table 1-1](#) on page 18.

For campus clusters See [Table 1-2](#) on page 20.

Table 1-1 Hardware requirements for basic clusters

Item	Description
SF Oracle RAC systems	Two to sixteen systems with two or more CPUs. For details on the additional requirements for Oracle, see the Oracle documentation.
DVD drive	A DVD drive on one of the nodes in the cluster.
Disks	SF Oracle RAC requires that all shared storage disks support SCSI-3 Persistent Reservations (PR). Note: The coordinator disk does not store data, so configure the disk as the smallest possible LUN on a disk array to avoid wasting space. The minimum size required for a coordinator disk is 128 MB.

Table 1-1 Hardware requirements for basic clusters (*continued*)

Item	Description
Disk space	<p>You can evaluate your systems for available disk space by running the product installation program. Navigate to the product directory on the product disc and run the following command:</p> <pre># ./installsfrac -precheck node_name</pre> <p>You can also use the Veritas Web-based installation program to determine the available disk space.</p> <p>For details on the additional space that is required for Oracle, see the Oracle documentation.</p>
RAM	<p>Each SF Oracle RAC system requires at least 2 GB.</p> <p>For Oracle RAC requirements, see the Oracle Metalink document: 169706.1</p>
Swap space	See the Oracle Metalink document: 169706.1
Network	<p>Two or more private links and one public link.</p> <p>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.</p> <p>Symantec recommends gigabit Ethernet using enterprise-class switches for the private links.</p> <p>Oracle requires that all nodes use the IP addresses from the same subnet.</p> <p>You can also configure aggregated interfaces.</p>
Fiber Channel or SCSI host bus adapters	At least one additional SCSI or Fibre Channel Host Bus Adapter per system for shared data disks.

[Table 1-2](#) lists the hardware requirements for campus clusters in addition to the basic cluster requirements.

Table 1-2 Hardware requirements for campus clusters

Item	Description
Storage	<ul style="list-style-type: none"> ■ The storage switch (to which each host on a site connects) must have access to storage arrays at all the sites. ■ Volumes must be mirrored with storage allocated from at least two sites. ■ DWDM links are recommended between sites for storage links. DWDM works at the physical layer and requires multiplexer and de-multiplexer devices. ■ The storage and networks must have redundant-loop access between each node and each storage array to prevent the links from becoming a single point of failure.
Network	<ul style="list-style-type: none"> ■ Oracle requires that all nodes use the IP addresses from the same subnet. ■ Symantec recommends a common cross-site physical infrastructure for storage and LLT private networks.
I/O fencing	I/O fencing requires placement of a third coordinator point at a third site. The DWDM can be extended to the third site or the iSCSI LUN at the third site can be used as the third coordination point. Alternatively Coordination Point Server can be deployed at the third remote site as an arbitration point.

Supported Solaris operating systems

This section lists the supported operating systems for this release of Veritas products.

Table 1-3 shows the supported operating systems for this release.

Table 1-3 Supported operating systems

Operating systems	Levels	Chipsets
Solaris 10	Update 8, 9, and 10	SPARC
Solaris 10	Update 8, 9, and 10	x86
Solaris 11	SRU1 or later	SPARC
Solaris 11	SRU1 or later	x86

For Storage Foundation for Oracle RAC, all nodes in the cluster must have the same operating system version and update level.

Supported database software

Note: SF Oracle RAC supports only 64-bit Oracle.

The following database versions are supported:

- | | |
|--------------------|---|
| Solaris 10 (SPARC) | ■ Oracle RAC 10g Release 2 |
| | ■ Oracle RAC 11g Release 1 Database |
| | Note: Oracle 11g Release 1 Clusterware is not supported. |
| | ■ Oracle RAC 11g Release 2 |
| Solaris 10 (x64) | ■ Oracle RAC 10g Release 2 |
| | ■ Oracle RAC 11g Release 2 |
| Solaris 11 (SPARC) | 11.2.0.3 |
| Solaris 11 (x64) | 11.2.0.3 |

For the latest information on supported Oracle database versions, see the following Technical Support TechNote:

<http://www.symantec.com/docs/DOC5081>

Support for minor database versions is also documented in the afore-mentioned Technical Support TechNote.

Additionally, see the following Oracle support site for information on patches that may be required by Oracle for each release.

<https://support.oracle.com>

Veritas File System requirements

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

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

```
For Solaris 10: # echo "lwp_default_stksize/X" | mdb -k
                lwp_default_stksize:
                lwp_default_stksize:          6000

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

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

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

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

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

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

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

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

Supported replication technologies for global clusters

SF Oracle RAC supports the following hardware-based replication and software-based replication technologies for global cluster configurations:

Hardware-based replication	<ul style="list-style-type: none">■ EMC SRDF■ Hitachi TrueCopy■ IBM Metro Mirror■ IBM SAN Volume Controller (SVC)■ EMC MirrorView
Software-based replication	<ul style="list-style-type: none">■ Veritas Volume Replicator■ Oracle Data Guard

Fixed issues

This section covers the incidents that are fixed in this release.

Issues fixed in SF Oracle RAC 6.0.1

[Table 1-4](#) lists the issues fixed in SF Oracle RAC 6.0.1.

Table 1-4 Issues fixed in SF Oracle RAC 6.0.1

Incident number	Description
2585899	The SF Oracle RAC installer does not support the use of fully qualified domain names (FQDN). Specifying the fully qualified domain name of a system results in the following error: The node sys1 doesn't seem to be part of the cluster, or CVM is not running on the node sys1.
2329580	If you install and start SF Oracle RAC, but later configure SF Oracle RAC using <code>installvcs</code> , some drivers may not stop successfully when the installer attempts to stop and restart the SF Oracle RAC drivers and processes. The reason the drivers do not stop is because some dependent SF Oracle RAC processes may be in the running state.

Table 1-4 Issues fixed in SF Oracle RAC 6.0.1 (*continued*)

Incident number	Description
2392741	<p>Policy-managed Oracle RAC databases fail to come online on some of the nodes in the server pool.</p> <p>If the cardinality of a policy-managed Oracle RAC database is set to a number lesser than the number of nodes in the server pool, and if the Oracle agent tries to bring the database online on all the nodes in the server pool, the operation fails on some of the nodes in the server pool. The resource on respective nodes move to the faulted state.</p>
2749412	Setting the <code>UseVirtualIP</code> attribute to 1 overwrites the IP address of the virtual interface on some nodes in the cluster.
2757032	The <code>PrivNIC/MultiPrivNIC</code> agents fail to match the exact IP address configured in the agent configuration with the IP address configured on the system. As a result, the agent detects the wrong interface as the active interface resulting in a resource fault.
2580393	<p>Removal of SAN cable from any node in a global cluster setup takes application service groups offline on all nodes.</p> <p>In a replicated global cluster setup, the removal of SAN cable from any node in the cluster causes the CFS mount points to fault. As a result, dependent application groups are taken offline and replication to the secondary site is adversely affected.</p>
2734745	The <code>PrivNIC</code> resource faults after the <code>UseVirtualIP</code> attribute is set to 1.
2740150	The SF Oracle RAC installer fails to set the value of the CSSD resource attribute <code>OfflineWaitLimit</code> to 3.
2746948	<p>Some drivers fail to add to the system.</p> <p>Sometimes during bootup, some of the drivers fail to add in the system because of <code>add_drv/rem_drv</code> race between our modules which are independent of each other.</p>
2729806	The <code>MultiPrivNIC</code> agent plumbs network interfaces on the global zone.

Storage Foundation for Databases (SFDB) tools fixed issues

Table 1-5 describes the Veritas Storage Foundation for Databases (SFDB) tools issues fixed in this release.

Table 1-5 SFDB tools fixed issues

Fixed issues	Description
2585643	If you provide an incorrect host name with the <code>-r</code> option of <code>vxfadm</code> , the command fails with an error message similar to one of the following: FSM Error: Can't use string ("") as a HASH ref while "strict refs" in use at /opt/VRTSdbd/lib/perl/DBED/SfaeFsm.pm line 776. SFDB vxfadm ERROR V-81-0609 Repository location is invalid. The error messages are unclear.
2703881 (2534422)	The FlashSnap validation operation fails with the following error if the mirrors for data volumes and archive log volumes share the same set of disks: SFAE Error:0642: Storage for diskgroup oradatadg is not splittable.
2582694 (2580318)	After you have done FlashSnap cloning using a snapplan, any further attempts to create a clone from the same snapplan using the <code>dbed_vmcloinedb</code> continue to use the original clone SID, rather than the new SID specified using the <code>new_sid</code> parameter. This issue is also observed when you resynchronize the snapplan, take a snapshot again without specifying the new clone SID, and then try to clone with the new SID.
2579929	The <code>sfae_auth_op -o auth_user</code> command, used for authorizing users, fails with the following error message: SFDB vxfadm ERROR V-81-0384 Unable to store credentials for <username> The authentication setup might have been run with a strict umask value, which results in the required files and directories being inaccessible to the non-root users.

LLT, GAB, and I/O fencing fixed issues

[Table 1-6](#) lists the fixed issues for LLT, GAB, and I/O fencing.

Table 1-6 LLT, GAB, and I/O fencing fixed issues

Incident	Description
2845244	<p>vxfen startup script gives error grep: can't open /etc/vxfen.d/data/cp_uid_db.</p> <p>The error comes because vxfen startup script tries to read a file that might not be present. This error is typically seen when starting vxfen for the very first time after installation.</p>
2554167	Setting peerinact value to 0 in the /etc/llttab file floods the system log file with large number of log messages.
2699308	Vxfenswap fails when <i>LANG</i> is set to a value other than 'C'. The vxfenswap utility internally uses the <i>tr</i> command. If the <i>LANG</i> environment variable is set to something other than C, it may cause improper functioning of the vxfenswap utility.
2726341	On Solaris 11, vxfen startup scripts do not report the correct status of fencing.
2850926	Fencing may start up with an error message <i>open failed for device: /dev/vxfen</i> in the log. It happens when the fencing startup script tries to access the driver that is still loading into memory. However, fencing comes up seamlessly in spite of the error message.
2699291	Logs report errors related to <i>mv</i> command when the vxfen service is disabled.
2762660	Post-install script of the VRTSllt package reports error while attempting to disable the SMF service system/llt.
2762660	Post-install script of the VRTSvxfen package reports error while attempting to disable the SMF service system/vxfen.

Known issues

This section covers the known issues in this release.

For Oracle RAC issues:

See “[Oracle RAC issues](#)” on page 27.

For SF Oracle RAC issues:

See “[SF Oracle RAC issues](#)” on page 29.

Oracle RAC issues

This section lists the known issues in Oracle RAC.

Oracle Grid Infrastructure installation may fail with internal driver error

The Oracle Grid Infrastructure installation may fail with the following error:

```
[INS-20702] Unexpected Internal driver error
```

Workaround:

Perform one of the following steps depending on the type of installer you use for the installation:

- Script-based installer

Export the `OUI_ARGS` environment variable, before you run the SF Oracle RAC installation program:

```
export OUI_ARGS=-ignoreInternalDriverError
```

For more information, see the Oracle Metalink document: 970166.1

- Web-based installer

When you run the Web-based installer, in the **Enter the arguments to be passed to the Oracle installer** text box, enter the value `-ignoreInternalDriverError`.

For more information, see the *Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide*.

During installation or system startup, Oracle Grid Infrastructure may fail to start

After successful installation of Oracle RAC 11g Release 2 Grid Infrastructure, while executing the `root.sh` script, `oasd` may fail to start. Similarly, during system startup, Oracle Grid Infrastructure may fail to start though the VCS engine logs may indicate that the `cssd` resource started Oracle Grid Infrastructure successfully.

The following message may be displayed on running the `strace` command:

```
# /usr/bin/strace -ftt -p pid_of_oasd.bin
14:05:33.527288 open("/var/tmp/.oracle/npoasd",
O_WRONLY <unfinished ...>
```

For possible causes and workarounds, see the Oracle Metalink document: 1069182.1

Enabling ODM in Oracle RAC 11 Release 2 installations causes errors (1913013)

Enabling ODM in Oracle RAC 11 Release 2 installations causes the following error:

```
'ODM ERROR V-41-4-1-253-12 Not enough space'
Oracle instance may also crash with same error.
```

The error is observed if the DISM (Dynamic Intimate Shared memory) feature is enabled. In Solaris, the Oracle database uses DISM if it is available on the system, and if the value of the `sga_max_size` initialization parameter is larger than the size required for all SGA components combined.

Workaround: Make sure that the file `ORACLE_HOME/bin/oradism` is owned by the root user with "execute" and "setuid" permissions. If the problem persists after correcting the permissions, uncomment the `sga_max_size` and `memory_target` `init.ora` parameters.

Oracle VIP Configuration Assistant fails with an error message (1182220)

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

```
The given interface(s), "net0" 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.).

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.

Oracle Database Configuration Assistant displays an error

The Database Configuration Assistant utility displays the following error:

```
SGA size cannot be greater than maximum shared memory
segment size (0).
```

Workaround: Ignore this message and manually configure the database memory parameters for Oracle. In the "Memory" tab of the Oracle Database Creation Assistant (DBCA), select a Custom and Manual shared memory management configuration and enter the appropriate values.

SF Oracle RAC issues

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

Installation known issues

This section describes the known issues during installation and upgrade.

Verification of Oracle binaries incorrectly reports as failed during Oracle Grid Infrastructure installation

The verification of Oracle binaries may incorrectly report as failed during the Oracle Grid Infrastructure installation using the SF Oracle RAC installer. The message is erroneously reported due to a break in passwordless SSH communication. The SSH communication fails because execution of the `root.sh` script changes the owner of the operating system root directory to the grid user directory.

Stopping the installer during an upgrade and then resuming the upgrade might freeze the service groups [2574731]

The service groups freeze due to upgrading using the product installer if you stopped the installer after the installer already stopped some of the processes and then resumed the upgrade.

Workaround: You must unfreeze the service groups manually after the upgrade completes.

To unfreeze the service groups manually

- 1 List all the frozen service groups

```
# hagrp -list Frozen=1
```

- 2 Unfreeze all the frozen service groups:

```
# haconf -makerw
# hagrp -unfreeze service_group -persistent
# haconf -dump -makero
```

After Live Upgrade to Solaris 10 Update 10, boot from alternate boot environment may fail (2370250)

If your setup involves volumes in a shared disk group that are mounted as CFS in a cluster, then during Live Upgrade using the `vxlustart` command from any supported Solaris version to Solaris 10 Update 10, boot from an alternate boot environment may fail.

Workaround: Run the `vxlufinish` command. Before rebooting the system, manually delete the entries of all the volumes of shared disks that are mounted as CFS in the `/altroot.5.10/etc/vfstab` directory.

On Sparc, Live Upgrade from Solaris 9 to Solaris 10 Update 10 may fail (2424410)

On Sparc, Live Upgrade from Solaris 9 to Solaris 10 Update 10 may fail with the following error:

```
Generating file list.
Copying data from PBE <source.24429> to ABE <dest.24429>.
99% of filenames transferredERROR: Data duplication process terminated
unexpectedly.
ERROR: The output is </tmp/lucreate.13165.29314/lucopy.errors.29314>.

29794 Killed
Fixing zonepaths in ABE.
```

```
Unmounting ABE <dest.24429>.  
100% of filenames transferredReverting state of zones in PBE  
<source.24429>.  
ERROR: Unable to copy file systems from boot environment <source.24429>  
to BE <dest.24429>.  
ERROR: Unable to populate file systems on boot environment <dest.24429>.  
Removing incomplete BE <dest.24429>.  
ERROR: Cannot make file systems for boot environment <dest.24429>.
```

This is a known issue with the Solaris `lucreate` command.

Workaround: Install Oracle patch 113280-10,121430-72 or higher before running `vxlustart`.

On Solaris 10, a flash archive installed through JumpStart may cause a new system to go into maintenance mode on reboot (2379123)

If a Flash archive is created on a golden host with encapsulated root disks, when this Flash archive is installed onto another host through JumpStart, the new system may go to maintenance mode when you initially reboot it.

This problem is caused by the predefined root disk mirror in the Flash archive. When the archive is applied to a clone system, which may have different hard drives, the newly cloned system may get stuck at root disk mirroring during reboot.

Workaround: Create the Flash archive on a golden host with no encapsulated root disks. Run `vxunroot` to clean up the mirrored root disks before you create the Flash archive.

Flash Archive installation not supported if the target system's root disk is encapsulated

Symantec does not support SF Oracle RAC installation using Flash Archive if the target system's root disk is encapsulated.

Make sure that the target system's root disk is unencapsulated before starting the installation.

Web installer does not ask for authentication after the first session if the browser is still open (2509330)

If you install or configure SF Oracle RAC and then close the Web installer, if you have other browser windows open, the Web installer does not ask for authentication in the subsequent sessions. Since there is no option to log out of the Web installer, the session remains open as long as the browser is open on the system.

Workaround: Make sure that all browser windows are closed to end the browser session and subsequently log in again.

After performing a manual rolling upgrade, make sure the CVM is online on all nodes without errors (2595441)

Make sure that the CVM is online on all nodes without errors after you perform the first phase of a manual rolling upgrade. The CVM protocol version will not upgrade successfully on the nodes where CVM is offline or has errors.

If the CVM protocol version does not upgrade successfully, upgrade the CVM protocol on the CVM master node.

To upgrade the CVM protocol on the CVM master node

- 1 Find out which node is the CVM master:

```
# vxctrl -c mode
```

- 2 On the CVM master node, upgrade the CVM protocol:

```
# vxctrl upgrade
```

sfmh discovery issue when you upgrade your Veritas product to 6.0.1 (2622987)

If a host is not reporting to any management server but sfmh discovery is running before you upgrade to 6.0.1, sfmh-discovery may fail to start after the upgrade.

Workaround: If the host is not reporting to VOM, stop sfmh-discovery manually before upgrading to 6.0.1 by executing the following command on the managed host:

```
/opt/VRTSsfmh/adm/vxvmdiscovery-ctrl.sh stop
```

Stopping the Web installer causes Device Busy error messages (2633924)

If you start the Web installer, and then perform an operation (such as prechecking, configuring, or uninstalling), you may get an error message saying the device is busy.

Workaround: Do one of the following:

- Kill the start.pl process.
- Start the webinstaller again. On the first Web page you see that the session is still active. Either take over this session and finish it or terminate it directly.

After finishing a kernel upgrade on a master node the cvm group on a slave node does not come online (2439439)

After successfully finishing a kernel upgrade on one node, the cvm group does not come online on the second node.

Workaround: Check that your cluster is not in a jeopardy state before you perform a rolling upgrade.

Erroneous resstatechange trigger warning

You may encounter the following warning when you restart resources:

```
CPI WARNING V-9-40-4317 The installer has detected that resstatechange trigger is configured by setting TriggerResStateChange attributes.
```

Workaround:

In future releases, the resstatechange trigger will not be invoked when a resource is restarted. Instead, the resrestart trigger will be invoked if you set the TriggerResRestart attribute. The resrestart trigger is available in the current release. Refer to the VCS documentation for details.

Veritas File System modules may fail to unload if SmartMove is enabled and a break-off snapshot volume has been reattached (2851403)

The Veritas File System modules, vxportal and vxfs, may fail to unload if SmartMove is enabled and a break-off snapshot volume is reattached. Reattaching the snapshot causes an extra reference count to the vxportal module, which causes the module unload operation to fail.

Workaround:

Manually unload the Veritas Volume Manager modules (vxspec, vxio, vxdmp) before unloading the vxportal module. This decrements the reference count of the vxportal module.

LLT known issues

This section covers the known issues related to LLT in this release.

Cannot configure LLT if full device path is not used in the lltab file (2858159)

(Oracle Solaris 11) On virtual machines ensure that you use the full path of the devices corresponding to the links in lltab. For example, use /dev/net/net1 instead of /dev/net/net:1 in the lltab file, otherwise you cannot configure LLT.

Cannot use CPI response files to add nodes to a cluster that is using LLT over UDP (2869763)

When you run the `addnode -responsefile` command, if the cluster is using LLT over UDP, then the `/etc/lltab` file generated on new nodes is not correct. So, the procedure fails and you cannot add nodes to a cluster using CPI response files.

Workaround: None

GAB known issues

This section covers the known issues related to GAB in this release.

Cluster panics during reconfiguration (2590413)

While a cluster is reconfiguring, GAB broadcast protocol encounters a race condition in the sequence request path. This condition occurs in an extremely narrow window which eventually causes the GAB master to panic.

Workaround: There is no workaround for this issue.

GAB may fail to stop during a phased upgrade on Oracle Solaris 11 (2858157)

While performing a phased upgrade on Oracle Solaris 11 systems, GAB may fail to stop. However, CPI gives a warning and continues with stopping the stack.

Workaround: Reboot the node after the installer completes the upgrade.

Cannot run pfiles or truss files on gablogd (2292294)

When pfiles or truss is run on gablogd, a signal is issued to gablogd. gablogd is blocked since it has called an gab ioctl and is waiting for events. As a result, the pfiles command hangs.

Workaround: None.

(Oracle Solaris 11) On virtual machines, sometimes the common product installer (CPI) may report that GAB failed to start and may exit (2879262)

GAB startup script may take longer than expected to start up. The delay in start up can cause the CPI to report that GAB failed and exits.

Workaround: Manually start GAB and all dependent services.

I/O fencing known issues

This section covers the known issues related to I/O fencing in this release.

Installer is unable to split a cluster that is registered with one or more CP servers (2110148)

Splitting a cluster that uses server-based fencing is currently not supported.

You can split a cluster into two and reconfigure SF Oracle RAC on the two clusters using the installer. For example, you can split a cluster *clus1* into *clus1A* and *clus1B*.

However, if you use the installer to reconfigure the SF Oracle RAC, the installer retains the same cluster UUID of *clus1* in both *clus1A* and *clus1B*. If both *clus1A* and *clus1B* use the same CP servers for I/O fencing, then the CP server allows registration only from the cluster that attempts to register first. It rejects the registration from the cluster that attempts next. Thus, the installer reports failure during the reconfiguration of the cluster that uses server-based fencing.

Workaround: There is no workaround for this issue.

Fencing does not come up on one of the nodes after a reboot (2573599)

If VxFEN unconfiguration has not finished its processing in the kernel and in the meantime if you attempt to start VxFEN, you may see the following error in the `/var/VRTSvcs/log/vxfen/vxfen.log` file:

```
VXFEN vxfenconfig ERROR V-11-2-1007 Vxfen already configured
```

However, the output of the `gabconfig -a` command does not list port b. The `vxfenadm -d` command displays the following error:

```
VXFEN vxfenadm ERROR V-11-2-1115 Local node is not a member of cluster!
```

Workaround: Start VxFEN again after some time.

The vxfenswap utility does not detect failure of coordination points validation due to an RSH limitation (2531561)

The `vxfenswap` utility runs the `vxfenconfig -o` modify command over RSH or SSH on each cluster node for validation of coordination points. If you run the `vxfenswap` command using RSH (with the `-n` option), then RSH does not detect the failure of validation of coordination points on a node. From this point, `vxfenswap` proceeds as if the validation was successful on all the nodes. But, it fails at a later stage when it tries to commit the new coordination points to the VxFEN driver. After the failure, it rolls back the entire operation, and exits cleanly with a non-zero error code. If you run `vxfenswap` using SSH (without the `-n` option), then SSH detects the failure of validation of coordination of points correctly and rolls back the entire operation immediately.

Workaround: Use the `vxfenswap` utility with SSH (without the `-n` option).

In absence of cluster details in CP server, VxFEN fails with pre-existing split-brain message (2433060)

When you start server-based I/O fencing, the node may not join the cluster and prints error messages in logs similar to the following:

In the `/var/VRTSvcs/log/vxfen/vxfen.log` file:

```
VXFEN vxifenconfig ERROR V-11-2-1043
Detected a preexisting split brain. Unable to join cluster.
```

In the `/var/VRTSvcs/log/vxfen/vxfen.log` file:

```
operation failed.
CPS ERROR V-97-1400-446 Un-authorized user cpsclient@sys1,
domaintype vx; not allowing action
```

The `vxrend` daemon on the application cluster queries the coordination point server (CP server) to check if the cluster members as seen in the GAB membership are registered with the CP server. If the application cluster fails to contact the CP server due to some reason, then fencing cannot determine the registrations on the CP server and conservatively assumes a pre-existing split-brain.

Workaround: Before you attempt to start VxFEN on the application cluster, ensure that the cluster details such as cluster name, UUID, nodes, and privileges are added to the CP server.

When I/O fencing is not up, the `svcs` command shows VxFEN as online (2492874)

Solaris 10 SMF marks the service status based on the exit code of the start method for that service. The VxFEN start method executes the `vxifen-startup` script in the background and exits with code 0. Hence, if the `vxifen-startup` script subsequently exits with failure then this change is not propagated to SMF. This behavior causes the `svcs` command to show incorrect status for VxFEN.

Workaround: Use the `vxifenadm` command to verify that I/O fencing is running.

Fencing port b is visible for few seconds even if cluster nodes have not registered with CP server (2415619)

Even if the cluster nodes have no registration on the CP server and if you provide coordination point server (CP server) information in the `vxifenmode` file of the cluster nodes, and then start fencing, the fencing port b is visible for a few seconds and then disappears.

Workaround: Manually add the cluster information to the CP server to resolve this issue. Alternatively, you can use installer as the installer adds cluster information to the CP server during configuration.

CP server repetitively logs unavailable IP addresses (2530864)

If coordination point server (CP server) fails to listen on any of the IP addresses that are mentioned in the `vxcps.conf` file or that are dynamically added using the command line, then CP server logs an error at regular intervals to indicate the failure. The logging continues until the IP address is bound to successfully.

```
CPS ERROR V-97-51-103 Could not create socket for host
10.209.79.60 on port 14250
CPS ERROR V-97-1400-791 Coordination point server could not
open listening port = [10.209.79.60]:14250
Check if port is already in use.
```

Workaround: Remove the offending IP address from the listening IP addresses list using the `rm_port` action of the `cpsadm` command.

See the *Veritas Storage Foundation for Oracle RAC Administrator's Guide* for more details.

Server-based fencing comes up incorrectly if default port is not mentioned (2403453)

When you configure fencing in customized mode and do no provide default port, fencing comes up. However, the `vxfenconfig -l` command output does not list the port numbers.

Workaround: Retain the "port=<port_value>" setting in the `/etc/vxfenmode` file, when using customized fencing with at least one CP server. The default port value is 14250.

Secure CP server does not connect from localhost using 127.0.0.1 as the IP address (2554981)

The `cpsadm` command does not connect to the secure CP server on the localhost using 127.0.0.1 as the IP address

Workaround: Connect the secure CP server using any of the virtual IPs that is configured with the CP server and is plumbed on the local node.

Unable to customize the 30-second duration (2551621)

When the `vxcpsserv` process is not able to bind to an IP address during startup, it attempts to bind to that IP address at an interval of 30 seconds. This interval is not configurable.

Workaround: There is no workaround for this issue.

NIC resource gets created with incorrect name while configuring CPSSG with the `configure_cps.pl` script (2585229)

The name of the NIC resource created by the `configure_cps.pl` script does not come out correct when, for example, m^{th} VIP is mapped to n^{th} NIC and every m is not equal to n . In this case, although CPSSG continues to function without any problem, when you unconfigure CPSSG using `configure_cps.pl`, it fails.

Workaround: To unconfigure CPSSG, you must remove the CPSSG configuration from the VCS configuration.

CP server configuration fails while setting up secure credentials for CP server hosted on an SFHA cluster (2621029)

When you configure CP server using the `configure_cps.pl` utility, the configuration fails while setting up secure credentials for CP server that is hosted on an SFHA cluster. You may see the following error:

```
Creating softlink to credential directory /etcVRTScps/db/CPSERVER
on node nodename.
Unable to connect to node nodename using /usr/bin/ssh.
Please configure ssh communication and retry. Exiting.
```

Workaround: You can use any of the following options:

- Before running the `configure_cps.pl` utility, change the default shell for root user to either KSH or bash.
- Perform the following steps after running the `configure_cps.pl` utility on each node of the cluster:
 - Manually remove the old credential directory or softlink. For example:

```
# rm -rf /varVRTSvcs/vcsauth/data/CPSERVER
```

- Create a new soft-link to the shared location of the credential directory:

```
# ln -s path_of_CP_server_credential_directory \
/varVRTSvcs/vcsauth/data/CPSERVER
```

- Start the CPSSG service group:

```
# hagrp -online CPSSG -any
```

The `cpsadm` command fails after upgrading CP server to 6.0 or above in secure mode (2846727)

The `cpsadm` command may fail after you upgrade coordination point server (CP server) to 6.0 in secure mode. If the old VRTSat package is not removed from the system, the `cpsadm` command loads the old security libraries present on the system. As the installer runs the `cpsadm` command on the CP server to add or upgrade the SF Oracle RAC cluster (application cluster), the installer also fails.

Workaround: Perform the following procedure on all of the nodes of the CP server.

To resolve this issue

- 1 Rename `cpsadm` to `cpsadmbin`:

```
# mv /opt/VRTScps/bin/cpsadm /opt/VRTScps/bin/cpsadmbin
```

- 2 Create a file `/opt/VRTScps/bin/cpsadm` with the following content:

```
#!/bin/sh
EAT_USE_LIBPATH="/opt/VRTScps/lib"
export EAT_USE_LIBPATH
/opt/VRTScps/bin/cpsadmbin "$@"
```

- 3 Change the permissions of the new file to 775:

```
# chmod 755 /opt/VRTScps/bin/cpsadm
```

Server-based fencing may fail to start after reinstalling the stack (2802682)

Server-based fencing may fail to start if you use the existing configuration files after reinstalling the stack.

Workaround:

After reinstalling the stack, add the client cluster information on the coordination point server because the client cluster information is removed when the stack is uninstalled. For more details, see the Setting up server-based I/O Fencing manually section in the Veritas Storage Foundation for Oracle RAC Installation Guide. Alternatively, you can manually modify the `/etc/vxfenmode` file and the `main.cf` file to start fencing in disable mode and then configure fencing.

Common product installer cannot setup trust between a client system on release version 5.1SP1 and a server on release version 6.0 or later (2824472)

The issue exists because the 5.1SP1 release version does not support separate directories for truststores. But, release version 6.0 and later support separate directories for truststores. So, because of this mismatch in support for truststores, you cannot set up trust between client systems and servers.

Workaround: Set up trust manually between the coordination point server and client systems using the `cpsat` or `vcsat` command. Now, the servers and client systems can communicate in secure mode.

Hostname and username are case sensitive in CP server (2846392)

The hostname and username on the CP server are case sensitive. The hostname and username used by fencing to communicate with CP server must be in same case as present in CP server database, else fencing fails to start.

Workaround: Make sure that the same case is used in the hostname and username on the CP server.

Fencing may show the RFSM state as replaying for some nodes in the cluster (2555191)

Fencing based on coordination point clients in Campus cluster environment may show the RFSM state as replaying for some nodes in the cluster.

Workaround:

Restart fencing on the node that shows RFSM state as replaying.

Veritas Cluster Server may not come up after rebooting the first node in phased upgrade on Oracle Solaris 11 (2852863)

If any of the kernel level services that depend upon Veritas Cluster Server (VCS) do not come up, then VCS fails to come up. The LLT, GAB, and Vxfen modules may also fail to come up because the `add_drv` command failed to add its driver to the system. On Solaris 11, `add_drv` may fail if there is another `add_drv` command that is being run on the system at the same time.

Workaround:

Check the status of LLT, GAB and Vxfen modules. Ensure that all the three services are online in SMF. Then, retry starting VCS.

Cannot run the vxgentsthdw utility directly from the install media if VRTSvxfen package is not installed on the system (2858190)

If VRTSvxfen package is not installed on the system, then certain script files that are needed for the vxgentsthdw utility to function are not available. So, without the VRTSvxfen package installed on the system you cannot run the utility from the install media.

Workaround: Install VRTSvxfen package, then run the utility from either the install media or from the `/optVRTSvcs/vxfen/bin/` location.

Usernames should be case-insensitive on the CP server (2846392)

The hostname and username on the CP server should be case-insensitive. But at present the CP server does not support case insensitivity in both username and hostname. The CP client fails to communicate with the CP server if a different case is used in hostname and username and hence fencing fails to start.

Coordination point server-based fencing may fail if it is configured on 5.1SP1RP1 using 6.0.1 coordination point servers (2824472)

The 5.1SP1 installer (CPI) cannot set up trust between a 5.1SP1 client and a 6.0 or later server, because there are no separate directories for truststores in the

5.1SP1. When trust cannot be setup, the 5.1SP1 installer cannot configure 5.1SP1 clients to work with 6.0 or later CPS in secure mode.

Workaround:

Set up trust manually between the CPS and clients using the cpsat or the vcsat command. After that, CPS and client will be able to communicate properly in the secure mode.

The upper bound value of FaultTolerance attribute of CoordPoint agent should be less than the majority of the coordination points. (2846389)

The upper bound value of `FaultTolerance` attribute of `CoordPoint` agent should be less than the majority of the coordination points. Currently this value is less than the number of coordination points.

vxfentsthdw utility fails to launch before you install the VRTSvx Fen package (2858190)

Before you install the VRTSvx Fen package, the file of `/etc/vxfen.d/script/vxfen_scriptlib.sh` where stores the `vxfentsthdw` utility doesn't exist. In this case, the utility bails out.

Workaround:

Besides installing the VRTSvx Fen package, run the `vxfentsthdw` utility directly from the installation DVD.

PrivNIC and MultiPrivNIC agents not supported with Oracle RAC 11.2.0.2 and later versions

The PrivNIC and MultiPrivNIC agents are not supported with Oracle RAC 11.2.0.2 and later versions.

For more information, see the following Technote:

<http://www.symantec.com/business/support/index?page=content&id=TECH145261>

File system check daemon fails to restart after abnormal termination (2689195)

The file system check daemon (`vxfscckd`) fails to update the `vxfscckd-pid` file with the new process ID (pid) of the `vxfscckd` process after abnormal termination. As a result, the CFSfscckd agent fails to detect the status of the `vxfscckd` daemon.

Workaround: Perform the following steps to resolve the issue on the node where the `vxfscckd` resource faults:

1. Log into the node as the root user.

2. Kill all `vxfscdkd` processes:

```
# kill -9 `ps -ef|grep vxfscdkd|awk '{print $2}'`
```

3. Remove the `vxfscdkd-pid` file:

```
# rm /var/adm/cfs/vxfscdkd-pid
```

4. Bring the `vxfscdkd` resource online:

```
# hares -online vxfscdkd_resname -sys node_name
```

Issue with format of the last 8-bit number in private IP addresses (1164506)

The PrivNIC/MultiPrivNIC resources fault if the private IP addresses have a leading 0 in any of the octets that comprise the IP address, for example X.X.X.01 or X.X.0X.1. or X.0X.X.1 or 0X.X.X.1, where X is an octet of the IP address.

When you configure private IP addresses for Oracle Clusterware, ensure that the IP addresses have a format as displayed in the following two-node example:

- On galaxy: 192.168.12.1
- On nebula: 192.168.12.2

Confirm the correct format by viewing the PrivNIC or MultiPrivNIC resource in the `/etc/VRTSvcs/conf/config/main.cf` file.

CVMVolDg agent may fail to deport CVM disk group

The CVM disk group is deported based on the order in which the CVMVolDg resources are taken offline. If the CVMVolDg resources in the disk group contain a mixed setting of 1 and 0 for the `CVMDeportOnOffline` attribute, the disk group is deported only if the attribute value is 1 for the last CVMVolDg resource taken offline. If the attribute value is 0 for the last CVMVolDg resource taken offline, the disk group is not deported.

Workaround: If multiple CVMVolDg resources are configured for a shared disk group, set the value of the `CVMDeportOnOffline` attribute to 1 for all of the resources.

Warning message displayed on taking cssd resource offline if LANG attribute is set to "eucJP" (2123122)

When you take the cssd resource offline using the `hares -offline cssd` command and the LANG attribute is set to "eucJP", the following message may be observed in the `hamsg engine_A` command output:

```
VCS INFO V-16-2-13716 Could not find message V-16-2-13716
```

You may ignore the message.

PrivNIC resource faults in IPMP environments on Solaris 11 systems (2838745)

The PrivNIC resource faults on Solaris 11 systems when private interfaces used by IPMP are configured under PrivNIC resource.

Workaround: Avoid using PrivNIC or MultiPrivNIC agents in IPMP environments.

Error displayed on removal of VRTSjadb language package (2569224)

Removal of the VRTSjadb language package displays the following error on the screen:

```
Executing postremove script.  
Generating BMC map file...  
bmcmap ERROR V-33-1000-10001 Unable to create BMC map
```

You may ignore the error.

"Configuration must be ReadWrite : Use haconf -makerw" error message appears in VCS engine log when hastop -local is invoked (2609137)

A message similar to the following example appears in the `/var/VRTSvcs/log/engine_A.log` log file when you run the `hastop -local` command on any system in a SF Oracle RAC cluster that has CFSMount resources:

```
2011/11/15 19:09:57 VCS ERROR V-16-1-11335 Configuration must be  
ReadWrite : Use haconf -makerw
```

The `hastop -local` command successfully runs and you can ignore the error message.

Workaround: There is no workaround for this issue.

Multiple system panics upon unmounting a CFS file system (2107152)

There is a system panic when you unmount a `mntlock`-protected VxFS file system, if that device is duplicate mounted on different directories.

Workaround: There is no workaround for this issue.

Application group attempts to come online on primary site before fire drill service group goes offline on the secondary site (2107386)

The application service group comes online on the primary site while the fire drill service group attempts to go offline at the same time, causing the application group to fault.

Workaround: Ensure that the fire drill service group is completely offline on the secondary site before the application service group comes online on the primary site.

Oracle group fails to come online if Fire Drill group is online on secondary cluster [2653695]

If a parallel global service group faults on the local cluster and does not find a failover target in the local cluster, it tries to failover the service group to the remote cluster. However, if the firedrill for the service group is online on a remote cluster, offline local dependency is violated and the global service group is not able to failover to the remote cluster.

Workaround: Offline the Firedrill service group and online the service group on a remote cluster.

Oracle service group faults on secondary site during failover in a disaster recovery scenario [2653704]

Oracle service group fails to go online in the DR site when disaster strikes the primary site. This happens if the AutoFailover attribute on the Service Group is set to 1 and when the corresponding service group's FireDrill is online in the DR site. Firedrill Service group may remain ONLINE on the DR site.

Workaround: If the service group containing the Oracle (or any database) resource faults after attempting automatic DR failover while FireDrill is online in the DR site, manually offline the FireDrill Service Group. Subsequently, attempt the online of the Oracle Service Group in the DR site.

Veritas Volume Manager can not identify Oracle Automatic Storage Management (ASM) disks (2771637)

Veritas Volume Manager (VxVM) commands can not identify disks that are initialized by ASM. Administrators must use caution when using the VxVM commands to avoid accidental overwriting of the ASM disk data.

Oracle Universal Installer fails to start on Solaris 11 systems (2784560)

The Oracle Universal Installer (OUI) fails to start when the SF Oracle RAC installer invokes the OUI for the installation of Oracle Clusterware/Grid Infrastructure software.

Workaround: Install the following packages before installing Oracle Clusterware/Grid Infrastructure.

```
SUNWxwplt  
SUNWmfrun
```

For instructions, see the Oracle documentation.

Veritas Storage Foundation for Databases (SFDB) tools known issues

The following are known issues in this release of Veritas Storage Foundation for Databases (SFDB) tools.

SFDB commands do not work in IPV6 environment (2619958)

In IPV6 environment, SFDB commands do not work for SF Oracle RAC. There is no workaround at this point of time.

Database Storage Checkpoint unmount may fail with device busy (2591463)

In some cases, when a database that is cloned using a Database Storage Checkpoint is shut down, an error similar to the following may occur:

```
SFAE Error:0457: Failed to unmount device  
/dev/vx/dsk/datadg/datavol:Ckpt_1317707593_rw_1317708154.  
Reason: VxFS returned error : umount: /tmp/clonedb/data: device is  
busy
```

Workaround

As an Oracle user, force shut down the clone database if it is up and then retry the unmount operation.

Attempt to use SmartTier commands fails (2332973)

The attempts to run SmartTier commands such as `dbdst_preset_policy` or `dbdst_file_move` fail with the following error:

```
fsppadm: ERROR: V-3-26551: VxFS failure on low level mechanism  
with message - Device or resource busy
```

This error occurs if a sub-file SmartTier command such as `dbdst_obj_move` has been previously run on the file system.

There is no workaround for this issue. You cannot use file-based SmartTier and sub-file SmartTier simultaneously.

Attempt to use certain names for tiers results in error (2581390)

If you attempt to use certain names for tiers, the following error message is displayed:

```
SFORA dbdst_classify ERROR V-81-6107 Invalid Classname BALANCE
```

This error occurs because the following names are reserved and are not permitted as tier names for SmartTier:

- BALANCE
- CHECKPOINT
- METADATA

Workaround

Use a name for SmartTier classes that is not a reserved name.

Clone operation failure might leave clone database in unexpected state (2512664)

If the clone operation fails, it may leave the clone database in an unexpected state. Retrying the clone operation might not work.

Workaround

If retrying does not work, perform one the following actions depending on the point-in-time copy method you are using:

- For FlashSnap, resync the snapshot and try the clone operation again.
- For FileSnap and Database Storage Checkpoints, destroy the clone and create the clone again.
- For space-optimized snapshots, destroy the snapshot and create a new snapshot.

Contact Symantec support if retrying using the workaround does not succeed.

FlashSnap resync fails if there is an existing space-optimized snapshot (2479901)

If you try a FlashSnap resync operation when there is an existing space-optimized snapshot, the resync operation fails with the following error:

```
Error: VxVM vxdg ERROR V-5-1-4597 vxdg join FS_oradg oradg failed
datavol_snp : Record already exists in disk group
archvol_snp : Record already exists in disk group
```

Workaround

Destroy the space-optimized snapshot first and then perform the FlashSnap resync operation.

Clone command fails if PFILE entries have their values spread across multiple lines (1922384)

If you have a `log_archive_dest_1` in single line in the `init.ora` file, then `dbed_vmclob` will work but `dbed_vmclob` will fail if you put in multiple lines for `log_archive_dest_1`.

Workaround

There is no workaround for this issue.

SFDB commands do not work with the ZHS16GBK character set (2715323)

SFDB commands do not work if the character set of the Oracle database is set to ZHS16GBK. This occurs because SFDB commands are not supported with multi-byte character sets except AL32UTF8 and ZHS16GBK is a multi-byte character set.

There is no workaround for this issue.

Data population fails after datafile corruption, rollback, and restore of offline checkpoint (2869259)

Sometimes when a datafile gets corrupted below its reservation size, the rollback may not pass and the file may not be rolled back correctly.

There is no workaround at this point of time.

Checkpoint clone fails if the archive log destination is same as the datafiles destination (2869266)

Checkpoint cloning fails if the archive log destination is the same as the datafiles destination. The error is similar to:

```
Use of uninitialized value $path in hash element  
at /opt/VRTSdbd/lib/perl/DBED/CkptOracle.pm line 121.  
Use of uninitialized value $path in concatenation (.) or string  
at /opt/VRTSdbd/lib/perl/DBED/CkptOracle.pm line 124.  
Use of uninitialized value $path in pattern match (m//)  
at /opt/VRTSdbd/lib/perl/DBED/CkptOracle.pm line 126.
```

SFDB vxsadm ERROR V-81-0564 Oracle returned error.

Reason: ORA-02236: invalid file name (DBD ERROR: error possibly near
<*> indicator at char 172 in 'CREATE CONTROLFILE REUSE SET DATABASE
'TClone03' RESETLOGS NOARCHIVELOG

Workaround: For the 6.0.1 release, create distinct archive and datafile mounts for the checkpoint service.

FileSnap detail listing does not display the details of a particular snap (2846382)

FileSnap does not support displaying a detailed listing of a snapshot or clone. FileSnap only supports displaying a summary of all the snapshots or clones. For example, for the CLI vxsadm -s filesnap -a oracle --name=snap1 -o list, a summary listing all the snapshots is displayed, instead of a detailed listing of a particular snapshot.

Workaround: There is no workaround for this issue.

Flashsnap clone fails under some unusual archivelog configuration on RAC (2846399)

In a RAC environment, when using FlashSnap, the archive log destination to snapshot must be a shared path, and must be the same across all the nodes. Additionally, all nodes must use the same archive log configuration parameter to specify the archive log destination. Configurations similar to the following are not supported:

```
tpcc1.log_archive_dest_1='location=/tpcc_arch'  
tpcc2.log_archive_dest_2='location=/tpcc_arch'  
tpcc3.log_archive_dest_3='location=/tpcc_arch'
```

Where tpcc1, tpcc2, and tpcc3 are the names of the RAC instances and /tpcc_arch is the shared archive log destination.

Workaround: To use FlashSnap, modify the above configuration to *.log_archive_dest_1='location=/tpcc_arch'. For example,

```
tpcc1.log_archive_dest_1='location=/tpcc_arch'  
tpcc2.log_archive_dest_1='location=/tpcc_arch'  
tpcc3.log_archive_dest_1='location=/tpcc_arch'
```

'vxdbd' process is online after Flash archive installation (2869269)

After a Flash archive installation of the SF stack, the vxdbd process is up, even if the stack is not configured.

Workaround: You can ignore, or stop the vxdbd process using the /opt/VRTSdbd/common/bin/vxdbdctrl stop command.

Checkpoint clone fails in CFS environment if cloned using same checkpoint and same clone name on both nodes (2869268)

The Checkpoint clone of an oracle database fails in a CFS environment, if you create a clone with a clone name and checkpoint name same as another clone up on a different CFS node.

Workaround: There is no workaround. Create a clone with a different clone name.

Very long off-host cloning times for large number of datafiles (2849540)

When cloning off-host in certain Oracle database configurations, particularly with several hundred datafiles, the cloning can take a very long time, upto an

hour or more. This problem does not cause the cloning to fail. The problem applies to all services such as FlashSnap, Space-optimized snapshots, FileSnap, and Checkpoint.

Workaround: There is no workaround at this point of time.

sfua_rept_migrate fails after phased SFRAC upgrade from 5.0MP3RP5 to 6.0.1 (2874322)

Command `sfua_rept_migrate` sometimes gives an error when upgrading to 6.0.1, and fails to unmount the repository volume. The error message is similar to:

```
# ./sfua_rept_migrate
Mounting SFUA Sybase ASA repository.
Unmounting SFUA Sybase ASA repository.
UX:vxfs umount: ERROR: V-3-26388: file system /rep has been mount
locked
SFORA sfua_rept_migrate ERROR V-81-5550 umount /dev/vx/dsk/repdg/repvol
failed.
SFORA sfua_rept_migrate ERROR V-81-9162 Failed to umount repository.
```

Workaround: The error does not hamper the upgrade. The repository migration works fine, but the old repository volume does not get unmounted. Unmount the mount using the manual option.

For example, use `/opt/VRTS/bin/umount -o mntunlock=VCS /rep`.

For more information, see [TECH64812](#).

The system may hang with Solaris 11 SRU1

When running Solaris 11 SRU1 the system may hang due to an Oracle bug. Oracle Bug ID is 7105131 deadman panic.

Workaround: SRU1 for Solaris 11 should be updated to SRU2a. The bug is fixed in SRU2a: Oracle Solaris 11 Support Repository Updates (SRU) Index (Doc ID 1372094.1)

Software limitations

This section covers the software limitations of this release.

See the corresponding Release Notes for a complete list of software limitations related to that component or product.

See “[Documentation](#)” on page 54.

Oracle Clusterware/Grid Infrastructure installation fails if the cluster name exceeds 14 characters

Setting the cluster name to a value that exceeds 14 characters during the installation of Oracle Clusterware/Grid Infrastructure causes unexpected cluster membership issues. As a result, the installation may fail.

Workaround: Restart the Oracle Clusterware/Grid Infrastructure installation and set the cluster name to a value of maximum 14 characters.

Rolling upgrade from version 5.1 SP1 RP2 requires VCSMM point patch

Before performing rolling upgrades from 5.1 SP1 RP2, apply the VCSMM point patch on the SF Oracle RAC cluster.

For instructions, see: <https://sort.symantec.com/patch/detail/6093>

Parallel execution of `vxsfadm` is not supported (2515442)

Only one instance of the `vxsfadm` command can be run at a time. Running multiple instances of `vxsfadm` at a time is not supported.

Stale SCSI-3 PR keys remain on disk after stopping the cluster and deporting the disk group

When all nodes present in the SF Oracle RAC cluster are removed from the cluster, the SCSI-3 Persistent Reservation (PR) keys on the data disks may not get preempted. As a result, the keys may be seen on the disks after stopping the cluster or after the nodes have booted up. The residual keys do not impact data disk fencing as they will be reused or replaced when the nodes rejoin the cluster. Alternatively, the keys can be cleared manually by running the `vxfenclearpre` utility.

For more information on the `vxfenclearpre` utility, see the *Veritas Storage Foundation for Oracle RAC Administrator's Guide*.

Creating point-in-time copies during database structural changes is not supported (2496178)

SFDB tools do not support creating point-in-time copies while structural changes to the database are in progress, such as adding or dropping tablespaces and adding or dropping data files.

However, once a point-in-time copy is taken, you can create a clone at any time, regardless of the status of the database.

Web installation program does not support phased upgrade and native operating system upgrade mechanisms

The Web installation program does not support phased upgrade and native operating system upgrade mechanisms such as Live Upgrade.

Policy-managed databases not supported by CRSResource agent

The CRSResource agent supports only admin-managed database environments in this release. Policy-managed databases are not supported.

Health checks may fail on clusters that have more than 10 nodes

If there are more than 10 nodes in a cluster, the health check may fail with the following error:

```
vxgettext ERROR V-33-1000-10038
Arguments exceed the maximum limit of 10
```

The health check script uses the `vxgettext` command, which does not support more than 10 arguments.[2142234]

Cached ODM not supported in SF Oracle RAC environments

Cached ODM is not supported for files on Veritas local file systems and on Cluster File System.

Limitations related to I/O fencing

This section covers I/O fencing-related software limitations.

Preferred fencing limitation when VxFEN activates RACER node re-election

The preferred fencing feature gives preference to more weighted or larger subclusters by delaying the smaller subcluster. This smaller subcluster delay is effective only if the initial RACER node in the larger subcluster is able to complete the race. If due to some reason the initial RACER node is not able to complete the race and the VxFEN driver activates the racer re-election algorithm, then the smaller subcluster delay is offset by the time taken for the racer re-election and the less weighted or smaller subcluster could win the race. This limitation though not desirable can be tolerated.

Stopping systems in clusters with I/O fencing configured

The I/O fencing feature protects against data corruption resulting from a failed cluster interconnect, or “split brain.” See the *Veritas Cluster Server Administrator’s Guide* for a description of the problems a failed interconnect can create and the protection I/O fencing provides.

In a cluster using SCSI-3 based fencing, I/O fencing implements data protection by placing the SCSI-3 PR keys on both the data disks and coordinator disks. In a cluster using CP server-based fencing, I/O fencing implements data protection by placing the SCSI-3 PR keys on data disks and similar registrations on CP server. The VCS 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 coordination points 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 coordination points and data disks. Depending on the order of reboot and subsequent startup events, the cluster may warn of a possible split brain condition and fail to start up.

Workaround: Use the shutdown -r command on one node at a time and wait for each node to complete shutdown.

Uninstalling VRTSvxvm causes issues when VxFEN is configured in SCSI3 mode with dmp disk policy (2522069)

When VxFEN is configured in SCSI3 mode with dmp disk policy, the DMP nodes for the coordinator disks can be accessed during system shutdown or fencing arbitration. After uninstalling VRTSvxvm package, the DMP module will no longer be loaded in memory. On a system where VRTSvxvm package is uninstalled, if VxFEN attempts to access DMP devices during shutdown or fencing arbitration, the system panics.

Veritas Storage Foundation for Databases (SFDB) tools software limitations

The following are the SFDB tools software limitations in this release.

Oracle Data Guard in an Oracle RAC environment

Database snapshots and Database Storage Checkpoints are not supported in a Data Guard with Oracle RAC environment.

Upgrading to Oracle 10.2.0.5 is required if using SFDB tools

If you are running Oracle version 10.2.0.4 and upgrading a Storage Foundation product with SFDB tools to 6.0.1, you must upgrade the Oracle binaries and database to version 10.2.0.5, before upgrading to 6.0.1.

Documentation

Product guides are available in the PDF format on the software media in the `/docs/product_name` directory. Additional documentation is available online.

Make sure that you are using the current version of documentation. The document version appears on page 2 of each guide. The publication date appears on the title page of each document. The latest product documentation is available on the Symantec website.

<http://sort.symantec.com/documents>

Documentation set

Table 1-7 lists the documentation for Veritas Storage Foundation for Oracle RAC.

Table 1-7 Veritas Storage Foundation for Oracle RAC documentation

Document title	File name
<i>Veritas Storage Foundation for Oracle RAC Release Notes</i>	sfrac_notes_601_sol.pdf
<i>Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide</i>	sfrac_install_601_sol.pdf
<i>Veritas Storage Foundation for Oracle RAC Administrator's Guide</i>	sfrac_admin_601_sol.pdf

Table 1-8 lists the documentation for Veritas Storage Foundation Cluster File System High Availability.

Table 1-8 Veritas Storage Foundation Cluster File System High Availability documentation

Document title	File name
<i>Veritas Storage Foundation Cluster File System High Availability Release Notes</i>	sfcfs_notes_601_sol.pdf

Table 1-8 Veritas Storage Foundation Cluster File System High Availability documentation (*continued*)

Document title	File name
<i>Veritas Storage Foundation Cluster File System High Availability Installation Guide</i>	sfcfs_install_601_sol.pdf
<i>Veritas Storage Foundation Cluster File System High Availability Administrator's Guide</i>	sfcfs_admin_601_sol.pdf

Table 1-9 lists the documents for Veritas Cluster Server.

Table 1-9 Veritas Cluster Server documentation

Title	File name
<i>Veritas Cluster Server Installation Guide</i>	vcs_install_601_sol.pdf
<i>Veritas Cluster Server Release Notes</i>	vcs_notes_601_sol.pdf
<i>Veritas Cluster Server Administrator's Guide</i>	vcs_admin_601_sol.pdf
<i>Veritas Cluster Server Bundled Agents Reference Guide</i>	vcs_bundled_agents_601_sol.pdf
<i>Veritas Cluster Server Agent Developer's Guide</i> (This document is available online, only.)	vcs_agent_dev_601_unix.pdf
<i>Veritas Cluster Server Application Note: Dynamic Reconfiguration for Oracle Servers</i>	vcs_dynamic_reconfig_601_sol.pdf
<i>Veritas Cluster Server Agent for DB2 Installation and Configuration Guide</i>	vcs_db2_agent_601_sol.pdf
<i>Veritas Cluster Server Agent for Oracle Installation and Configuration Guide</i>	vcs_oracle_agent_601_sol.pdf
<i>Veritas Cluster Server Agent for Sybase Installation and Configuration Guide</i>	vcs_sybase_agent_601_sol.pdf

Table 1-10 lists the documentation for Veritas Storage Foundation.

Table 1-10 Veritas Storage Foundation documentation

Document title	File name
<i>Veritas Storage Foundation Release Notes</i>	sf_notes_601_sol.pdf
<i>Veritas Storage Foundation Installation Guide</i>	sf_install_601_sol.pdf

Table 1-10 Veritas Storage Foundation documentation (*continued*)

Document title	File name
<i>Veritas Storage Foundation Administrator's Guide</i>	sf_admin_601_sol.pdf
<i>Veritas Storage Foundation: Storage and Availability Management for Oracle Databases</i>	sfas_oracle_admin_601_unix.pdf
<i>Veritas File System Programmer's Reference Guide</i> (This document is available online, only.)	vxfs_ref_601_sol.pdf

Table 1-11 lists the documentation for Veritas Storage Foundation and High Availability Solutions products.

Table 1-11 Veritas Storage Foundation and High Availability Solutions products documentation

Document title	File name
<i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i>	sfas_solutions_601_sol.pdf
<i>Veritas Storage Foundation and High Availability Solutions Virtualization Guide</i>	sfas_virtualization_601_sol.pdf
<i>Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide</i>	sfas_replication_admin_601_sol.pdf

If you use Veritas Operations Manager (VOM) to manage Veritas Storage Foundation and High Availability products, refer to the VOM product documentation at:

<http://sort.symantec.com/documents>

Note: The GNOME PDF Viewer is unable to view Symantec documentation. You must use Adobe Acrobat to view the documentation.

Manual pages

The manual pages for Veritas Storage Foundation and High Availability Solutions products are installed in the `/opt/vrts/man` directory.

Set the `MANPATH` environment variable so the `man(1)` command can point to the Veritas Storage Foundation manual pages:

- For the Bourne or Korn shell (`sh` or `ksh`), enter the following commands:

```
MANPATH=$MANPATH:/opt/VRTS/man
export MANPATH
```

- For C shell (`csh` or `tcsh`), enter the following command:

```
setenv MANPATH ${MANPATH}:/opt/VRTS/man
```

See the `man(1)` manual page.

