Veritas Storage Foundation™ for Oracle® RAC Release Notes

Linux

5.1 Platform Release 1

symantec™

Veritas Storage Foundation™ for Oracle RAC Release Notes

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Europe, Middle-East, and Africa	semea@symantec.com
North America and Latin America	supportsolutions@symantec.com

About this release

This document includes the following topics:

- About Veritas Storage Foundation for Oracle RAC
- About SF Oracle RAC Release Notes
- Features in this release
- Installation requirements
- Known issues
- Software limitations
- Documentation

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 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.

- Use of clustered file system and volume management technologies for placement of Oracle Cluster Registry (OCR) and voting disks. These technologies provide robust shared block and raw interfaces for placement of OCR 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, SAN switches, and storage arrays.

- 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 Group Reservation (PGR) based I/O fencing or Coordination Point Server-based I/O fencing.

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

About Veritas Operations Services

Veritas Operations Services (VOS) is a Web-based application that is designed specifically for Symantec enterprise products. VOS increases operational efficiency and helps improve application availability.

VOS automates and simplifies administrator tasks, including:

- Determining if systems are ready to install or upgrade Symantec enterprise products

- Gathering deployment and license key information

- Receiving notifications about the latest updates for:

  - Patches

  - Hardware Compatibility Lists (HCLs)

  - Array Support Libraries (ASLs)

  - Array Policy Modules (APMs)

  - VCS Agents

  - Storage Foundation and High Availability Management Utility

- Determining whether your Symantec enterprise product configurations conform to best practices

- Managing server and environmental configuration data from a single Website

- Interpreting error and other message codes and their solutions

- Identifying and downloading patches for Symantec enterprise products

To access VOS, go to:

http://vos.symantec.com/

About SF Oracle RAC Release Notes

This document provides important information regarding SF Oracle RAC 5.1 Platform Release 1.

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

For important updates regarding this release, review the Late-Breaking News TechNote on the Symantec Technical Support Web site:

http://entsupport.symantec.com/docs/335001

Features in this release

This section describes the list of features available in SF Oracle RAC 5.1 PR1.

Veritas keyless licensing

This release of the Veritas products introduces the option to install without a license key. A license key is used during the installation of a software to identify that the user has the right to use the software. Previous releases of Veritas products required that you obtain a license key prior to installation. The installer required that you enter a valid license key before the Veritas software was installed.

The keyless license strategy does not eliminate the need to obtain a license. A software license is a legal instrument governing the usage or redistribution of copyright protected software. The administrator and company representatives must ensure that a server or cluster is entitled to the license level for the products installed. Symantec reserves the right to ensure entitlement and compliance through auditing.

In this release of the Veritas products, the product installer does not require that you enter a license key. The installer prompts you to select one of the following licensing methods:

- Install a license key for the product and features that you want to install.

- Continue to install without a license key.
  The installer prompts for the product modes and options that you want to install, and then sets the required product level.
  Within 60 days of choosing this option, you must install a valid license key corresponding to the license level entitled or continue with keyless licensing by managing the server or cluster with a management server. If you do not comply with the above terms, continuing to use the Veritas product is a violation of your end user license agreement, and results in warning messages.
  For more information about keyless licensing, see the following URL:
  http://go.symantec.com/sfhakeyless

If you upgrade to this release from a prior release of the Veritas software, the product installer does not change the license keys that are already installed. The existing license keys may not activate new features in this release.

If you upgrade with the product installer, or if you install or upgrade with a method other than the product installer, you must do one of the following to license the products:

- Run the vxkeyless command to set the product level for the products you have purchased. This option also requires that you manage the server or cluster with a management server.

■ Use the `vxlicinst` command to install a valid product license key for the 5.1 Platform Release 1 products you have purchased.

You can also use the above options to change the product levels to another level that you are authorized to use.

Symantec recommends updating to keyless licensing for the following reasons:

■ it enables 5.1 Platform Release 1 functionality.

■ it allows you to change the product level easily.

For information about setting or changing the product level, see the Installation Guide for your Veritas product.

See the `vxkeyless(1m)` manual page.

List of packages in SF Oracle RAC 5.1 PR1

Table 1-1 lists the filesets in SF Oracle RAC 5.1 PR1.

Table 1-1   List of RPMs

Name	Description
VRTSvlic	Symantec License Utilities
VRTSvxvm	Veritas Volume Manager binaries
VRTSfssdk	Veritas File System SDK - Manual Pages
VRTSvcs	Veritas Cluster Server
VRTSatClient	Symantec Product Authentication Service
VRTSatServer	Symantec Product Authentication Service
VRTSvcsdr	Veritas Cluster Server Disk Reservation Modules and Utilities by Symantec
VRTScavf	Veritas Cluster Server Agents for Storage Foundation Cluster File System
VRTSamf	Veritas Asynchronous Monitoring Framework by Symantec
VRTSlvmconv	Veritas Linux LVM to VxVM Converter
VRTSperl	Veritas Perl 5.8.8 redistribution
VRTSaslapm	Volume Manager ASL/APM

Table 1-1   List of RPMs *(continued)*

Name	Description
VRTSllt	Veritas Low Latency Transport
VRTSspt	Veritas Software Support Tools
VRTSsfmh	Veritas Storage Foundation Managed Host
VRTSgab	Veritas Group Membership and Atomic Broadcast
VRTSob	Veritas File System Management Services Provider
VRTSvxfs	Veritas File System binaries
VRTSvxfen	Veritas I/O Fencing
VRTScps	Veritas Cluster Server Coordination Point Server
VRTSvcsea	Veritas Cluster Server Enterprise Agents
VRTSgms	Veritas Group Messaging Services
VRTSvcsag	Veritas Cluster Server Bundled Agents
VRTSdbed	Veritas Storage Foundation Common Utilities for Databases
VRTSodm	Veritas Oracle Disk Manager
VRTSglm	Veritas Global Lock Manager
VRTSdbac	Veritas Oracle Real Application Cluster Support Package
VRTScutil.bff	Veritas Cluster Utility

Option to start and stop SF Oracle RAC

You can use the `-start` and `-stop` options with the SF Oracle RAC installer to start and stop SF Oracle RAC.

Support for server-based fencing

The Coordination Point Server provides an alternative fencing mechanism that integrates with the existing VCS I/O fencing module.

The Coordination Point server (CPS) is a software solution running on a remote system or cluster that provides arbitration functionality by allowing client cluster nodes to perform the following tasks:

- Self-register to become a member of an active client cluster with access to the data drives

- Check which other nodes are registered as members of this active client cluster

- Self-unregister from this active client cluster

- Forcefully unregister other nodes (preempt) as members of this active client cluster

Multiple client clusters running different operating systems are able to simultaneously access the CP server. TCP/IP based communication is used between the CP server and client clusters.

Installation and upgrade without manual rebooting of nodes

You need not reboot the nodes in the cluster manually after you install or upgrade SF Oracle RAC. The installer automatically starts SF Oracle RAC 5.1 PR1 after the installation or upgrade without requiring a reboot of the nodes.

Installer resilience

If the installation or configuration of SF Oracle RAC fails, the installer discovers the presence of an installer instance when you run the installer again. The installer provides an option to resume the installation.

Sample configuration files

A number of sample configuration files that illustrate various deployment scenarios are available at `/etc/VRTSvcs/conf/sample_rac/`. Each sample file contains a high-level description of the deployment scenario.

Adding nodes to a cluster

The SF Oracle RAC installer provides the following capabilities for adding nodes to a cluster:

- Configures SF Oracle RAC and adds nodes to an existing SF Oracle RAC cluster.

- Performs the following Oracle RAC pre-installation tasks:

  - Creates Oracle user and groups on the new node.

  - Configures the private IP addresses and the PrivNIC resource for Oracle Clusterware (only if the IP addresses on the existing cluster are configured as PrivNIC resources).

- Configures private IP addresses and the MultiPrivNIC resource for Oracle Clusterware and Oracle UDP IPC (only if the IP addresses on the existing cluster are configured as MultiPrivNIC resources).

- If the CFSMount and CVMVolDg resources for OCR and voting disk are configured under the cvm service group, the installer brings them online after adding the node to the cluster.

- Starts the cvm group on the new node

Options to install minimum, recommended, or all SF Oracle RAC RPMs

The installer provides the following options for installing SF Oracle RAC:

- Minimal
  Install only the basic functionality of SF Oracle RAC.
  To view the list of RPMs for this option, use `-minpkgs` option with the installer script.

- Recommended
  Installs SF Oracle RAC without optional RPMs.
  To view the list of RPMs for this option, use `-recpkgs` option with the installer script.

- All
  Installs all SF Oracle RAC RPMs.
  To view the list of RPMs for this option, use `-allpkgs` option with the installer script.

Cross-product upgrades

If you try to perform a cross-product upgrade, the installer gracefully exits with an error message. For example, if you choose to upgrade SFCFS 5.0 MP3 to SF Oracle RAC 5.1 PR1, the installer displays the following error message:

```
SFCFS 5.0.30.00 is installed.
Upgrading SFCFS 5.0.30.00 directly to SF Oracle RAC 5.1 PR1 is
not supported.
```

The installer does not support direct upgrade from a previous SFCFS or SFHA version to SF Oracle RAC 5.1 PR1. You must upgrade SFCFS or SFHA to version 5.1, then install SF Oracle RAC 5.1 PR1.

Simplified SF Oracle RAC configuration

SF Oracle RAC configuration is fast and simple with minimal manual interventions. The Cluster Volume Manager and Veritas Volume Replicator configuration is automatically performed by the installer.

Communication modes

By default, the installer program uses SSH for communication. It switches to RSH if password-less SSH is not enabled.

Oracle RAC installation

Table 1-2 lists the Oracle RAC tasks that you can perform using the SF Oracle RAC installer.

Table 1-2   Installer-supported Oracle tasks

Oracle task	Description
Oracle user and group creation	■ The installer checks the Oracle user and group IDs in use and suggests unused values.
OCR and voting disk configuration	■ The installer creates CVM volume mirrors for OCR and voting disk ■ The installer creates the OCR and voting disk volumes and sets the ownership ■ The installer starts the volumes ■ If you choose to create the storage on CFS, the installer creates the mount point, mounts it on all the nodes, and sets the ownership for the CFS mount point ■ The installer adds the volume and mount point resources to the VCS configuration so that the resources are brought online automatically when the node starts. ■ The installer brings the resources online
PrivNIC and MultiPrivNIC configuration	The installer configures the private IP addresses for high availability using the PrivNIC or MultiPrivNIC agents. It uses all the available LLT links in the cluster for high availability purposes.
Oracle RAC installation	The installer prompts for installation-related information and validates it. After successful validation, it invokes the Oracle Universal Installer to install Oracle Clusterware and Oracle database.

Table 1-2   Installer-supported Oracle tasks *(continued)*

Oracle task	Description
Post-installation Oracle RAC configuration	The installer enables you to perform the following post-installation tasks: ■ Relinking of Veritas libraries with Oracle RAC ■ Configuration of CSSD agent

Support for load balancing in MultiPrivNIC

The MultiPrivNIC agent supports load-balanced fail over if multiple links are identified as failover targets. The attribute `UseLoadBalance` supports load balanced fail over of links. In the event that a preferred link goes down, the IP address is failed over to a private link on which maximum number of peer nodes are visible. If multiple links see maximum nodes and if load-balancing is enabled, the agent considers the current traffic on all devices and calculates a "winner" device with lower traffic. If load balancing is not enabled, the IP address is failed over to the link with the lower network ID.

Silent installation of Oracle RAC using response files

SF Oracle RAC supports the completion of the following Oracle RAC tasks using SF Oracle RAC response files:

■ Creating Oracle user and groups

■ Creating storage for OCR and voting disk

■ Configuration of private IP addresses and corresponding PrivNIC/MultiPrivNIC resources

■ Installation of Oracle Clusterware and Oracle database by specifying the path of the Oracle RAC response files in the appropriate response file variable definitions. For more information, see the *Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide*.

■ Configuration of the CSSD resource

■ Relinking the SF Oracle RAC libraries with Oracle RAC

Note: You can use the SF Oracle RAC response file in tandem with the Oracle RAC response files for Oracle Clusterware and Oracle database to perform silent end-to-end installation of SF Oracle RAC and Oracle RAC.

Enhancements to VRTSexplorer utility

The VRTSexplorer utility is a tool provided by Symantec to gather system and configuration information from a node to diagnose or analyze issues in the cluster. The utility is located at `/opt/VRTSspt/VRTSexplorer`.

I/O fencing configuration

You can use the `-fencing` option with the `installsfrac` program to configure I/O fencing.

Based on the fencing mechanism you want to use in the cluster, the installer provides the following options to configure I/O fencing:

- Disk-based I/O fencing - when you want to use disks as coordination points

- Server-based I/O fencing - when you want to use at least one CP server as coordination point

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

Support for a universally unique ID (UUID) for each cluster

This release introduces a universally unique ID for each cluster.

The VCS installer configures a UUID value for each cluster at the end of the configuration. If you manually configure a cluster, you must use the uuidconfig.pl utility to create a cluster UUID.

LLT supports point-to-point unicast heartbeating mechanism

The default heartbeating mechanism in LLT is now point-to-point unicast and not broadcast heartbeating.

Support for Cached ODM

You can enable Cached ODM for files on Veritas local file systems and on Cluster File System.

Changes to I/O fencing feature

This section lists the new features and changes related to the I/O fencing feature.

Support for Coordination Point server

This release adds support for Coordination Point server (CP server). You can use CP server as a coordination point with server-based I/O fencing.

The Coordination Point server is a software solution based on the customized fencing mechanism, running on a remote system or cluster that provides arbitration functionality by allowing client cluster nodes to perform the fencing tasks.

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

Unique I/O fencing keys for coordinator disks

The vxfen driver now encodes the LLT cluster ID in the SCSI3 keys registered on the coordinator disks. If the disk is zoned to multiple clusters, the I/O fencing key allows you to identify which cluster a coordinator disk belongs to. SF Oracle RAC does not support sharing of coordinator disks across multiple clusters.

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

New command options for vxfenclearpre

The vxfenclearpre command now includes the following options:

- A coordinator-only disk option
- An option to clear all keys from coordinator disks
- An option to clear all keys with the VF prefix from the coordinator disks
- An option to clear only the keys from the coordinator disks you specify in the clusterid

New -W option for vxfenconfig command

The vxfenconfig command now has a -W option. You can use this option to display the supported and the current I/O fencing protocol versions.

New vxfen_vxfnd_tmt tunable parameter

I/O fencing introduces a new tunable parameter vxfen_vxfnd_tmt. You can use this parameter to tune the time in seconds that the I/O fencing driver VxFEN must wait for the I/O fencing daemon VXFEND to return after completing a given task.

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

Changes to SF Oracle RAC clusters running in secure mode

This section lists the changes in 5.1 PR1 for clusters running in secure mode.

Support for passwordless login for non-root users

Support is added for passwordless login for non-root users to run HA commands on secure clusters.

See the *Veritas Cluster Server Administrator's Guide* for more information.

Support to enable LDAP authentication in secure clusters using AT CLIs

You can now use the `addldapdomain` and the `atldapconf` commands to enable LDAP authentication in secure clusters.

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

Changes to Storage Foundation for Databases (SFDB) functionality

The Storage Foundation for Databases (SFDB) feature for enhanced management of Oracle databases is updated as indicated in the topics below.

For information on using SFDB tools, see the *Veritas Storage Foundation: Storage and Availability Management for Oracle Databases* guide.

SFDB new features

New features in the Storage Foundation for Databases tools package for database storage management for release 5.1:

■ SQLlite repository

■ Multiple disk group support for FlashSnap

■ Mapped mount points for individual volumes for Database Flashsnap clones

■ Oracle Dataguard support

■ Oracle Enterprise Manager (OEM) Plugin

■ Cached ODM support

SFDB feature changes

Commands which have changed:

- `sfua_db_config` functionality is changed: this command is no longer needed to create a SFDB repository. The functionality of `sfua_db_config` is now used to set user and group access to various SFDB directories.

- Use the `dbed_update` command to create a new SQLite SFDB repository.

- `sfua_rept_adm` was used in release 5.0 to perform repository backup and restore and this command will be obsolete in release 5.1.

- The `sfua_rept_util` command is used to perform SQLite repository backup and restore.

- The `sfua_rept_migrate` command is added for migrating the SFDB repository from the 4.x or 5.0 release to the 5.1 release.

Commands which continue to be supported:

- `dbed_update`

- Database Storage Checkpoint commands: `dbed_ckptcreate`, `dbed_ckptdisplay`, `dbed_ckptmount`, `dbed_ckptquota`, `dbed_ckptremove`, `dbed_ckptrollback`, `dbed_clonedb`, `dbed_ckptumount`

- Database Flashsnap commands: `dbed_vmchecksnap`, `dbed_vmclonedb`, `dbed_vmsnap`

- Database Dynamic Storage Tiering commands: `dbdst_addvol`, `dbdst_admin`, `dbdst_classify`, `dbdst_convert`, `dbdst_file_move`, `dbdst_partition_move`, `dbdst_preset_policy`, `dbdst_rmvol`, `dbdst_show_fs`, `dbdst_tbs_move`, `dbdst_report`

SFDB features which are no longer supported

Commands which are no longer supported in release 5.1:

- ORAMAP (`libvxoramap`)

- Storage mapping commands `dbed_analyzer`, `vxstorage_stats`

- DBED providers(DBEDAgent), Java GUI, and `dbed_dbprocli`.
  The SFDB Oracle features can only be accessed through the command line interface. However, Veritas Storage Foundation Manager 2.1 (a separately licensed product) can display Oracle database information such as tablespaces, database to LUN mapping, and tablespace to LUN mapping.

- Storage statistics: commands `dbdst_makelbfs`, `vxdbts_fstatsummary`, `dbdst_fiostat_collector`, `vxdbts_get_datafile_stats`

- `dbed_saveconfig`, `dbed_checkconfig`

- `dbed_ckptplan`, `dbed_ckptpolicy`

■ dbed_scheduler

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
See "Hardware requirements" on page 21.

■ Supported software
See "Supported software" on page 22.

■ Required operating system patches
See "Required operating system patches" on page 23.

■ License requirements
See "License requirements" on page 23.

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/330441

■ Review the Oracle documentation for additional requirements pertaining to your version of Oracle.

Table 1-3   Hardware requirements for basic clusters

Item	Description
Architecture	x86_64 (Opteron and AMD)
SF Oracle RAC systems	Two to eight systems with two or more CPUs at 2GHz or higher.
DVD drive	A DVD drive on one of the 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.

Table 1-3   Hardware requirements for basic clusters *(continued)*

Item	Description
Disk space	You can evaluate your systems for available disk space by running the following command:
	Mount the product installation media containing the software.
	`# ./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 RAM at least twice the Oracle SGA size.
Swap space	For Oracle RAC swap space requirement, refer to the Oracle RAC documentation.
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.
	You can also configure aggregated interfaces.
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

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

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

Table 1-4 lists the supported software versions.

Table 1-4   Supported software

Software	Version
Database	Oracle RAC 11g Release 2
Operating system	Red Hat Enterprise Linux 5 (RHEL 5) Update 3 or later
	Oracle Enterprise Linux 5.3 (OEL 5.3) or later
	SUSE Linux Enterprise Server 10 with SP2 (SLES 10 SP2)
	SUSE Linux Enterprise Server 10 with SP3 (SLES 10 SP3)

Required operating system patches

The following patch is required for systems running SLES10 SP2: kernel 2.6.16.60-0.39.3

License requirements

You need to obtain the appropriate licenses to install and configure SF Oracle RAC. For more information on the available licensing options and the required licenses, see the *Veritas Storage Foundation for Oracle RAC Installation and Configuration Guide.*

Known issues

This section lists the known issues in SF Oracle RAC 5.1 PR1.

- The Oracle Grid Infrastructure software installation fails with the following error:

```
INFO: Checking specified location on remote nodes
INFO: size estimation for Completeinstall is 3501.327449798584
SEVERE: [FATAL] [INS-20702] Unexpected internal driver error
```

  For more information, see the Oracle Metalink document: 970166.1

- The Oracle Cluster Verification utility fails during the installation of the Oracle Grid Infrastructure software. You may ignore this error. This is a known issue with Oracle RAC.

- In the SF Oracle RAC environment, the `dbdst_file_move` command fails to move the archive and flashback files to the specified storage class on the slave node. [2012876]

Workaround: Run the `dbdst_file_move` command only from the master node in the cluster:

```
$ /opt/VRTS/bin/dbdst_file_move -S $ORACLE_SID -o datafile \
-f listfile -c storage_class
```

■ Cloning an Oracle RAC 11g Release 2 database instance using the `-offline` option of the `dbed_clonedb` command fails with the following error when ODM is enabled [2014924]:

```
The /tmp/oralog.out.10392 file indicates an error.
Sample output of the /tmp/oralog.out.10392 file:
ALTER DATABASE OPEN RESETLOGS
*
ERROR at line 1:
ORA-00600: internal error code, arguments: [ksfdgmsn4],
[ODM ERROR V-41-4-2-207-1 Operation not permitted],
[], [], [], [], [], [], [], [], [], []
ORA-00318: log 1 of thread 1, expected file size 512 doesn't match 512
ORA-00312: online log 1 thread 1:
'/tmp/mofcln1/snap_data11r2/FLAS11r2/redo01.log'
```

Software limitations

The following limitations apply to this release.

SELinux supported in disabled and permissive modes only

SELinux (Security Enhanced Linux) is supported only in "Disabled" and "Permissive" modes. After you configure SELinux in "Permissive" mode, you may see a few messages in the system log. You may ignore these messages.

Volume Manager does not support RAID 5 in a cluster environment

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

Performance recommendation for space-optimized volume snapshots

For minimal performance impact, Symantec recommends that the Space Optimized Snapshots (SOS) be created only of data volumes. A mirror breakoff snapshot should be created of the Oracle log volume. The log volumes are typically small in size and do not have significant space overhead.

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.

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.

The latest documents are available on the Symantec website. The Veritas Storage Foundation documentation set is available at the following URL:

http://www.symantec.com/business/support/overview.jsp?pid=15107

Table 1-5 lists the documentation for SF Oracle RAC in this release.

Table 1-5   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: Storage and Availability Management for Oracle Databases	sf_adv_ora.pdf
Veritas Storage Foundation for Oracle RAC Release Notes	sfrac_notes.pdf
Veritas Storage Foundation and High Availability Solutions Getting Started Guide	getting_started.pdf

Note: Apart from the documents available in this release, the SF Oracle RAC 5.1 PR1 documentation contains references to the following component product documentation:

Veritas Cluster Server User's Guide

Veritas Cluster Server Installation Guide

Veritas Cluster Server Bundled Agents Reference Guide

Veritas Volume Managers Administrator's Guide

These documents must be referenced from version 5.1 product disc.

For the complete list of 5.1 documents:

See "Version 5.1 documentation" on page 26.

Version 5.1 documentation

This section lists the product guides that are available on the product disc of version 5.1.

Table 1-6 lists the documentation for Veritas Cluster Server.

Table 1-6   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 Administrator's Guide	vcs_admin.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_agent.pdf

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

Table 1-7   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 Installation Guide	sfcfs_install.pdf
Veritas Storage Foundation Cluster File System Administrator's Guide	sfcfs_admin.pdf

Table 1-8 lists the documentation for Veritas Volume Manager and Veritas File System.

Table 1-8   Veritas Volume Manager and Veritas File System documentation

Document title	File name
Veritas Volume Manager Administrator's Guide	vxvm_admin.pdf
Veritas Volume Manager Troubleshooting Guide	vxvm_tshoot.pdf
Veritas File System Administrator's Guide	vxfs_admin.pdf

Table 1-9 lists the documentation for Symantec Product Authentication Service.

Table 1-9   Symantec Product Authentication Service documentation

Document title	File name
Symantec Product Authentication Service Administrator's Guide	at_admin.pdf
Symantec Product Authentication Service Release Notes	at_notes.pdf