

Veritas™ Cluster Server Release Notes

Solaris

6.0

Veritas™ Cluster Server Release Notes

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- Version and patch level
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- Problem description:
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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.

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Veritas Cluster Server Release Notes

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About this document

This document provides important information about Veritas Cluster Server (VCS) version 6.0 for Solaris. Review this entire document before you install or upgrade VCS.

The information in the Release Notes supersedes the information provided in the product documents for VCS.

This is Document version: 6.0.4 of the *Veritas Cluster Server 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

In addition to reading this Release Notes document, review the component product release notes before installing the product.

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

/product_name/docs

Symantec recommends copying the `docs` directory on the software media that contains the product guides to the `/opt/VRTS` directory on your system.

This release includes the following component product release notes:

- *Veritas Storage Foundation Release Notes (6.0)*

About Veritas Cluster Server

Veritas™ Cluster Server (VCS) by Symantec provides High Availability (HA) and Disaster Recovery (DR) for mission critical applications running in physical and virtual environments. VCS ensures continuous application availability despite application, infrastructure or site failures.

About VCS agents

VCS bundled agents manage a cluster's key resources. The implementation and configuration of bundled agents vary by platform.

For more information about bundled agents, refer to the *Veritas Cluster Server Bundled Agents Reference Guide*.

The Veritas High Availability Agent Pack gives you access to agents that provide high availability for various applications, databases, and third-party storage solutions. The Agent Pack is available through Symantec™ Operations Readiness Tools (SORT). For more information about SORT, see <https://sort.symantec.com/home>. For information about agents under development and agents that are available through Symantec consulting services, contact your Symantec sales representative.

VCS provides a framework that allows for the creation of custom agents. Create agents in situations where the Veritas High Availability Agent Pack, the bundled agents, or the enterprise agents do not meet your needs.

For more information about the creation of custom agents, refer to the *Veritas Cluster server Agent developer's Guide*. You can also request a custom agent through Symantec consulting services.

About compiling custom agents

Custom agents developed in C++ must be compiled using Oracle Solaris Studio. The following is the layout of `libvcsagfw.so` in `usr/lib`:

```
/usr/lib/libvcsagfw.so --> . /libvcsagfw.so.2
```

If you use custom agents compiled on older compilers, the agents may not work with VCS 6.0. If your custom agents use scripts, continue linking to `ScriptAgent`. Use `Script50Agent` for agents written for VCS 5.0 and above.

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 | <ul style="list-style-type: none">■ 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 | <ul style="list-style-type: none">■ 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:
<http://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 6.0

This section lists the changes in Veritas Cluster Server 6.0.

Changes related to installation and upgrades

The product installer includes the following changes in 6.0.

Support for product deployment using Flash Archives on Solaris 10

Use a Flash archive to install the Storage Foundation and High Availability Suite of products and the Solaris 10 operating system in conjunction with JumpStart.

See the *Installation Guide* for more information.

The installer can now detect duplicate VCS cluster IDs and can automatically generate cluster IDs

The installer can now detect duplicate VCS cluster IDs and prompt you to select an unused one. It can also generate an unused ID during installation.

The installer can check product versions and hotfixes

You can check the existing product versions using the installer command with the `-version` option before or after you install. After you have installed the current version of the product, you can use the `showversion` script in the `/opt/VRTS/install` directory to find version information.

You can discover the following information with these commands:

- The installed version of all released Storage Foundation and High Availability Suite of products
- The missing required packages or patches as applicable for platform
- The available updates (including patches or hotfixes) from SORT for the installed products

Depending on the product, the script can identify versions from 4.0 onward.

Using the installer's postcheck option

You can use the installer's postcheck option to diagnose installation-related problems and to provide troubleshooting information.

Rolling upgrade improvements

The rolling upgrade procedure has been streamlined and simplified.

Packaging updates

The following lists the package changes in this release.

- New `VRTSsfcp160` package for product installer scripts

The `VRTSsfcp160` package is introduced in this release. The `VRTSsfcp160` package contains the installer scripts and libraries that the installer uses to install, configure and upgrade Veritas products.

- **New `VRTSvbs` package**

The `VRTSvbs` package enables the VBS command line interface on a Veritas Operations Manager managed host in a Virtual Business Services configuration. For more information, see the *Virtual Business Service–Availability User’s Guide*.

- **`VRTSvcSag` package change**

The `/etc/VRTSvcSag/conf/types.cf` and various sample configurations are packaged with the `VRTSvcSag` package instead of the `VRTSvcS` package. This is to ease hotfix installation for bundled agents that require attribute changes.

For more information, see the *Installation Guide*.

Changes to the VCS engine

Support multiple children in service group dependency

A service group can have dependency on multiple child service groups. All child dependencies must be satisfied for the parent service group to go online. The dependency types which are not supported in a multiple child configuration are "online local hard" and "offline local". The `-propagate` option cannot be used if the dependency tree contains global and/or remote dependency.

For more details, refer to the *Administrator's Guide*.

Single command line option to online or offline service groups in a service group dependency

If you have a parent service group in a service group dependency, you can online the entire dependency tree bottom-up with a single command, without having to online each group manually. For online operation, the command starts to online the service groups from the lowermost service group in dependency tree. Similarly, if you have a child service group in a service group dependency, you can offline the entire dependency tree top-down with a single command, without having to offline each group manually. For offline operation, the command offlines the service group from the top of the dependency tree.

You can use the following commands to online or(and) offline the service groups respectively:

- `hagrpl -online -propagate <grp_name> -sys <sys_name>`

- `hagrp -offline -propagate <grp_name> -sys <sys_name>`

Refer to the *manual pages* associated with `hagrp` command for more information on the `-propagate` option.

Note: The `-propagate` option cannot be used if the dependency tree contains global and/or remote dependency.

Using the `-propagate` option with `hagrp -online`, all required child service groups are automatically brought online by VCS. Similarly using the `-propagate` option with `hagrp -offline`, all the dependent parent groups are automatically brought offline by VCS.

Ability to send notifications to a wider audience

You can configure users, other than the owners of resources, resource types, service groups, systems, or clusters, as recipients of notifications about events related to a resource, resource type, service group, system, or cluster.

Use the following attributes to configure recipients of notifications:

- `ResourceRecipients`
- `TypeRecipients`
- `GroupRecipients`
- `SystemRecipients`
- `ClusterRecipients`

The registered recipients get notifications about the events that have a severity level that is equal to or greater than the level specified in the attribute. For more information, see *Veritas Cluster Server Administrator's Guide*.

Ability to specify a single user across all nodes of VCS cluster

You can add a user to the VCS configuration without specifying the host name, such as **admin** and assign administrator privileges. The admin user can log in using the host-specific credentials and perform any administrative operations.

Thus, you need not add the same user, 'admin', multiple times in the VCS configuration as `admin@host1`, `admin@host2`, and so on. Once added, the user can operate from any node of the cluster.

Changes related to IMF

This release includes the following changes to Intelligent Monitoring Framework (IMF):

IMF is enabled by default and has new agent support

The Intelligent Monitoring Framework (IMF) functionality is enabled by default for all agents that can leverage IMF.

Following are the new IMF-aware agents in VCS 6.0:

- Zone
- DB2udb (provides only PRON IMF support)
- Sybase
- SybaseBk

Enable and disable IMF by automated script for agents

VCS provides the `/opt/VRTSvcs/bin/haimfconfig` script to enable and disable IMF for agents when VCS is either running or stopped. You can use this script to disable IMF for all IMF-aware agents, including bundled agents, enterprise agents, and custom agents. You must run the script once on each node of the cluster.

Note: The automated script restarts the agent, if it is running on the current node, to enable the IMF after confirming with the user.

Prevention of Concurrency Violation (PCV) using IMF

With the new IMF-based Proactive PCV feature, VCS can proactively prevent the same VCS failover service group from coming online on more than one node in the cluster. Typically, VCS detects such a concurrency violation after it has occurred. This feature is available only for application resources and is disabled by default.

For more information, refer to the *Administrator's Guide*.

Support plug-in for AMF support in custom agents

Script-based custom agents can now leverage IMF functionality by following the steps documented in the *Veritas Cluster Server Agent Developer's Guide*.

Enhanced amfstat utility

The `amfstat` utility is enhanced to display the new event types that AMF driver can support. For more details, refer to the `amfstat` man pages.

Changes related to VCS triggers

This release includes the following changes related to VCS triggers:

- VCS can execute trigger scripts specific to a service group and/or resource. Thus, trigger scripts for multiple objects need not be merged into single trigger script.
- You can enable the `nofailover`, `postonline` and `postoffline` triggers for each system by using the `TriggersEnabled` attribute.
- You can execute multiple scripts for a trigger. The trigger scripts must be installed inside the trigger directory using the `T<num>` nomenclature. VCS executes the trigger scripts in `T<num>` order.
For example: If the `preonline` directory contains the scripts `T00preonline`, `T01preonline`, `T02preonline`, then the script `T00preonline` is executed first, then `T01preonline` and finally, `T02preonline` is executed.
- The agent restarts a faulted resource if the `RestartLimit` is set. Whenever the agent restarts a resource, VCS invokes the `resrestart` trigger if the `TriggerResRestart` attribute is set to 1 or if `RESRESTART` is specified in the `TriggersEnabled` attribute. Otherwise, VCS invokes the `resstatechange` trigger. See the *Veritas Cluster Server Administrator's Guide* for more information.

Caution: Use of `resstatechange` to indicate restart is being deprecated. In later releases, you must use only the `resrestart` trigger to indicate restarting of resources.

New attributes

The following sections describe the attributes introduced in VCS 6.0, 5.1SP1, VCS 5.1, and VCS 5.0MP3.

Attributes introduced in VCS 6.0

Cluster-level attribute

- `EnableVMAutoDiscovery`: Enables or disables auto discovery of virtual machines. By default, auto discovery of virtual machines is disabled.

- **SystemRebootAction:** Determines whether frozen service groups are ignored on system reboot.

Service group attributes

- **OnlineClearParent:** When this attribute is enabled for a service group and the service group comes online or is detected online, VCS clears the faults on all online type parent groups, such as online local, online global, and online remote.
- **ProPCV:** Indicates whether the service group is proactively prevented from concurrency violation for ProPCV-enabled resources.
- **TriggerPath:** Enables you to customize the trigger path.
- **TriggerResRestart:** Determines whether or not to invoke the restart trigger if resource restarts.
- **TriggersEnabled:** Determines if a specific trigger is enabled on a node or not.

Resource type attributes:

- **AdvDbg:** Enables activation of advanced debugging.

Zpool agent attributes

- **DeviceDir:** Specifies the directories that the `zpool import` command must search for devices or files.
- **FailMode:** Controls the system behavior in the event of a catastrophic pool failure. The value of this attribute is used as the failmode option while importing the ZFS storage pool. The possible values are **wait**, **continue**, or **panic**.
- **ForceOpt:** Invokes the following commands again with the `-f` option if this attribute is enabled (if the value is set to 1) and if the following commands fail:
 - `zpool export` in the offline entry point
 - `zpool export` in the clean entry point
 - `zpool import` in the online entry point
- **ForceRecoverOpt:** Invokes the `zpool import` command again with `-F` option when this attribute is enabled (if its value is set to 1) and if the `zpool import` command fails.

LDom agent attributes:

- **Memory:** Specifies the amount of memory to be assigned to an LDom. See the *Bundled Agents Reference Guide* for more information on the new attributes.
- **RemoveLDomConfigForMigration:** If enabled, agent removes the LDom configuration from the system during offline and clean operations provided

CfgFile attribute is configured. You must enable this attribute if domain migration is planned for the logical domain. This is because, domain migration cannot be performed if logical domain configuration is present on target node for migration.

- **IPAddress:** The IP address to be assigned to an exclusive IP zone at this site after a cross-site failover. The agent writes the IP address inside the Zone Root in the `/etc/hostname.Device` file, where Device is the value of Device key.
- **Netmask:** The netmask to be used in an exclusive IP zone at this site after a cross-site failover. The agent writes the netmask inside the Zone Root in the file `/etc/netmasks`.
- **Gateway (Default Router):** The default gateway used by this Zone at this site.
- **DNS:** The domain name to use within the Zone at this site.
- **ConfigureNetwork:** Specifies if the LDom agent configures the network-bootarguments PROM variable of the guest domain.

Sybase agent attributes:

- **Quorum_dev:** The quorum device manages the cluster membership, stores cluster configuration data and contains information shared among server instances and nodes. It must be a disk accessible to all nodes in the cluster. Specify fully qualified quorum device name. Note: This attribute should be specified only for cluster edition. For example:
`/dev/vx/rdisk/Sybase_install_dg/quorum_vol`.
- **interfaces_File:** Specifies the location of interfaces file for the Sybase instance. If this attribute is configured, `[-I interfaces file]` option is used when connecting to the isql session. If this attribute is not configured, the agent does not use the `-I` option.
- **ShutdownWaitLimit:** Specifies the maximum number of seconds for which the agent waits for the Sybase instance to stop after issuing the `shutdown with wait` command, and before attempting to issue the `kill -15 <data server-pid>` command, if required.
- **DelayAfterOnline:** Specifies the number of seconds that elapse after the Online entry point is complete and before the next monitor cycle is invoked.
- **DelayAfterOffline:** Specifies the number of seconds that elapse after the Offline entry point is complete and before the next monitor cycle is invoked.

SybaseBk agent attribute:

- **interfaces_File:** Specifies the location of the interfaces file for the Sybase instance. If this attribute is configured, `[-I inerfaces file]` option is used when

connecting to the isql session. If this attribute is not configured, the agent does not use the -I option.

Oracle agent attributes

- **DBName:** Specifies the database name. This attribute is required only for a policy-managed database. The value of this attribute must be set to the database name.
- **ManagedBy:** Specifies whether the database is administrator-managed or policy-managed. The default value of this attribute is **ADMIN**. You need not explicitly set its value. In a policy managed RAC database, this attribute must be set to **POLICY**.

DiskGroupSnap agent attributes:

- **FDType:** Specifies the configuration to be used for the firedrill. The possible values of this attribute are Bronze and Gold (default).

Zone agent attribute:

- **DeleteVCSZoneUser:** If enabled on a non-secure cluster, Zone agent deletes the VCS Zone user created for password-less communication between local-zone and global zone during offline and clean entry points. DeleteVCSZoneUser is disabled by default.
- **DROpts:** The value of this attribute consists of the following keys that define disaster recovery options for the Zone agent:
 - **DNSDomain**
 - **DNSSearchPath**
 - **DNSServers**
 - **Gateway**
 - **Device**
 - **IPAddress**
 - **Netmask**
 - **Hostname**

In a DR configuration, if one or more of these keys are set, the resource is considered to be DR-enabled. If all the keys stay at their default value (""), then the resource is not DR-enabled even if it is in a disaster recovery configuration.

Attributes introduced in VCS 5.1SP1

Application Agent attributes

- **EnvFile:** This attribute specifies the environment file that must be sourced before running `StartProgram`, `StopProgram`, `MonitorProgram` or `CleanProgram`.
- **UseSUDash:** This attribute specifies that the agent must run `su - user -c <program>` or `su user -c <program>` while running `StartProgram`, `StopProgram`, `MonitorProgram` or `CleanProgram`.

RemoteGroup agent attribute

- **ReturnIntOffline:** This attribute can take one of the following three values. These values are not mutually exclusive and can be used in combination with one another. You must set `IntentionalOffline` attribute to 1 for the `ReturnIntOffline` attribute to work.
 - **RemotePartial:** Makes `RemoteGroup` resource to return `IntentionalOffline` when the remote service group is in `ONLINE|PARTIAL` state.
 - **RemoteOffline:** Makes `RemoteGroup` resource to return `IntentionalOffline` when the remote service group is in `OFFLINE` state.
 - **RemoteFaulted:** Makes `RemoteGroup` resource to return `IntentionalOffline` when the remote service group is in `OFFLINE|FAULTED` state.

DiskGroup agent attribute

- **Reservation:** Determines if you want to enable SCSI-3 reservation. See the *Bundled Agents Reference Guide* for more information. In order to support SCSI-3 disk reservation, you must be sure that the disks are SCSI-3 compliant. Since all the disks are not SCSI-3 compliant, reservation commands fail on such disk groups. The `Reservation` attribute helps in resolving this issue. The `Reservation` attribute can have one of the following three values:
 - **ClusterDefault:** The disk group is imported with or without SCSI-3 reservation, based on the cluster-level `UseFence` attribute.
 - **SCSI3:** The disk group is imported with SCSI-3 reservation.
 - **NONE:** The disk group is imported without SCSI-3 reservation. The agent does not care about the cluster-level `UseFence` attribute.

Note: This attribute must be set to `NONE` for all resources of type `DiskGroup` in case of non-SCSI-3 fencing.

IP agent attribute

- **ExclusiveIPZone:** When an IP resource has to be configured for exclusive IP zone, set the value of this attribute to 1 (one). It also requires a valid

ContainerInfo to be configured in the service group. The IP resource monitors virtual IP address on interface inside the exclusive IP zone.

IPMultiNICB agent attribute

- **Options:** Value of this attribute is used as the option for the `ifconfig` command. For example, if value of this attribute is set to “deprecated” then “deprecated” option is set on the interface while bringing IPMultiNICB resource online.

NFS agent attribute

- **CleanRmtab:** To clear the `/etc/rmtab` file before starting the mount daemon, set the value of CleanRmtab to 1.

NFSRestart agent attribute

- **Lower:** Defines the position of the NFSRestart resource in the service group. The NFSRestart resource below the Share resource needs a value of 1. The NFSRestart resource on the top of the resource dependency tree has a Lower attribute value of 0.

NIC agent attribute

- **ExclusiveIPZone:** When the NIC resource is to be configured for exclusive IP zone, set the value of this attribute to 1 (one). It also requires a valid ContainerInfo to be configured in the service group. NIC resource monitors network interface inside the exclusive IP zone.

NotifierSourceIP agent attribute

- **NotifierSourceIP:** Lets you specify the interface that the notifier must use to send packets. This attribute is string/scalar. You must specify an IP address that is either DNS resolvable or appears in the `/etc/hosts` file.

SambaServer agent attributes

- **PidFile:** The absolute path to the Samba daemon (smbd) Pid file. This attribute is mandatory if you are using Samba configuration file with non-default name or path.
- **SocketAddress:** The IPv4 address where the Samba daemon (smbd) listens for connections. This attribute is mandatory if you are configuring multiple SambaServer resources on a node.

Zone agent attributes

- **RunFsync:** If the value of this attribute is 1, the Zone agent checks the system consistency for vxfs file systems. It uses the `fsck -y` command on all vxfs file systems that are defined in the zones's `xml` file. This file is located in `/etc/zones`. Adjust the Zone agent default OnlineTimeout value so that zone

agent has sufficient time to run the fsck command before it brings the zone online.

- **DetachZonePath:** If disabled, Zone agent skips detaching the Zone root during zone resource offline and clean. DetachZonePath is enabled (1) by default.
- **ForceAttach:** If disabled, the Zone agent attaches the ZonePath without the -F option during zone resource online. ForceAttach is enabled (1) by default.

Oracle agent attributes

- **DBAUser:** Database/ASM user with sysdba/sysasm permissions respectively.
- **DBAPword:** The encrypted value of the password of DBAUser.

ASMInst agent attributes

- **MonitorOption:** Enables or disables health check monitoring.

NetBios agent attribute

- **PidFile:** The absolute path to the Samba daemon (nmbd) PidFile. This attribute is mandatory if you are using Samba configuration file with non-default name or path.

Sybase agent attribute

- **Run_ServerFile:** The attribute specifies the location of the RUN_SERVER file for a Sybase instance. If this attribute is not specified, the default location of this file is accessed while starting Sybase server instances.

Cluster-level attributes

- **AutoAddSystemToCSG:** Indicates whether the newly joined or added systems in the cluster become a part of the SystemList of the ClusterService service group if the service group is confirmed. The value 1 (default) indicates that the new systems are added to SystemList of ClusterService. The value 0 indicates that the new systems are not added to SystemList of ClusterService.
- **CounterMissTolerance:** If GlobalCounter does not update in CounterMissTolerance intervals of CounterInterval, then VCS reports about this issue depending on the CounterMissAction (that is, CounterMissTolerance * CounterInterval) time has elapsed since last update of GlobalCounter then CounterMissAction is performed. The default value of CounterMissTolerance is 20.
- **CounterMissAction:** The action mentioned in CounterMissAction is performed whenever the GlobalCounter is not updated for CounterMissTolerance intervals of CounterInterval.
The two possible values of CounterMissAction are LogOnly and Trigger.

LogOnly logs the message in Engine Log and SysLog. Trigger invokes a trigger which has a default action of collecting the comms tar file. The Default value of Trigger is LogOnly.

- PreferredFencingPolicy: The I/O fencing race policy to determine the surviving subcluster in the event of a network partition. Valid values are Disabled, System, or Group.

Disabled: Preferred fencing is disabled. The fencing driver favors the subcluster with maximum number of nodes during the race for coordination points.

System: The fencing driver gives preference to the system that is more powerful than others in terms of architecture, number of CPUs, or memory during the race for coordination points. VCS uses the system-level attribute FencingWeight to calculate the node weight.

Group: The fencing driver gives preference to the node with higher priority service groups during the race for coordination points. VCS uses the group-level attribute Priority to determine the node weight.

Resource type attributes

- IMF: Determines whether the IMF-aware agent must perform intelligent resource monitoring.

It is an association attribute with three keys Mode, MonitorFreq, and RegisterRetryLimit.

- Mode: Defines whether to perform IMF monitoring based on the state of the resource. Mode can take values 0, 1, 2, or 3. Default is 0.
- MonitorFreq: Specifies the frequency at which the agent invokes the monitor agent function. Default is 1.
- RegisterRetryLimit: Defines the maximum number of times the agent attempts to register a resource. Default is 3.
- IMFRegList: Contains a list of attributes. The values of these attributes are registered with the IMF module for notification. If an attribute defined in IMFRegList attribute is changed then the resource, if already registered, is unregistered from IMF. If IMFRegList is not defined and if any attribute defined in ArgList is changed the resource is unregistered from IMF.
- AlertOnMonitorTimeouts: Indicates the number of consecutive monitor failures after which VCS sends an SNMP notification to the user.

Attributes introduced in VCS 5.1

VCS 5.1 introduced the following new attributes. See the *Veritas Cluster Server Administrator's Guide* for more information.

Resource type attributes:

- **ContainerOpts:** Specifies the behavior of the agent in a container environment.
- **CleanRetryLimit:** Number of times to retry the clean function before moving a resource to ADMIN_WAIT state.
- **EPClass:** Enables you to control the scheduling class for the agent functions (entry points) except the online entry point.
- **EPPriority:** Enables you to control the scheduling priority for the agent functions (entry points) except the online entry point.
- **FaultPropogation:** Specifies if VCS should propagate the fault up to parent resources and take the entire service group offline when a resource faults.
- **OnlineClass:** Enables you to control the scheduling class for the online agent function (entry point).
- **OnlinePriority:** Enables you to control the scheduling priority for the online agent function (entry point).

Service group level attribute:

- **ContainerInfo:** Specifies information about the container that the service group manages.

Cluster level attributes:

- **CID:** The CID provides universally unique identification for a cluster.
- **DeleteOnlineResource:** Defines whether you can delete online resources.
- **HostMonLogLvl:** Controls the behavior of the HostMonitor feature.

Attributes introduced in VCS 5.0 MP3

VCS 5.0MP3 introduced the following attributes.

Resource type attributes:

- **FaultPropagation:** Specifies if VCS should propagate the fault up to parent resources and take the entire service group offline when a resource faults.
- **AgentFile:** Complete name and path of the binary for an agent. Use when the agent binaries are not installed at their default locations.
- **AgentDirectory:** Complete path of the directory in which the agent binary and scripts are located. Use when the agent binaries are not installed at their default locations.

Cluster level attributes:

- **DeleteOnlineResource:** Defines whether you can delete online resources.

- **HostMonLogLvl:** Controls the behavior of the HostMonitor daemon. Configure this attribute when you start the cluster. You cannot modify this attribute in a running cluster.
- **EngineShutdown:** Provides finer control over the hastop command.
- **BackupInterval:** Time period in minutes after which VCS backs up configuration files.
- **OperatorGroups:** List of operating system user account groups that have Operator privileges on the cluster.
- **AdministratorGroups:** List of operating system user account groups that have administrative privileges on the cluster.
- **Guests:** List of users that have Guest privileges on the cluster.

System level attributes:

- **EngineVersion:** Specifies the major, minor, maintenance-patch, and point-patch version of VCS.

Service group level attributes:

- **TriggerResFault:** Defines whether VCS invokes the resfault trigger when a resource faults.
- **AdministratorGroups:** List of operating system user account groups that have administrative privileges on the service group.
- **OperatorGroups:** List of operating system user account groups that have Operator privileges on the service group.
- **Guests:** List of users that have Guest privileges on the service group.

Changes to VCS bundled agents

This section describes changes to the bundled agents for VCS.

See the *Veritas Cluster Server Administrator's Guide* and *Veritas Cluster Server Bundled Agents Reference Guide* for more information.

Support for Windows DNS server

The DNS agent now supports Windowcs DNS server in its configuration. A new attribute UseGSSAPI is added to DNS agent configuration for this functionality.

See the *Veritas Cluster Server Bundled Agents Reference Guide* for more information on using this attribute and additional requirements for configuring DNS agent with Windows DNS server.

DNS agent supports DNS scavenging for Windows DNS servers

DNS agent can now be configured to send periodic refresh request to configured Windows DNS servers to avoid aging and scavenging of resource records.

Added support for DR of Solaris LDom

The LDom agent is enhanced to accept cluster (subnet) specific network parameters that are applied when the agent starts the LDom. These are mainly:

- IPAddress
- Netmask
- Gateway (Default Router)
- DNS
- ConfigureNetwork

Added support for DR of Solaris Zones

The Zone agent is enhanced to accept the cluster (subnet) specific network parameters that are applied when the agent starts the Zone. These are mainly the DNS settings for the Zone. The Zone agent also sets the Base IPAddress of the Zone in case if exclusive-IP zones.

RVGPrimary agent starts replication from new primary post role change to the other secondaries in the RDS

After a successful migration or takeover of a Secondary RVG, the RVGPrimary agent ensures to automatically start the replication from the new Primary to the additional Secondary(s) that exists in the RDS, if any.

Refer to the *SF Replication Administrator's Guide* for information about how the RVGPrimary agent works in a multiple secondary setup.

Campus Cluster firedrill made easy

Campus Cluster firedrill configuration has been made easier by introducing a new attribute `FDType`. You can control the firedrill flavor by setting just this attribute instead of specifying specific values for other attributes.

You need to install the Global Cluster Option (GCO) license to run firedrill in a Campus Cluster configuration.

Change in behavior of DiskGroup agent

The following changes have been affected to the DiskGroup agents:

- The type of the attribute PanicSystemOnDGLoss is changed from boolean to integer. Attribute PanicSystemOnDGLoss now accepts the following values:
 - 0: Do not halt the system
 - 1: Halt the system if either disk groups go into disabled state or the disk group resource faults due to monitor timeout.
 - 2: Halt the system if disk group goes into disabled state.
 - 3: Halt the system if disk group resource faults due to monitor timeout.
- The monitor agent function takes the service group containing the DiskGroup resource offline if the MonitorReservation attribute is set to 0, the value of the cluster wide attribute UseFence is set to SCSI3, and if the disk group is found imported without SCSI reservation.

Application agent enhancements

Application agent has undergone the following enhancements:

- Enhanced agent to support shared disk for StartProgram, StopProgram, MonitorProgram, and CleanProgram.
- Enhanced agent to understand Unix style for return codes for MonitorProgram, 0 (ONLINE) and 1 (OFFLINE).
- Application agent no longer uses the StopProgram during clean operation if CleanProgram is not specified.
- The character limitation for processes length in MonitorProcesses attribute is removed. Now you can use `/usr/ucb/ps -ww <pid>` command to get the full COMMAND for process and configure it in MonitorProcesses attribute.
- For applications running in Solaris 10 zones, you must set PidFile attribute to the path as seen from the non-global zone.

Apache agent enhancements

The following are the enhancements to the Apache agent

- The httpDir attribute is enhanced such that you can specify the full path of the binary (including the binary name). If you specify only the directory name, the agent assumes the default binary name httpd.
- If the Apache Benchmarking binary in the httpDir directory does not use the default name, then the agent recognizes the alternative binary name ab2, and performs detail monitoring.
- Enhanced Apache agent version parsing to accommodate IBM HTTP server 7.0.

Zone agent enables milestone while making the zone online

When `boot-state` is specified in the Zone agent, the Zone agent must run `svcadm enable -r <boot-state>` to enable the specified boot-state. If Zone is on shared disk and you disable the bootstate, the Zone faults on the other node and since the boot state is disabled, it faults on that node as well. Therefore, Zone agent must run `svcadm enable -r <boot-state>`.

Zone agent enables milestone while making the zone online, if not already enabled. The following option enables all the dependent services:

```
zlogin <zone-name>; svcadm enable -r <boot-state>
```

Enhanced preonline_ipc trigger

The `preonline_ipc` trigger functionality of VCS, that performs certain checks before bringing a group online, did not work for resources other than IP resources.

The `preonline_ipc` trigger is enhanced to support the following types of resources on a system:

- IP
- IPMultiNIC
- IPMultiNICB

Enhancing Zpool agent for better support with Solaris 10

Enhanced Zpool agent with the following attributes to handle various `zpool` issues:

- DeviceDir
- FailMode
- ForceOpt
- ForceRecoverOpt

First failure data capture for VCS agent entry point times out

To debug entry point timeout, a new attribute `AdvDbg` is introduced. The attribute helps VCS are some information like process stack, process tree and core on entry point timeout. This is helpful in troubleshooting entry point timeout scenarios.

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

Enabled IMF for Zone agent

The Zone agent now leverages IMF functionality for instantaneous detection of resource state change. This also reduces the CPU footprint of the agent by significantly reducing the periodic monitoring for resource states.

For more information refer to the *Administrator's Guide*.

Change in behavior of Zpool agent

Before VCS 6.0, if the storage pool was brought online outside VCS and `altrootpath` setting of the zpool was not set, then the Zpool agent returned ONLINE state. The Zpool agent is modified such that it returns UNKNOWN. You must export the zpool and online the resource to set the `altrootpath`.

For more information, refer to *Veritas Cluster Server Bundled Agents Reference Guide*.

Changes in network agents

The `NetMask` attribute is a required attribute for the following agents:

- IP
- IPMultiNIC
- MultiNICA
- IPMultiNICB

Changes to database agents

Changes to DB2 agent

- The VCS agent for DB2 now supports intelligent resource monitoring for online Db2 processes in PRON mode for non-MPP and MPP configuration mode.
- Prior to VCS 6.0 release, in case of partition mobility from source node to the target node having high speed inter-connect/switch configuration, the switch name entry would not get updated in the `db2nodes.cfg` configuration file. In VCS 6.0 release, the DB2 agent ensures that the switch name gets updated correctly in the configuration file.
- Added IMF support for DB2 agent: The DB2 agents now leverages the IMF functionality for instantaneous detection of resource state change. This also reduces the CPU footprint of the agent by significantly reducing the periodic monitoring for resource states.

See the *Administrator's Guide* for more information.

Changes to the Oracle agent

- The VCS agent for Oracle has two new attributes: DBName and ManagedBy.
- The VCS agent for Oracle has additional options to the StartUpOpt and ShutDownOpt attributes:
 - The StartUpOpt attribute introduces SRVCTLSTART_RO as additional startup options.
 - The ShutDownOpt attribute introduces SRVCTLSTOP_TRANSACT, SRVCTLSTOP_ABORT, and SRVCTLSTOP_IMMEDIATE as additional shut down options.
- The VCS agent for Oracle introduces support for policy managed database.
- The VCS agent for Oracle ASM instance introduces the following additional Startup options:
 - STARTUP_MOUNT
 - STARTUP_OPEN
 - SRVCTLSTART_MOUNT
 - SRVCTLSTART_OPEN
- The VCS agent for Oracle ASM instance introduces the following additional Shutdown option:
 - SRVCTLSTOP
- With Oracle version 11.2.0.2, the Oracle agent for VCS supports Startup and Shutdown options that use `srvctl` utility for Oracle restart configuration.

Changes to the Sybase agent

The Veritas Cluster Server agent for Sybase includes the following new or enhanced features:

- The VCS agents for Sybase and SybaseBk now support intelligent resource monitoring.
- Intelligent monitoring framework (IMF) is enabled by default in VCS 6.0 release. The `haimfconfig` script can be used to enable/disable IMF for Sybase and SybaseBk agents. The Sybase agent now leverages the IMF functionality for instantaneous detection of resource state change. This also reduces the CPU footprint of the agent by significantly reducing the periodic monitoring for resource states.

See the *Administrator's Guide* and *Agent for Sybase Installation and Configuration Guide* for more information.

- In addition to Sybase ASE Enterprise edition support, Sybase agent is enhanced to support Sybase ASE cluster edition. For Sybase ASE cluster edition, the VCS agent for Sybase makes the Sybase adaptive server highly available in a VCS cluster.
- The Sybase agent introduces the following new attributes:
 - Quorum_dev
 - interfaces_File
 - ShutdownWaitLimit (default value 60)
 - DelayAfterOnline (default value 10)
 - DelayAfterOffline (default value 2)
- The SybaseBk agent introduces the following new attribute:
 - interfaces_File
- The default value of ToleranceLimit attribute is set to 1 (one) for Sybase agent.
- The DetailMonitor attribute is deprecated in VCS 6.0. Instead, LevelTwoMonitorFreq attribute of Sybase agent may be used. The default value of LevelTwoMonitorFreq attribute is 0 (zero).
- The long pathname limitation for \$SYBASE is resolved.
- With VCS 6.0 release using VCS Cluster Manager (Java Console), Sybase and SybaseBk agents encrypt the password by default. Sybase and SybaseBk agents supports both plain text and encrypted password. If required, the plain text value can be specified for agent attributes using the command line or by editing the configuration file.
- Sybase agent uses new timeout option during shutdown of Sybase dataserver used instead of "shutdown with nowait". For Sybase ASE Enterprise edition the timeout option for shutdown command is supported for versions 12.5.4 and 15.0.2 onwards.
For Sybase ASE Cluster Edition the timeout option for shutdown command is supported from versions 15.5 ESD #1 onwards.
- For a Solaris Zone environment, Sybase and SybaseBk agents are updated to check the ContainerInfo attribute for physical to virtual failover support.

Changes to VCS clusters in secure mode

In this release, the installation and configuration experience of secure cluster is considerably simplified. You can easily convert the cluster into secure cluster with this simplified secure cluster configuration model.

The new architecture is based on embedded VxAT, where the security components are installed as a part of the VCS package. The root broker is no longer a single-point-of-failure in the new architecture. There is no dependency on a separate VRTSat package. Non-root users who are already logged on VCS hosts are now not prompted for password. Additionally, a cluster-level user feature is introduced to simplify user administration in secure clusters.

See the *Installation Guide* and *Administrator's Guide* for more information.

Changes to LLT

This release includes the following new features and changes to LLT:

- Faster detection of LLT link failures
LLT now has the capability to detect the LLT link failures immediately using the operating system's link-down notification feature.
- LLT now supports VLAN tagging (IEEE 802.1Q).
- The `lltconfig` command includes the following new options:
 - `-Q`
You can use this option to configure a link as "hidden". LLT needs this type of link when you enable faster detection of link failure.
 - `-j`
You can use this option to set the LLT link failure detection level.
 - The command also includes a new timer parameter `linkstable`. This parameter specifies the amount of time to wait before LLT processes the link-down event for any link of the local node when you have enabled faster link failure detection. This `linkstable` prevents a flaky link from causing unnecessary membership changes.
 - `-N`
You can use this option to list all the used cluster IDs.
 - `-M`
You can use this option to display the currently loaded LLT module version information.

See the `lltconfig` manual page for more information.

The `llttab` file includes the following changes:

- `hidden`
The new keyword `hidden` indicates that the link is a hidden link which LLT uses when you enable faster detection of link failure.
- `set-linkfaildetectlevel`

You can use this new command option in the `/etc/llttab` file to set the LLT link failure detection level.

- Link utilization statistics are enhanced that help in the root cause analysis of performance related issues.
- Periodic flushing of ARP cache is disabled.

See the *Veritas Cluster Server Installation Guide* and the *Veritas Cluster Server Administrator's Guide* for more details.

Changes to GAB

This section covers the new features and changes related to GAB in this release.

Better GAB and I/O fencing integration to ensure application availability

In the event of a split-brain situation before VxFEN module implements the decision, sometimes GAB proceeds with attempting to resolve the join after the split-brain. GAB removes all but one joining subcluster. This behavior can cause the entire cluster to shut down. To avoid this scenario, GAB now gives priority to the fencing module.

With the GAB and I/O fencing integration in this release, if the I/O fencing module's decision is still pending before GAB initiates a join of the subcluster, GAB delays the iofence message. GAB wait depends on the value of the VxFEN tunable parameter `panic_timeout_offst` based on which VxFEN computes the delay value and passes to GAB.

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

GAB can now recognize clients with names in addition to ports

When kernel clients initialize GAB API, they can now define a client name string. GAB now adds a client name which enables GAB to track the client even before GAB port is registered. GAB also passes the client name information to LLT when registering the LLT port. The `lltstat -p` command also displays the GAB client names when providing the status details of the ports in use.

This feature is applicable only to GAB kernel clients, and not applicable for user-land GAB clients such as HAD.

The `gabconfig` command has new `-C` option

The `-C` option of the `gabconfig` command lists the names of the GAB clients that have registered with GAB. The `-c` option when used with `-a` option lists the client names along with the port membership details.

Changes to I/O fencing

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

Support for Non-SCSI3 fencing

In environments that do not support SCSI-3 PR, non-SCSI-3 fencing provides reasonable data protection by causing the winning side to delay by a configurable amount (`loser_exit_delay`, default 55). Additionally, Symantec has enhanced the fencing component to help panic the losing side quickly. Together, these enhancements help narrow down the window of potential data corruption drastically.

See the *Veritas Cluster Server Installation Guide* and the *Veritas Cluster Server Administrator's Guide* for more details.

Installer support to migrate between fencing configurations in an online cluster

You can now use the installer to migrate between disk-based and server-based fencing configurations. You can also replace the coordination points for any I/O fencing configuration in an online cluster using the same installer option. The installer uses the `vx fenceswap` script internally.

You can also use response files to perform these I/O fencing reconfiguration operations.

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

Support for racer node re-election during I/O fencing race

At the time of a network partition, the VxFEN module elects the lowest node in each sub-cluster as the racer node to race for the coordination points on behalf of the sub-cluster. The other spectator nodes wait on the racer node to do the fencing.

In the previous releases, the I/O fencing race was entirely dependent on the single racer node as follows:

- If the racer node is not able to reach a majority of coordination points, then the VxFEN module on the racer node sends a LOST_RACE message and all nodes in the subcluster also panic when they receive the LOST_RACE message.
- If the racer node panics during the arbitration, then the spectator nodes in the sub-cluster assume that the racer node lost the race and the spectator nodes also panic.

With the new racer node re-election feature, the VxFEN module re-elects the node with the next lowest node id in the sub-cluster as the racer node. This feature optimizes the chances for the sub-cluster to continue with the race for coordination points.

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

Support for multiple virtual IP addresses in CP servers

You can now configure multiple network paths (virtual IP addresses) to access a CP server. CP server listens on multiple virtual IP addresses. If a network path fails, CP server does not require a restart and continues to listen on one of the other available virtual IP addresses.

See the *Veritas Cluster Server Installation Guide* and the *Veritas Cluster Server Administrator's Guide* for more details.

Support for Quorum agent in CP servers

With the support for multiple virtual IP addresses, you can now use the Quorum agent to configure CP server service group failover policies. You can specify the minimum number of IP resources that must be online for the Quorum resource to remain online.

See the *Veritas Cluster Server Installation Guide* and the *Veritas Cluster Server Administrator's Guide* for more details.

With fencing enabled, GAB can now automatically seed the cluster when some cluster nodes are unavailable

In the earlier releases, if some of the nodes are not up and running in a cluster, then GAB port does not come up to avoid any risks of preexisting split-brain. In such cases, you can manually seed GAB using the command `gabconfig -x` to bring the GAB port up. However, if you have enabled I/O fencing in the cluster, then I/O fencing can handle any preexisting split-brain in the cluster.

In this release, I/O fencing has extended this functionality to be able to automatically seed GAB as follows:

- If a number of nodes in a cluster are not up, GAB port (port a) still comes up in all the member-nodes in the cluster.
- If the coordination points do not have keys from any non-member nodes, I/O fencing (GAB port b) also comes up.

This new functionality is disabled by default. You must manually enable this automatic seeding feature of GAB in clusters where I/O fencing is configured in enabled mode.

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

You can still use the `gabconfig -x` command to manually seed the cluster.

Graceful shutdown of a node no longer triggers I/O fencing race condition on peer nodes

In the earlier releases, a gracefully leaving node clears its I/O fencing keys from coordination points. But the remaining sub-cluster races against the gracefully leaving node to remove its registrations from the data disks. During this operation, if the sub-cluster loses access to the coordination points, the entire cluster may panic if the racer loses the race for coordination points.

In this release, this behavior has changed. When a node leaves gracefully, the CVM or other clients on that node are stopped before the VxFEN module is unconfigured. Hence, data disks are already clear of its keys. The remaining sub-cluster tries to clear the gracefully leaving node's keys from the coordination points but does not panic if it is not able to clear the keys.

Changes related to virtualization support

This section lists virtualization changes for this release.

Enhanced LDom agent to support dynamic memory reconfiguration

The Oracle VM server for SPARC support dynamic reconfiguration of memory assigned to logical domain. Symantec added a new attribute memory to support this feature with LDOM agent.

Support for DR of LDOM guest domain

The LDom agent is enhanced to accept cluster (subnet) specific network parameters which are applied when the agent boots the LDom. These are mainly the IPAddress, Netmask, Gateway (Default Router), and DNS.

Virtualization support on Solaris

The following new virtualization features are introduced on Solaris:

- Support for LDom domain migration: LDom agent now detects the LDom migration (warm/live) and changes the state of the LDom resource accordingly.
- Support for Alternate I/O domain: Introduced new agent AlternateIO in VCS 6.0 to support I/O domain for LDom guests.
- Support for Zone agent to allow single VCS user to manage multiple zones: You can use single VCS user to manage multiple zones in VCS environment. You no longer require a separate VCS user to manage each zone in single VCS cluster. The `hazonesetup` command is enhanced to support this. See `hazonesetup` command usage for more information.

Domain migration support for Oracle VM server (OVM) for SPARC

Added support for logical domain migration (warm migration on OVM 2.0 and live migration on OVM 2.1) in Oracle VM Server for SPARC environment. LDom agent detects the logical domains being migrated and changes the state of VCS resource accordingly.

See the *Veritas Storage Foundation and High Availability Virtualization Guide* for more information on supported configurations for domain migration.

Added support for multiple I/O domains to the guest domains

Added support for logical domains with access storage and network services from multiple I/O domains. Added a new agent AlternateIO to monitor the storage and network services from primary and alternate I/O domains. Current release supports only two I/O domains for guest domain.

See the *Virtualization Guide* for more information on supported configurations. See the *Bundled Agents Reference Guide* for more information on the AlternateIO agent.

Parallel option is added to hazonesetup command to configure parallel service groups

The `hazonesetup` command does not set localized zone name attribute in case of parallel zone. Parallel option is added to `hazonesetup` command to configure parallel service group.

Updated hazonesetup command syntax to accommodate new arguments

Updated `hazonesetup` syntax to accommodate the following:

- Support to accept the user name for Zone from `hazonesetup` command.
- Support to update the password for the VCS Zone user whenever needed.
- If the username is not passed to `hazonesetup`, it creates a user with the default username.
- Support to configure parallel Zone service group.

The new syntax for `hazonesetup` command is:

```
# /opt/VRTS/bin/hazonesetup [-t] -g <sg_name>  
-r <res_name> -z <zone_name> [-u <user_name>] -p <password>  
[-a] [-l] -s <systems>
```

Where:

| | |
|--------------|---|
| -t | Update the password for VCS zone user |
| -g sg_name | Name of the zone service group to be created in VCS configuration |
| -r res_name | Name of the zone resource to be created in VCS configuration |
| -z zone_name | Name of the zone configured on the system |
| -u user_name | Name of the VCS user used for password less communication between local zone and global zone. If no user name is specified default user name is assumed |
| -p password | Password for the VCS user used for password less communication |
| -a | Populate AutoStartList for the group |
| -l | Configure parallel service group. If -l is not specified a failover service group is created by default. |
| -s systems | Comma (,) separated list of systems on which the zone service group need to be configured. (Ex., sys1,sys2,...). |

Licensing changes in the SFHA Solutions 6.0 release

Storage Foundation and High Availability Solutions 6.0 introduces the following licensing changes:

- The Cluster File System license is deprecated. CFS customers are entitled to the Storage Foundation Cluster File System High Availability (SFCFS HA) functionality.
- The VVR Option is renamed as Veritas Replicator Option. This option includes VVR (volume-based replication) and the new file-based replication solution.
- The VVR Enterprise license is deprecated; you can use Storage Foundation Enterprise and add Veritas Replicator Option to get this functionality. VVR Enterprise customers are entitled to Storage Foundation Enterprise with Replicator Option.
- The VCS license enables full cluster functionality as well as the limited start/stop functionality.
- Storage Foundation Enterprise CFS for Oracle RAC (Linux/x64) customers are entitled to Storage Foundation Enterprise for Oracle RAC (Linux/x64.)

The following functionality is included in the Standard and Enterprise licenses:

- The Compression feature is available with the Standard license.
- The SmartTier feature is now available with the Standard license.
- The Deduplication feature is available with the Enterprise license on Solaris SPARC.

The following products are included in this release:

- Dynamic Multi-Pathing
- VirtualStore
- Storage Foundation Basic
- Storage Foundation Standard
- Storage Foundation Enterprise
- Veritas Cluster Server
- Veritas Cluster Server HA/DR
- Storage Foundation Standard HA: Storage Foundation Standard plus Veritas Cluster Server
- Storage Foundation Enterprise HA: Storage Foundation Enterprise plus Veritas Cluster Server
- Storage Foundation Enterprise HA/DR
- Storage Foundation Enterprise Cluster File System HA
- Storage Foundation Enterprise Cluster File System HA/DR

- Storage Foundation Enterprise for Oracle RAC
- Storage Foundation Enterprise HA/DR for Oracle RAC
- Storage Foundation Enterprise for Sybase ASE CE
- Storage Foundation Enterprise HA/DR for Sybase CE

HA: High Availability

HA/DR: High Availability and Disaster Recovery

Veritas Replicator Option can be added to all Storage Foundation and High Availability products, except Dynamic Multi-Pathing and Veritas Cluster Server.

Note that products, features, and options may differ by operating system and platform. Please see the product documentation for information on supported platforms.

Enhancements to collecting a VxExplorer troubleshooting archive

The Symantec Operations Readiness Tools (SORT) data collector contains functionality to collect and submit a VxExplorer archive. You can send this archive to Symantec Technical Support for problem diagnosis and troubleshooting. VxExplorer does not collect customer data.

The legacy `VxExplorer` script now works differently. When you run the script, it launches the SORT data collector on the specified local host with the `-vxexplorer` option.

To learn more about using the data collector to collect a VxExplorer archive, see: www.symantec.com/docs/HOWTO32575

Changes related to product documentation

The Storage Foundation and High Availability Solutions 6.0 release includes the following changes to the product documentation.

[Table 1-1](#) lists the documents introduced in this release.

Table 1-1 New documents

| New documents | Notes |
|---|--|
| <i>Veritas Storage Foundation Installation Guide</i> | Installation and upgrade information for Storage Veritas Foundation. |
| <i>Veritas Storage Foundation Administrator's Guide</i> | Administration information for Veritas Storage Foundation. |

Table 1-1 New documents (*continued*)

| New documents | Notes |
|---|---|
| <i>Veritas Storage Foundation and High Availability Release Notes</i> | Release-specific information for Veritas Storage Foundation and High Availability users. |
| <i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i> | Solutions and use cases for Veritas Storage Foundation and High Availability Solutions. |
| <i>Veritas Storage Foundation and High Availability Solutions Troubleshooting Guide</i> | Troubleshooting information for Veritas Storage Foundation and High Availability Solutions. |
| <i>Symantec VirtualStore Release Notes</i> | Release-specific information Symantec VirtualStore. |
| <i>Veritas Storage Foundation for Sybase ASE CE Release Notes</i> | Release-specific information for Veritas Storage Foundation for Sybase ASE CE. |
| <i>Veritas Storage Foundation for Sybase ASE CE Installation Guide</i> | Installation information for Veritas Storage Foundation for Sybase ASE CE. |
| <i>Veritas Storage Foundation for Sybase ASE CE Administrator's Guide</i> | Administration information for Veritas Storage Foundation for Sybase ASE CE. |
| <i>Virtual Business Services–Availability User's Guide</i> | Information about Virtual Business Services. This document is available online. |

[Table 1-2](#) lists the documents that are deprecated in this release.

Table 1-2 Deprecated documents

| Deprecated documents | Notes |
|---|---|
| <i>Veritas File System Administrator's Guide</i> | Content now appears in the <i>Veritas Storage Foundation Administrator's Guide</i> and in the <i>Veritas Storage Foundation Cluster File System High Availability Administrator's Guide</i> . |
| <i>Veritas Volume Manager Administrator's Guide</i> | Content now appears in the <i>Veritas Storage Foundation Administrator's Guide</i> and in the <i>Veritas Storage Foundation Cluster File System High Availability Administrator's Guide</i> . |

Table 1-2 Depreciated documents (*continued*)

| Deprecated documents | Notes |
|--|--|
| <i>Veritas Storage Foundation Advanced Features Administrator's Guide</i> | Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i> . |
| <i>Veritas Volume Manager Troubleshooting Guide</i> | Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Troubleshooting Guide</i> . |
| <i>Veritas Cluster Server Agents for Veritas Volume Replicator Configuration Guide</i> | Content now appears in the <i>Veritas Cluster Server Bundled Agents Reference Guide</i> . |
| <i>Veritas Volume Replicator Planning and Tuning Guide</i> | Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide</i> . |
| <i>Veritas Volume Replicator Advisor User's Guide</i> | Content now appears in the <i>Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide</i> . |

[Table 1-3](#) lists documents that are no longer bundled with the binaries. These documents are now available online.

Table 1-3 Online documents

| Document |
|---|
| <i>Veritas Cluster Server Agent Developer's Guide</i> |
| <i>Veritas Cluster Server Application Note: Dynamic Reconfiguration of Oracle Sun Servers</i> |
| <i>Veritas File System Programmer's Reference Guide</i> |

VCS system requirements

This section describes system requirements for VCS.

The following information applies to VCS clusters. The information does not apply to SF Oracle RAC installations.

VCS requires that all nodes in the cluster use the same processor architecture and run the same operating system.

For example, in a cluster with nodes running Solaris, all nodes must run Solaris SPARC or Solaris x64.

VCS requires that all nodes in the cluster use the same processor architecture and all nodes in the cluster must run the same VCS version. Each node in the cluster may run a different version of the operating system, as long as the operating system is supported by the VCS version in the cluster.

See “[Hardware compatibility list](#)” on page 42.

See “[Supported Solaris operating systems](#)” on page 42.

Hardware compatibility list

The compatibility list contains information about supported hardware and is updated regularly. For the latest information on supported hardware go to the following URL:

<http://www.symantec.com/docs/TECH170013>

Before installing or upgrading Veritas Cluster Server, review the current compatibility list to confirm the compatibility of your hardware and software.

Supported Solaris operating systems

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

[Table 1-4](#) shows the supported Solaris operating systems for this release.

Table 1-4 Supported Solaris operating systems

| Operating systems | Levels | Chipsets |
|-------------------|---------------------|----------|
| Solaris 10 | Update 8, 9, and 10 | SPARC |
| Solaris 10 | Update 8, 9, and 10 | x64 |

Supported VCS agents

[Table 1-5](#) lists the agents for enterprise applications and the software that the agents support.

Table 1-5 Supported software for the VCS agents for enterprise applications

| Agent | Application | Application version | Solaris version |
|-------|-------------------------------|---------------------|--------------------------------------|
| DB2 | DB2 Enterprise Server Edition | 9.1, 9.5, 9.7 | SPARC: Solaris 10 x64: Solaris 10 |

Table 1-5 Supported software for the VCS agents for enterprise applications
(continued)

| Agent | Application | Application version | Solaris version |
|--------|-----------------------------------|------------------------|--------------------------------------|
| Oracle | Oracle | 10gR2, 11gR1, 11gR2 | SPARC: Solaris 10 x64: Solaris 10 |
| Sybase | Sybase Adaptive Server Enterprise | 12.5.x, 15.x | SPARC: Solaris 10 x64: Solaris 10 |

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

For a list of the VCS application agents and the software that the agents support, see the [Veritas Cluster Server Agents Support Matrix](#) at Symantec website.

No longer supported

The following features are not supported in this release of VCS products:

- Several documents are deprecated in this release.
See [“Changes related to product documentation”](#) on page 39.

No longer supported agents and components

VCS no longer supports the following:

- Configuration wizards
- CampusCluster agent
- NFSLock agent.
Use the NFSRestart agent to provide high availability to NFS lock records.
- nfs_restart trigger.
Use the NFSRestart agent to provide high availability to NFS lock records.
- ServiceGroupHB agent.
This release does not support disk heartbeats. Symantec recommends using I/O fencing.
- SANVolume agent
- VRTSWebApp
- Oracle 8.0.x, Oracle 8.1.x, and Oracle 9i - not supported by the Oracle agent.
- VCS documentation package (VRTSvcscd)

The VCS documentation package (VRTSvcscd) is deprecated. The software disc contains the documentation for VCS in Portable Document Format (PDF) in the *cluster_server/docs* directory.

Symantec recommends copying pertinent documents from the disc to your system directory */opt/VRTS/docs* for reference.

- The *Veritas Cluster Server Agents for Veritas Volume Replicator Configuration Guide* is deprecated and its content is accommodated in the *Veritas Storage Foundation and High Availability Solutions Replication Administrator's Guide* and *Veritas Cluster Server Bundled Agents Reference Guide*.
- *hahbsetup* tool. This tool is removed as no supported feature requires this tool.
- *VRTSutil* package. This package is no longer supported.
- Solaris 8 and Solaris 9 branded zones are no longer supported for SFHA configurations.

Deprecated attributes

Deprecated Oracle agent attributes:

- *AgentDebug*
- *DetailMonitor*

Deprecated Mount agent attributes:

- *SecondLevelMonitor*
- *SecondLevelTimeout*

Deprecated Host Monitor attribute:

- *CPUUsageMonitoring*: The attribute can no longer be used to disable CPU usage monitoring by Host Monitor agent.

Sybase agent attribute:

- *DetailMonitor*

Known issues

This section covers the known issues in this release.

See the corresponding Release Notes for a complete list of known issues related to that product.

See [“Documentation”](#) on page 87.

NFS cluster I/O fails when storage is disabled

The I/O from the NFS clusters are saved on a shared disk or a shared storage. When the shared disks or shared storage connected to the NFS clusters are disabled, the I/O from the NFS Client fails and an I/O error occurs.

Workaround: If the application exits (fails/stops), restart the application.

Issues related to installation

This section describes the known issues during installation and upgrade.

Stopping the installer during an upgrade and then resuming the upgrade might freeze the service groups (2591399)

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

```
# hagr -list Frozen=1
```

- 2 Unfreeze all the frozen service groups:

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

Manual upgrade of VRTSvlic package loses keyless product levels [2115662]

If you upgrade the `VRTSvlic` package manually, the product levels that were set using `vxkeyless` may be lost. The output of the `vxkeyless display` command will not display correctly. To prevent this, perform the following steps while manually upgrading the `VRTSvlic` package.

1. Note down the list of products configured on the node for keyless licensing.

```
# vxkeyless display
```

2. Set the product level to NONE.

```
# vxkeyless set NONE
```

3. Upgrade the VRTSvlic package.

```
# pkgrm VRTSvlic
```

This step may report a dependency, which can be safely overridden.

```
# pkgadd -d VRTSvlic.pkg
```

4. Restore the list of products that you noted in step 1.

```
# vxkeyless set product[,product]
```

Issues with keyless licensing reminders after upgrading VRTSvlic [2141446]

After upgrading from 5.1 to higher versions of VCS, some keyless licenses may be left in the system. As a result, you may see periodic reminders being logged if the VOM server is not configured.

This happens if you are using keyless licenses before upgrading to 5.1SP1 or higher versions of VCS. After the upgrade, you install real keys and run `vxkeyless set NONE`. In this case, the keyless licenses may not be completely removed and you see warning messages being logged after two months (if VOM server is not configured). This does not result in any functionality impact.

To resolve this issue, perform the following steps:

1. Note down the list of products configured on the node for keyless licensing. Run `vxkeyless display` to display the list.
2. Set the product level to *NONE* with the command:

```
# vxkeyless set NONE
```

3. Find and delete the keyless licenses left over in the system. To do this, perform the following steps for every key stored in `/etc/vx/licenses/lic`:

- Verify if the key has `VXKEYLESS` feature Enabled using the following command:

```
# vxlicrep -k <license_key> | grep VXKEYLESS
```

- Delete the key if and only if `VXKEYLESS` feature is Enabled.

Note: When performing the search, do not include the `.vlic` extension as part of the search string.

4. Restore the previous list of products with the command:

```
# vxkeyless set product1[,product]
```

Upgrade or uninstallation of VCS may encounter module unload failures

When you upgrade or uninstall VCS, some modules may fail to unload with error messages similar to the following messages:

```
fdd failed to stop on node_name  
vxfs failed to stop on node_name
```

The issue may be observed on any one or all the nodes in the sub-cluster.

Workaround: After the upgrade or uninstallation completes, follow the instructions provided by the installer to resolve the issue.

Secure WAC communication needs to be disabled explicitly [2392568]

If you have WACs communicating securely where VCS is configured in secure mode and if you disable the VCS security, the WAC where VCS security is disabled continues attempting to communicate securely without success. Therefore, you need to explicitly disable WAC security when you disable VCS security.

Workaround: No workaround. Secure WAC communication needs to be disabled explicitly.

Installing VRTSvlic package on Solaris system with local zones displays error messages [2555312]

If you try to install VRTSvlic package on a Solaris system with local zones in installed state, the system displays the following error messages:

```
cp: cannot create /a/sbin/vxlicinst: Read-only file system  
cp: cannot create /a/sbin/vxlicrep: Read-only file system  
cp: cannot create /a/sbin/vxlictest: Read-only file system
```

Workaround: On the Solaris system, make sure that all non-global zones are started and in the running state before you install the VRTSvlic package.

Web installer has no option to remove node from a cluster

Web Installer does not provide the option to remove node from a cluster.

Workaround: Manually remove nodes from a cluster. There is no option to remove nodes available from Web Installer or CPI.

Flash archive installed through JumpStart causes 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.

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

If you install or configure VCS 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 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.

VCS Zone users must be added after upgrade to VCS 6.0

If you upgrade your configuration containing Zone resources to VCS 6.0 from:

- VCS 5.1SP1RP1 or later VCS releases with DeleteVCSZoneUser attribute of Zone agent set to 1
- VCS 5.1SP1 or earlier VCS releases

You may see the following issue.

Zone agent offline/clean entry points delete VCS Zone users from configuration. After upgrade to VCS 6.0, VCS Zone users need to be added to the configuration. VCS Zone users can be added by running `hazonesetup` utility with new syntax

after upgrade. See the *Veritas Storage Foundation and High Availability Solutions Virtualization Guide* for Solaris for more information on `hazonesetup` utility and see the *Veritas Storage Foundation and High Availability Solutions Virtualization Guide* for Solaris.

sfmh discovery issue when you upgrade your Veritas product to 6.0 (2622987)

If a host is not reporting to any management server but `sfmh` discovery is running before you upgrade to 6.0, `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 by executing the following command on the managed host:

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

Incorrect server names sometimes display if there is a clock synchronization issue (2627076)

When you install a cluster with the Web-based installer, you choose to synchronize your systems with an NTP server due to a clock synchronization issue, you may see the NTP server name in messages instead of your server names.

Workaround:

Ignore the messages. The product is still installed on the correct servers.

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.

Operational issues for VCS

Issues with configuration of resource values [1848959]

If you configure a resource that has more than 425 values in its **ArgListValues**, the agent managing that resource logs a message such as:

```
VCS WARNING V-16-2-13806 Thread(1437547408) ArgListValues overflow;  
Cannot append values more than upper limit of (425).
```

Normally, the number of values in **ArgListValues** for a resource must not exceed 425. However, in case of a keylist, association or vector type of attribute appears in the ArgList for a resource-type. Since these attributes can take multiple values, there is a chance for the resource values in **ArgListValues** to exceed 425.

Some VCS components do not work on the systems where a firewall is configured to block TCP traffic

The following issues may occur if you install and configure VCS on systems where a firewall is installed:

- If you set up Disaster Recovery using the Global Cluster Option (GCO), the status of the remote cluster (cluster at the secondary site) shows as "initing".
- If you configure fencing to use CP server, fencing client fails to register with the CP server.
- Setting up trust relationships between servers fails.

Workaround:

- Ensure that the required ports and services are not blocked by the firewall. Refer to the *Veritas Cluster Server Installation Guide* for the list of ports and services used by VCS.
- Configure the firewall policy such that the TCP ports required by VCS are not blocked. Refer to your respective firewall or OS vendor documents for the required configuration.

Stale legacy_run services seen when VCS is upgraded to support SMF [2431741]

If you have VCS 5.0MPx installed on a Solaris 10 system, VCS uses RC scripts to manage starting services. If you upgrade VCS to any version that supports SMF for VCS, you see stale legacy_run services for these RC scripts in addition to the SMF services.

Workaround: There are two ways to remove these legacy services:

- Open `svccfg` console using `svccfg -s smf/legacy_run` and delete the legacy services.

For example:

```
svccfg -s smf/legacy_run
svc:/smf/legacy_run> listpg *
rc2_d_S7011t    framework    NONPERSISTENT
rc2_d_S92gab   framework    NONPERSISTENT
svc:/smf/legacy_run> delpg rc2_d_S7011t
svc:/smf/legacy_run> delpg rc2_d_S92gab
svc:/smf/legacy_run> exit
```

- Reboot the system.

The `hastop -all` command on VCS cluster node with AlternateIO resource and StorageSG having service groups may leave the node in LEAVING state

On a VCS cluster node with AlternateIO resource configured and StorageSG attribute contain service groups with Zpool, VxVM or CVMVolDG resources, `hastop -local`` or `hastop -all`` commands may leave the node in "LEAVING" state.

This issue is caused by lack of dependency between service group containing LDom resource and service groups containing storage resources exported to logical domain in alternate I/O domain scenarios. In this scenario VCS may attempt to stop the storage service groups before stopping logical domain which is using the resources.

Workaround: Stop the LDom service group before issuing `hastop -local` or `hastop -all` commands.

Missing characters in system messages [2334245]

You may see missing characters, especially in long system messages in response to certain commands.

Workaround: No workaround.

Issues related to the VCS engine

Extremely high CPU utilization may cause HAD to fail to heartbeat to GAB

When CPU utilization is very close to 100%, HAD may fail to heartbeat to GAB. [1818687]

Missing host names in engine_A.log file

The GUI does not read the engine_A.log file. It reads the engine_A.ldf file, gets the message id from it, and then queries for the message from the bmc file of the appropriate locale (Japanese or English). The bmc file does not have system names present and so they are read as missing. [1736295]

Agent framework can reject `hares -action` command

When a probed resource is disabled and later enabled then, the agent framework can reject `hares -action` command till the agent successfully monitors the resource.

Character corruption observed when executing the `uuidconfig.pl -clus -display -use_lhost` command [2350517]

If password-less ssh/rsh is not set, the use of `uuidconfig.pl` command in non-English locale may print garbled characters instead of a non-English string representing the Password prompt.

Workaround: No workaround.

Trigger does not get executed when there is more than one leading or trailing slash in the triggerpath [2368061]

The path specified in TriggerPath attribute must not contain more than one leading or trailing `'\'` character.

Workaround: Remove the extra leading or trailing `'\'` characters from the path.

Service group is not auto started on the node having incorrect value of EngineRestarted [2397532]

When HAD is restarted by `hashadow` process, the value of EngineRestarted attribute is temporarily set to 1 till all service groups are probed. Once all service groups are probed, the value is reset. If HAD on another node is started at roughly the same time, then it is possible that it does not reset the value of EngineRestarted

attribute. Therefore, service group is not auto started on the new node due to mismatch in the value of EngineRestarted attribute.

Workaround: Restart VCS on the node where EngineRestarted is set to 1.

Group is not brought online if top level resource is disabled [2486476]

If the top level resource which does not have any dependency is disabled then the other resources do not come online and the following message is displayed:

```
VCS NOTICE V-16-1-50036 There are no enabled
resources in the group cvm to online
```

Workaround: Online the child resources of the topmost resource which is disabled.

NFS resource goes offline unexpectedly and reports errors when restarted [2490404]

VCS does not perform resource operations, such that if an agent process is restarted multiple times by HAD, only one of the agent process is valid and the remaining processes get aborted, without exiting or being stopped externally. Even though the agent process is running, HAD does not recognize it and hence does not perform any resource operations.

Workaround: Forcefully stop the agent process.

Parent group does not come online on a node where child group is online [2489053]

This happens if the AutostartList of parent group does not contain the node entry where the child group is online.

Workaround: Bring the parent group online by specifying the name of the system then use the `hargp -online [parent group] -any` command to bring the parent group online.

Cannot modify temp attribute when VCS is in LEAVING state [2407850]

An `ha` command to modify a temp attribute is rejected if the local node is in a LEAVING state.

Workaround: Execute the command from another node or make the configuration read-write enabled.

If secure and non-secure WAC are connected the engine_A.log receives logs every 5 seconds [1539646]

Two WACs in GCO must always be started either in secure or non-secure mode. The secure and non-secure WAC connections cause log messages to be sent to engine_A.log file.

Workaround: Make sure that WAC is running in either secure mode or non-secure mode on both the clusters in GCO.

Oracle group fails to come online if Fire Drill group is online on secondary cluster [2556835]

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 [2558903]

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.

POSTONLINE and POSTOFFLINE triggers are not enabled by default [2567387]

Before VCS 6.0, POSTONLINE and POSTOFFLINE triggers were enabled by default, so the triggers got executed whenever a service group came online. In VCS 6.0, you must explicitly enable the POSTONLINE and POSTOFFLINE triggers whenever you upgrade to VCS 6.0.

Alternatively, if you want the triggers to execute after the upgrade:

- 1 Before upgrade, set `vcs_start = 0` in `/etc/sysconfig/vcs` so that HAD does not start after the upgrade.
- 2 Upgrade the existing VCS to VCS 6.0.
- 3 Set `vcs_start = 1` in `/etc/sysconfig/vcs`
- 4 Start VCS on each node using `hastart`.
- 5 Set `TriggersEnabled` in `main.cf` for required groups as follows:

```
TriggersEnabled @<systemname>={POSTONLINE, POSTOFFLINE}
```

Example of trigger behavior:

```
group scriptfileonoff (
    SystemList = { vcssx235 = 0, vcssx236 = 1 }
    AutoStartList = { vcssx235, vcssx236 }
    TriggersEnabled @vcssx235 = { POSTONLINE }
)
MyFileOnOff MFileOnOff (
    PathName = "/tmp/mf1"
)
MyFileOnOff MFileOnOff1 (
    PathName = "/tmp/mf2"
```

Two CmdServer instances seen running on a node [2399292]

You may see two instances of `CmdServer` running on a node. One of these using IPv4 and the other IPv6.

This does not impact functionality in any way.

Workaround: No workaround.

Service group may fail to come online after a flush and a force flush operation [2616779]

A service group may fail to come online after flush and force flush operations are executed on a service group where offline operation was not successful.

Workaround: If the offline operation is not successful then use the force flush commands instead of the normal flush operation. If a normal flush operation is already executed then to start the service group use `-any` option.

Issues related to the bundled agents

Entry points that run inside a zone are not cancelled cleanly [1179695]

Cancelling entry points results in the cancellation of only the `zlogin` process. The script entry points that run inside a zone are forked off using the `zlogin` command. However, the `zlogin` command forks off an `sh` command, which runs in the context of the Solaris zone. This shell process and its family do not inherit the group id of the `zlogin` process, and instead get a new group id. Thus, it is difficult for the agent framework to trace the children or grand-children of the shell process, which translates to the cancellation of only the `zlogin` process.

Workaround: Oracle must provide an API or a mechanism to kill all the children of the `zlogin` process that was started to run the entry point script in the local-zone.

Solaris mount agent fails to mount Linux NFS exported directory

The Solaris mount agent mounts the mount directories. At this point, if it tries to mount a Linux NFS exported directory, the mount fails showing the following error:

```
nfs mount: mount: <MountPoint>: Not owner
```

This is due to system NFS default version mismatch between Solaris and Linux.

The workaround for this is to configure `MountOpt` attribute in mount resource and set `vers=3` for it.

Example

```
root@north $ mount -F nfs south:/test /logo/
nfs mount: mount: /logo: Not owner
root@north $
Mount nfsmount (
    MountPoint = "/logo"
    BlockDevice = "south:/test"
    FSType = nfs
    MountOpt = "vers=3"
)
```

The zpool command runs into a loop if all storage paths from a node are disabled

The Solaris Zpool agent runs `zpool` commands to import and export zpools. If all paths to the storage are disabled, the zpool command does not respond. Instead, the zpool export command goes into a loop and attempts to export the zpool. This continues till the storage paths are restored and zpool is cleared. As a result, the offline and clean procedures of Zpool Agent fail and the service group cannot fail over to the other node.

Workaround: You must restore the storage paths and run the `zpool clear` command for all the pending commands to succeed. This will cause the service group to fail over to another node.

Zone remains stuck in down state if tried to halt with file system mounted from global zone [2291200]

If zone halts without unmounting the file system, the zone goes to down state and does not halt with the `zoneadm` commands.

Workaround: Unmount the file system manually from global zone and then halt the zone. For VxFS, use following commands to unmount the file system from global zone.

To unmount when `VxFSMountLock` is 1

```
umount -o mntunlock=VCS <zone root path>/<Mount Point>
```

To forcefully unmount when `VxFSMountLock` is 1:

```
# umount -f -o mntunlock=VCS <zone root path>/<Mount Point>
```

To unmount when `VxFSMountLock` is 0:

```
# umount <zone root path>/<Mount Point>
```

To forcefully unmount when `VxFSMountLock` is 0:

```
# umount -f <zone root path>/<Mount Point>
```

To halt the zone, use following command:

```
# zoneadm -z <zone_name> halt
```

Process and ProcessOnly agent rejects attribute values with white spaces [2303513]

Process and ProcessOnly agent does not accept Arguments attribute values that are separated by multiple whitespaces. The Arguments attribute specifies the set of arguments for a process. If a script controls the process, the script is passed as an argument. You must separate multiple arguments by using a single whitespace. A string cannot accommodate more than one space between arguments, or allow leading or trailing whitespace characters. This attribute must not exceed 80 characters.

Workaround: You should use only single whitespace to separate the argument attribute values. Make sure you avoid multiple whitespaces between the argument attribute values or trailing whitespace characters.

The zpool commands hang and remain in memory till reboot if storage connectivity is lost [2433609]

If the FailMode attribute of `zpool` is set to continue or wait and the underlying storage is not available, the `zpool` commands hang and remain in memory until the next reboot.

This happens when storage connectivity to the disk is lost, the `zpool` commands hang and they cannot be stopped or killed. The `zpool` commands run by the monitor entry point remains in the memory.

Workaround: There is no recommended workaround for this issue.

Application agent cannot handle a case with user as root, envfile set and shell as csh [2584285]

Application agent does not handle a case when the user is root, envfile is set, and shell is csh. The application agent uses the `system` command to execute the `Start/Stop/Monitor/Clean Programs` for the root user. This executes `Start/Stop/Monitor/Clean Programs` in `sh` shell, due to which there is an error when root user has `csh` shell and `EnvFile` is written accordingly.

Workaround: Do not set `csh` as shell for root user. Use `sh` as shell for root instead.

IMF registration fails for Mount resource if the configured MountPoint path contains spaces [2442598]

If the configured MountPoint of a Mount resource contains spaces in its path, then the Mount agent can online the resource correctly, but the IMF registration for ONLINE monitoring fails. This is due to the fact that the AMF driver does not

support spaces in the path. Leading and trailing spaces are handled by the Agent and IMF monitoring can be done for such resources.

Workaround: Symantec recommends to turn off the IMF monitoring for a resource having spaces in its path. For information on disabling the IMF monitoring for a resource, refer to Veritas Cluster Server Administrator's Guide.

Offline of zone resource may fail if `zoneadm` is invoked simultaneously [2353542]

Offline of zone EP uses `zoneadm` command to offline a zone. Therefore, if `zoneadm` is invoked simultaneously for multiple zones, the command may fail. This is due to Oracle bug 6757506 that causes a race condition between multiple instances of `zoneadm` command and displays the following message:

```
zoneadm: failed to get zone name: Invalid argument
```

Workaround: No workaround.

Password changed while using `hazonesetup` script does not apply to all zones [2332349]

If you use the same user name for multiple zones, updating password for one zone does not updated the password of other zones.

Workaround: While updating password for VCS user which is used for multiple zones, update password for all the zones.

MultiNICB agent may fail to perform the link-based and probe-based detection as expected [2509232]

You may be unable to configure the MultiNICB agent to perform probe-based detection of resource state.

You can configure the MultiNICB agent to perform link-based detection and probe-based detection by setting the `LinkTestRatio` attribute to 1 (one) and the `IgnoreLinkStatus` attribute to 0 (zero). However, when you set these values, the agent may fail to send out ICMP requests to determine the resource state. As a result, the agent may report an erroneous resource state and probe-based detection may fail.

Workaround: Set the `LinkTestRatio` attribute to 2. MultiNICB agent now sends an ICMP request after every alternate monitor cycle, and is able to determine the correct resource state.

NIC agent may report incorrect interface state due to less traffic [2512592]

When PingOptimize is set to 1 and no NetworkHosts is specified, NIC agent depends on packet count to report the health of the interface. If the traffic on the interface is not sufficient enough, NIC agent may report incorrect state of the interface.

Workaround: Any of the following workaround must resolve the issue:

- Setting PingOptimize = 0. This makes NIC agent ping the broadcast address whenever there is no traffic on the interface.
- Setting valid NetworkHosts value. This makes NIC agent to ping NetworkHosts to check health of status.

RemoteGroup agent does not failover in case of network cable pull [2588807]

A RemoteGroup resource with ControlMode set to OnOff may not fail over to another node in the cluster in case of network cable pull. The state of the RemoteGroup resource becomes UNKNOWN if it is unable to connect to a remote cluster.

Workaround:

- Connect to the remote cluster and try taking offline the RemoteGroup resource.
- If connection to the remote cluster is not possible and you want to bring down the local service group, change the ControlMode option of the RemoteGroup resource to MonitorOnly. Then try taking offline the RemoteGroup resource. Once the resource is offline, change the ControlMode option of the resource to OnOff.

Concurrency violation in the service group [2555306]

Concurrency violation and data corruption of a Volume resource may occur, if storage connectivity is lost or all paths under VxDMP are disabled and PanicSystemOnDGLoss is set to 0

This happens when:

- In a cluster environment/configuration, if cluster wide UseFence attribute is set to SCSI3 and service group contains Volume resource and DiskGroup resource with the PanicSystemOnDGLoss attribute set to 0 (zero).
- If storage connectivity is lost or all paths under VxDMP are disabled, VCS fails over the service group. If storage connectivity is restored on the node on which the service group was faulted and DG is not deported manually, then volume may get started if disk group is not deported during the service group failover.

So volume resource shows state as online on both the nodes and thus cause concurrency violation. This may lead to data corruption.

Workaround: Ensure that the disk group is deported soon after storage connectivity is restored.

You are recommended to always configure Volume resource whenever Disk group resources is configured and set the attribute PanicSystemOnDGLoss to 1 or 2 as per requirement.

Coordpoint agent remains in faulted state [2555191]

The Coordpoint agent remains in faulted state because it detects `rfsm` to be in replaying state.

Workaround: Clear the fault and reconfigure fencing.

Prevention of Concurrency Violation (PCV) is not supported for applications running in a container [2536037]

For an application running in a container, VCS uses a similar functionality if that resource is not registered to IMF. Hence, there is no IMF control to take a resource offline. When the same resource goes online on multiple nodes, agent detects and reports to engine. Engine uses the offline monitor to take the resource offline. Hence, even though there is a time lag before the detection of the same resource coming online on multiple nodes at the same time, VCS takes the resource offline.

PCV does not function for an application running inside a local Zone on Solaris

Workaround: No workaround.

No IPv6 support for NFS [2022174]

IPv6 is not supported for NFS.

Workaround: No workaround.

Monitor program does not change a resource to UNKNOWN if Netmask value is hexadecimal IPMultiNIC [2583526]

For a IPMultiNIC type resource, monitor program does not change the status of the resource to UNKNOWN when the value of the Netmask attribute is specified in hexadecimal format.

When value for NetMask attribute is specified in hexadecimal format, the monitor does not transition the status of the resource. Hence, code related errors may be logged.

Workaround: No workaround.

Share resource goes offline unexpectedly causing service group failover [1939398]

Share resource goes offline unexpectedly and causes a failover when NFSRestart resource goes offline and UseSMF attribute is set to 1 (one).

When NFSRestart resource goes offline, NFS daemons are stopped. When UseSMF attribute is set to 1, the exported file systems become unavailable, hence Share resource unexpectedly goes offline.

Workaround: Set the value of ToleranceLimit of Share resource to a value more than 1.

Mount agent does not support all scenarios of loopback mounts [2604471]

For a mount point under VCS control, you can create loop back mounts for the mount point. For example, mount point /mntpt is mounted on /a as loop back mount and /a is mounted on /b as loop back mount, then offline and online of the mount resource fails.

Workaround: Mount the mount point /mntpt on /b as loop back mount.

State of the Application resource is reported OFFLINE if MonitorProgram does not have executable permissions [2612140]

Application agent reports state of resource as OFFLINE instead of UNKNOWN if the MonitorProgram command is present but does not have executable permissions.

Workaround: Make sure that the MonitorProgram command has executable permissions.

HA commands inside WPAR agent get stuck due to the login/password prompt [2431884]

After upgrade of secure clusters from VCS versions lower than VCS 6.0, the HA commands that run from within the WPAR display login/password prompts. Hence, agents trying to run HA commands inside WPAR get stuck because of the prompt, as the WPAR credentials are not upgraded because of change of architecture of VxAT in VCS 6.0.

Workaround: Run `hawparsetup.pl` again for each WPAR resource. This will create new credentials for the WPAR which can be used by HA commands in VCS 6.0.

NFS client reports I/O error because of network split brain [2564517]

When network split brain occurs, the failing node may take some time to panic. Thus, the service group on the failover node may fail to come online, as some of the resources (like IP resource) are still online on the failing node or disk group on the failing node may get disabled but IP resource on the same node continues to be online.

Workaround: Configure the preonline trigger for the service group containing DiskGroup resource on each system in the service group:

1 Copy the preonline_ipc trigger from

```
/opt/VRTSvcs/bin/sample_triggers/VRTSvcs to
/opt/VRTSvcs/bin/triggers/preonline/ as T0preonline_ipc.
```

```
# cp /opt/VRTSvcs/bin/sample_triggers/VRTSvcs/preonline_ipc
/opt/VRTSvcs/bin/triggers/preonline/T0preonline_ipc
```

2 Enable PREONLINE trigger for the service group.

```
# hagrps -modify <group_name> TriggersEnabled PREONLINE
-sys <node_name>
```

Some agents may fail to come online after full upgrade to VCS 6.0 if they were online before the upgrade [2618482]

Resources of type NFSRestart, DNS, LDom and Project do not come online automatically after a full upgrade to VCS 6.0 if they were previously online.

Workaround: Online the resources manually after the upgrade, if they were online previously.

Invalid Netmask value may display code errors

If you specify invalid Netmask value for the IP resource attribute, you may see the code errors similar to the following when you try to online the resource.

```
=====
Illegal hexadecimal digit 'x' ignored at
```

```
/opt/VRTSperl/lib/site_perl/5.12.2/Net/Netmask.pm line 78.  
ifconfig: <Netmask_value>: bad address  
=====
```

Workaround: Make sure you specify a valid Netmask value.

Issues related to the VCS database agents

Health check monitoring does not work with VCS agent for Oracle [2101570, 1985055]

The health check monitoring in Oracle agent for VCS does not work due to incompatibility of the health check APIs provided by Oracle.

Resolution: Disable health check monitoring by setting the MonitorOption attribute to 0 (zero).

Intentional Offline does not work for VCS agent for Oracle [1805719]

Due to issues with health check monitoring, Intentional Offline does not work for VCS agent for Oracle.

Make sure that the ohasd has an entry in the init scripts [1985093]

Make sure that the ohasd process has an entry in the init scripts so that when the process is killed or the machine is rebooted, this automatically restarts the process.

Workaround: Respawn off the ohasd process. Add the ohasd process in the `/etc/inittab` file to ensure that this process is automatically restarted when killed or the machine is rebooted.

The ASMInstAgent does not support having pfile/spfile for the ASM Instance on the ASM diskgroups

The ASMInstAgent does not support having pfile/spfile for the ASM Instance on the ASM diskgroups.

Workaround:

Have a copy of the pfile/spfile in the default `$GRID_HOME/dbs` directory to make sure that this would be picked up during the ASM Instance startup.

VCS agent for ASM: Health check monitoring is not supported for ASMInst agent

The ASMInst agent does not support health check monitoring.

Workaround: Set the MonitorOption attribute to 0.

NOFAILOVER action specified for certain Oracle errors

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

See the *Veritas Cluster Server Agent for Oracle Installation and Configuration Guide* for a description of the actions.

Currently, the reference file specifies the NOFAILOVER action when the following Oracle errors are encountered:

ORA-00061, ORA-02726, ORA-6108, ORA-06114

The NOFAILOVER action means that the agent sets the resource's state to OFFLINE and freezes the service group. You may stop the agent, edit the oraerror.dat file, and change the NOFAILOVER action to another action that is appropriate for your environment. The changes go into effect when you restart the agent.

ASM instance does not unmount VxVM volumes after ASMDG resource is offline

In configurations where ASMInstance resource is part of a separate parallel service group, the ASM instance does not unmount the volumes even after the ASMDG resource is taken offline. Therefore, the Volume resource cannot be taken offline. This issue occurs when you use VxVM volumes as ASM disk groups. [918022]

Workaround: Configure the ASMInstance resource as part of the failover service group where ASMDG resource is configured.

Concurrency violation due to process startup on failover node is not detected when detail monitoring is set for Oracle resources [2917558]

Inside a failover service group, when the administrator starts an Oracle resource on a node and if the Oracle instance is online on any other node within the cluster, the instance would come up. However, the database does not get mounted. In such circumstances, this startup attempt is detected by basic monitoring. If detail monitoring is enabled, this startup attempt does not get detected.

Workaround: No workaround.

Issues related to the agent framework

English text while using 'hares -action' command (1786742)

Description: The output of hares -action is displayed in English text and not in your configured locale.

Resolution: No resolution.

Agent framework cannot handle leading and trailing spaces for the dependent attribute

Agent framework does not allow spaces in the target resource attribute name of the dependent resource.

Workaround: Do not provide leading and trailing spaces in the target resource attribute name of the dependent resource.

The agent framework does not detect if service threads hang inside an entry point [1511211]

In rare cases, the agent framework does not detect if all service threads hang inside a C entry point. In this case it may not cancel them successfully.

Workaround: If the service threads of the agent are hung, send a kill signal to restart the agent. Use the following command: `kill -9 hung_agent's_pid`. The `haagent -stop` command does not work in this situation.

IMF related error messages while bringing a resource online and offline [2553917]

For a resource registered with AMF, if you run `hagrp -offline` or `hagrp -online` explicitly or through a collective process to offline or online the resource respectively, the IMF displays error messages in either case.

The errors displayed is an expected behavior and it does not affect the IMF functionality in any manner.

Workaround: No workaround.

Issues related to Live Upgrade

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.

Live Upgrade to Solaris 10 Update 10 fails in the presence of zones (2521348)

SFCFSHA Live Upgrade from Solaris 10 Update 7 5.1SP1 to Solaris 10 Update 10 using the `vxlustart` commands fails in the presence of zones with the following error message:

```
ERROR: Installation of the packages from this media of the media failed;
pfinstall returned these diagnostics:
Processing default locales
    - Specifying default locale (en_US.ISO8859-1)
Processing profile
ERROR: This slice can't be upgraded because of missing usr packages for the
following zones:
ERROR:    zone1
ERROR:    zone1
ERROR: This slice cannot be upgraded because of missing usr packages for
one or more zones.
The Solaris upgrade of the boot environment <dest.27152> failed.
```

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

Workaround: Check with Oracle for possible workarounds for this issue.

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: Check with Oracle for possible workarounds for this issue.

Issues related to VCS in Japanese locales

This section covers the issues that apply to VCS 6.0 in a Japanese locale.

The `hares -action` command displays output in English [1786742]

The `hares -action` command incorrectly displays output in English.

Character corruption issue

Character corruption occurs if installer is run with `HIASCII` option on French locale. [1539754, 1539747]

Workaround: No workaround.

Messages inside the zone are not localized

Locale is not set correctly for Solaris zone. Therefore, you may not see localized messages inside the zone.

Workaround: No workaround.

System messages having localized characters viewed using `hamsg` may not be displayed correctly

If you use `hamsg` to view system messages, the messages containing a mix of English and localized characters may not be displayed correctly. [2405416]

Workaround: No workaround. However, you can view English messages in the VCS log file.

Issues related to global clusters

The engine log file receives too many log messages on the secure site in global cluster environments [1539646]

When the WAC process runs in secure mode on one site, and the other site does not use secure mode, the engine log file on the secure site gets logs every five seconds.

Workaround: The two WAC processes in global clusters must always be started in either secure or non-secure mode. The secure and non-secure WAC connections will flood the engine log file with the above messages.

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.

Issues related to LLT

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

LLT port stats sometimes shows `rcvcnt` larger than `rcvbytes` (1788315)

With each received packet, LLT increments the following variables:

- `rcvcnt` (increment by one for every packet)
- `rcvbytes` (increment by size of packet for every packet)

Both these variables are integers. With constant traffic, `recvbytes` hits and rolls over `MAX_INT` quickly. This can cause the value of `recvbytes` to be less than the value of `recvcnt`.

This does not impact the LLT functionality.

LLT may incorrectly declare port-level connection for nodes in large cluster configurations (1809827)

When ports get registered and unregistered frequently on the nodes of the cluster, LLT may declare that a port-level connection exists with another peer node. This occurs in some corner cases even though a port is not even registered on the peer node.

Issues related to GAB

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

While deinitializing GAB client, "gabdebug -R GabTestDriver" command logs refcount value 2 (2536373)

After you unregister the gtx port with `-nodeinit` option, the `gabconfig -C` command shows `refcount` as 1. But when forceful `deinit` option (`gabdebug -R GabTestDriver`) is run to deinitialize GAB client, then a message similar to the following is logged.

```
GAB INFO V-15-1-20239
Client GabTestDriver with refcount 2 forcibly deinitd on user request
```

The `refcount` value is incremented by 1 internally. However, the `refcount` value is shown as 2 which conflicts with the `gabconfig -C` command output.

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.

Issues related to I/O fencing

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

Delay in rebooting Solaris 10 nodes due to vxfen service timeout issues (1897449)

When you reboot the nodes using the `shutdown -i6 -g0 -y` command, the following error messages may appear:

```
svc:/system/vxfen:default:Method or service exit
timed out. Killing contract 142
svc:/system/vxfen:default:Method "/lib/svc/method/vxfen stop"
failed due to signal Kill.
```

This error occurs because the vxfen client is still active when VCS attempts to stop I/O fencing. As a result, the vxfen stop service times out and delays the system reboot.

Workaround: Perform the following steps to avoid this vxfen stop service timeout error.

To avoid the vxfen stop service timeout error

- 1 Stop VCS. On any node in the cluster, run the following command:

```
# hastop -all
```

- 2 Reboot the systems:

```
# shutdown -i6 -g0 -y
```

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 Cluster Server Administrator's Guide* for more details.

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 `vx.fenmode` 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 nodes' and users' information to the CP server to resolve this issue. Alternatively, you can use installer as the installer adds cluster nodes' and users' information to the CP server during configuration.

The `cpsadm` command fails if LLT is not configured on the application cluster (2583685)

The `cpsadm` command fails to communicate with the coordination point server (CP server) if LLT is not configured on the application cluster node where you run the `cpsadm` command. You may see errors similar to the following:

```
# cpsadm -s 10.209.125.200 -a ping_cps
CPS ERROR V-97-1400-729 Please ensure a valid nodeid using
environment variable
CPS_NODEID
CPS ERROR V-97-1400-777 Client unable to communicate with CPS.
```

However, if you run the `cpsadm` command on the CP server, this issue does not arise even if LLT is not configured on the node that hosts CP server. The `cpsadm` command on the CP server node always assumes the LLT node ID as 0 if LLT is not configured.

According to the protocol between the CP server and the application cluster, when you run the `cpsadm` on an application cluster node, `cpsadm` needs to send the LLT node ID of the local node to the CP server. But if LLT is unconfigured temporarily, or if the node is a single-node VCS configuration where LLT is not configured, then the `cpsadm` command cannot retrieve the LLT node ID. In such situations, the `cpsadm` command fails.

Workaround: Set the value of the `CPS_NODEID` environment variable to 255. The `cpsadm` command reads the `CPS_NODEID` variable and proceeds if the command is unable to get LLT node ID from LLT.

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 `vxfen-startup` script in the background and exits with code 0. Hence, if the `vxfen-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 `vxfenadm` command to verify that I/O fencing is running.

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 vxfenconfig 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@galaxy,
domaintype vx; not allowing action
```

The `vxferd` 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, ensure that the cluster details such as cluster name, UUID, nodes, and privileges are added to the CP server.

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

The `vxferswap` utility runs the `vxferconfig -o modify` command over RSH or SSH on each cluster node for validation of coordination points. If you run the `vxferswap` 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, `vxferswap` 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).

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 cpsadm command fails after upgrading CP server to 6.0 in secure mode (2478502)

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 VCS cluster (application cluster), the installer also fails.

Workaround : Perform the following steps on all the nodes of the CP server:

- Rename `cpsadm` to `cpsadmbin`.

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

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

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

- Provide the following permissions to the new file:

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

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

When you configure fencing in customized mode and do not 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: No workaround.

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 /etc/VRTScps/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 /var/VRTSvc/vcsauth/data/CPSERVER
```

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

```
# ln -s path_of_CP_server_credential_directory \
/var/VRTSvc/vcsauth/data/CPSERVER
```

- Start the CPSSG service group:

```
# hagr -online CPSSG -any
```

Issues related to Intelligent Monitoring Framework (IMF)

Registration error while creating a Firedrill setup [2564350]

While creating the Firedrill setup using the `Firedrill setup` utility, VCS encounters the following error:

```
AMF amfregister ERROR V-292-2-167
Cannot register mount offline event
```

During Firedrill operations, VCS may log error messages related to IMF registration failure in the engine log. This happens because in the firedrill service group, there is a second CFSMount resource monitoring the same MountPoint through IMF.

Both the resources try to register for online/offline events on the same MountPoint and as a result, registration of one fails.

Workaround: No workaround.

IMF does not fault zones if zones are in ready or down state [2290883]

IMF does not fault zones if zones are in ready or down state.

IMF does not detect if zones are in ready or down state. In Ready state, there are no services running inside the running zones.

Workaround: Offline the zones and then restart.

IMF does not detect the zone state when the zone goes into a maintenance state [2534980]

IMF does not detect the change in state. However, the change in state is detected by Zone monitor in the next cycle.

Workaround: No workaround.

Engine log gets flooded with messages proportionate to the number of mount offline registration with AMF [2619778]

In a certain error condition, all mount offline events registered with AMF are notified simultaneously. This causes the following message to get printed in the engine log for each registered mount offline event:

```
<Date> <Time> VCS INFO V-16-2-13717
(vcsnode001) Output of the completed operation
(imf_getnotification)
=====
Cannot continue monitoring event
Got notification for group: cfsmount221
=====
```

This is an expected behavior for this error condition. Apart from the messages there will be no impact on the functionality of the VCS solution.

Workaround: No workaround.

Pearl errors seen while using haimfconfig command

Pearl errors seen while using `haimfconfig` command:

Pearl errors seen while using haimfconfig command

This error is due to the absolute path specified in main.cf for type-specific configuration files. Currently, haimfconfig does not support absolute path for type-specific configuration file in main.cf.

Workaround: Replace the actual path with the actual file name and copy the file from its absolute location to /etc/VRTSvcs/conf/config directory.

For example, if OracleTypes.cf is included in main.cf as:

```
include "/etc/VRTSagents/ha/conf/Oracle/OracleTypes.cf"
```

It should be replaced as follows in main.cf:

```
include "OracleTypes.cf"
```

Could not register process and skipping inactive event messages seen in engine log (2700482)

You may see the following error messages in the engine log:

```
2012/02/12 20:08:55 VCS ERROR V-16-10001-20565
Application:appl:imf_register:Could not register process
(/ApplicationTest/app_test_start) as part of resource (appl), errno <17>
```

Where errno <17> indicates that the event is already registered with AMF.

However, at this stage the amfstat output does not show this event as registered. After running the amfstat command, the following messages are logged in amfconfig -p dbglog.

```
809261 proff_event.c:240 AMF_TR skipping inactive
event (30017f3c740) 809261 proff_event.c:327 AMF_TR The number
of proff events changed between ioctls ask_cnt=1 I=0
```

Once VCS gets into this state, IMF registration for the particular resource does not succeed, unless the AMF driver is unconfigured and reconfigured. This also causes loss of ProPCV functionality for that resource if applicable. However, traditional monitoring and traditional PCV continues for that resource and the overall functionality remains unaffected.

Workaround: No workaround.

Issues related to the Cluster Manager (Java Console)

This section covers the issues related to the Cluster Manager (Java Console).

Some Cluster Manager features fail to work in a firewall setup [1392406]

In certain environments with firewall configurations between the Cluster Manager and the VCS cluster, the Cluster Manager fails with the following error message:

```
V-16-10-13 Could not create CmdClient. Command Server  
may not be running on this system.
```

Workaround: You must open port 14150 on all the cluster nodes.

VCS Cluster Manager (Java Console) does not encrypt Sybase and SybaseBk agent passwords [2379510]

If `isvcsagentcrypt` flag is set to True in `Sybase.xml` and `SybaseBk.xml` files, the attribute values get encrypted. However, the password attributes of Sybase and SybaseBk agents do not have the `isvcsagentcrypt` flag set to True in `Sybase.xml` and `SybaseBk.xml` files.

Workaround: Sybase and SybaseBk agents are modified to encrypt the password by default. As a result, you need not encrypt passwords if you use the VCS Cluster Manager (Java Console) to configure attributes.

Issues related to Virtual Business Services (VBS)

Fault propagation for Virtual Business Services with shared service groups and different controllers [2407832]

Fault propagation may not work for certain configurations having shared service groups and distinct controllers.

Workaround: No workaround.

Virtual Business Services fail to start if a participating service group has multiple children with the LOCAL FIRM dependency type [2490098]

Virtual Business Services fail to start if a participating service group has multiple children with the LOCAL FIRM dependency type. This occurs because Veritas Cluster Server (VCS) does not support propagating dependencies.

Workaround: Pull the dependent VCS groups into the Virtual Business Services without any dependencies. The Virtual Business Services will recognize the VCS dependencies and treat them as soft Virtual Business Services dependencies.

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 87.

Limitations related to VCS engine

VCS deletes user-defined VCS objects that use the HostMonitor object names

If you had defined the following objects in the `main.cf` file using the reserved words for the HostMonitor daemon, then VCS deletes these objects when the VCS engine starts. [1293092]

- Any group that you defined as `VCSHmg` along with all its resources.
- Any resource type that you defined as `HostMonitor` along with all the resources of such resource type.
- Any resource that you defined as `VCSHm`.

Limitations related to bundled agents

Programs using networked services may stop responding if the host is disconnected

Programs using networked services (for example, NIS, NFS, RPC, or a TCP socket connection to a remote host) can stop responding if the host is disconnected from the network. If such a program is used as an agent entry point, a network disconnect can cause the entry point to stop responding and possibly time out.

For example, if the host is configured to use NIS maps as a client, basic commands such as `ps -ef` can hang if there is network disconnect.

Symantec recommends creating users locally. To reflect local users, configure:

```
/etc/nsswitch.conf
```

Volume agent clean may forcibly stop volume resources

When the attribute `FaultOnMonitorTimeouts` calls the Volume agent clean entry point after a monitor time-out, the `vxvol -f stop` command is also issued. This command forcibly stops all volumes, even if they are still mounted.

False concurrency violation when using PidFiles to monitor application resources

The PID files created by an application contain the PIDs for the processes that are monitored by Application agent. These files may continue to exist even after a node running the application crashes. On restarting the node, the operating system may assign the PIDs listed in the PID files to other processes running on the node.

Thus, if the Application agent monitors the resource using the PidFiles attribute only, the agent may discover the processes running and report a false concurrency violation. This could result in some processes being stopped that are not under VCS control.

Volumes in a disk group start automatically irrespective of the value of the StartVolumes attribute in VCS

Volumes in a disk group are started automatically when the disk group is imported, irrespective of the value of the StartVolumes attribute in VCS. This behavior is observed if the value of the system-level attribute `autostartvolumes` in Veritas Volume Manager is set to On.

Workaround: If you do not want the volumes in a disk group to start automatically after the import of a disk group, set the `autostartvolumes` attribute to Off at the system level.

Online for LDom resource fails [2517350]

Online of LDom resource fails when the boot disk configured in the guest domain that is a part of the virtual disk multi-pathing group (`mpgroup`) and also the primary path to the virtual disk is not available.

This is due to the limitations in Oracle VM Server that do not allow retrying of other device paths that exist for the virtual disks, which are part of a virtual disk multi-pathing group, when booting a guest domain.

Workaround: None.

Zone agent registered to IMF for Directory Online event

The Directory Online event monitors the Zone root directory. If the parent directory of the Zone root directory is deleted or moved to another location, AMF does not provide notification to the Zone agent. In the next cycle of the zone monitor, it detects the change and reports the state of the resource as offline.

LDom resource calls clean entry point when primary domain is gracefully shut down

LDom agent sets failure policy of the guest domain to stop when primary domain stops. Thus when primary domain is shut down, guest domain is stopped. Moreover, when primary domain is shutdown, ldmd daemon is stopped abruptly and LDom configuration cannot be read. These operations are not under VCS control and VCS may call clean entry point.

Workaround: No workaround.

Limitations related to the VCS database agents

DB2 RestartLimit value

When multiple DB2 resources all start at the same time with no dependencies, they tend to interfere or race with each other. This is a known DB2 issue.

The default value for the DB2 agent RestartLimit is 3. This higher value spreads out the re-start of the DB2 resources (after a resource online failure), which lowers the chances of DB2 resources all starting simultaneously. [1231311]

Limitation with intentional offline functionality of VCS agent for Oracle

The Oracle resource never faults after an intentional offline.

Intentional offline functionality of VCS agent for Oracle requires you to enable health check monitoring. The agent uses Oracle's Health Check API to find the state of the database. If the API returns a graceful shutdown for the database, then the agent marks the resource state as INTENTIONAL OFFLINE. Later if the Oracle agent's online function does not succeed, the agent does not mark the resource as FAULTED. The state remains as INTENTIONAL OFFLINE because the agent receives the database state from the API as graceful shutdown during each monitor cycle. [1805719]

Limitations related to global clusters

- Cluster address for global cluster requires resolved virtual IP.
The virtual IP address must have a DNS entry if virtual IP is used for heartbeat agents.
- Total number of clusters in a global cluster configuration can not exceed four.
- Cluster may not be declared as faulted when Symm heartbeat agent is configured even when all hosts are down.

The Symm agent is used to monitor the link between two Symmetrix arrays. When all the hosts are down in a cluster but the Symm agent is able to see the replication link between the local and remote storage, it would report the heartbeat as ALIVE. Due to this, DR site does not declare the primary site as faulted.

Engine hangs when you perform a global cluster upgrade from 5.0MP3 in mixed-stack environments [1820327]

If you try to upgrade a mixed stack VCS environment (where IPv4 and IPv6 are in use), from 5.0MP3 to 5.1SP1, HAD may hang.

Workaround: When you perform an upgrade from 5.0MP3, make sure no IPv6 addresses are plumbed on the system..

Use VCS installer to install or upgrade VCS when the zone root is on VxFS shared storage [1215671]

You must use the VCS installer program to install or upgrade VCS when the zone root is on Veritas File System (VxFS).

Systems in a cluster must have same system locale setting

VCS does not support clustering of systems with different system locales. All systems in a cluster must be set to the same locale.

Limitations with DiskGroupSnap agent

The DiskGroupSnap agent has the following limitations:

- The DiskGroupSnap agent does not support layered volumes. [1368385]
- If you use the Bronze configuration for the DiskGroupSnap resource, you could end up with inconsistent data at the secondary site in the following cases: [1391445]
 - After the fire drill service group is brought online, a disaster occurs at the primary site during the fire drill.
 - After the fire drill service group is taken offline, a disaster occurs at the primary while the disks at the secondary are resynchronizing.

Symantec recommends that you use the Gold configuration for the DiskGroupSnap resource.

Cluster Manager (Java console) limitations

This section covers the software limitations for Cluster Manager (Java Console).

Cluster Manager (Java Console) version 5.1 and lower cannot manage VCS 6.0 secure clusters

Cluster Manager (Java Console) from versions lower than VCS 5.1 cannot be used to manage VCS 6.0 secure clusters. Symantec recommends using the latest version of Cluster Manager.

See the *Veritas Cluster Server Installation Guide* for instructions on upgrading Cluster Manager.

Cluster Manager does not work if the hosts file contains IPv6 entries

VCS Cluster Manager fails to connect to the VCS engine if the `/etc/hosts` file contains IPv6 entries.

Workaround: Remove IPv6 entries from the `/etc/hosts` file.

VCS Simulator does not support I/O fencing

When running the Simulator, be sure the `UseFence` attribute is set to the default, "None".

Limited support from Cluster Manager (Java console)

Features introduced in VCS 6.0 may not work as expected with Java console. However, CLI option of the simulator supports all the VCS 6.0 features. You are recommended to use Veritas Operations Manager (VOM) since all new features are already supported in VOM. However, Java console may continue to work as expected with features of releases prior to VCS 6.0.

Port change required to connect to secure cluster [2615068]

In order to connect to secure cluster, the default port must be changed from 2821 to 14149. You must choose **Advanced settings** in the **Login** dialog box and change **IP: 2821** to **IP: 14149** for secure cluster login.

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.

Documentation errata

The following sections cover additions or corrections for Document version: 6.0.4 of the product documentation. These additions or corrections may be included in later versions of the product documentation that can be downloaded from the Symantec Support website and the Symantec Operations Readiness Tools (SORT).

See the corresponding Release Notes for documentation errata related to that component or product.

See [“Documentation”](#) on page 87.

See [“About Symantec Operations Readiness Tools”](#) on page 9.

Veritas Cluster Server Bundled Agents Reference Guide

Topic: MultiNICA agent > Attributes

The Device attribute description also needs to mention the following:

Device attribute must be localized per system and must have different base IP addresses (as explained in *Sample Configuration: IPMultiNIC and MultiNICA of IPMultiNIC agent*).

Veritas Cluster Server Installation Guide

In the *Upgrading using Live Upgrade* chapter, use the `vxlustart` command instead of the `vcslustart` command in all instances.

The note in the *Supported software for VCS* section must read as VCS supports the previous and the next versions of SF to facilitate product upgrades.

Veritas Storage Foundation and High Availability Virtualization Guide

The following errata applies to the *Veritas Storage Foundation and High Availability Virtualization Guide*.

"To enable Oracle Disk Manager file access from non-global zones with Veritas File System" procedure is missing some steps

This procedure is in the "Veritas extension for Oracle Disk Manager" section of Chapter 2 "Storage Foundation and High Availability Solutions support for Solaris Zones." The procedure is missing the following steps:

4 Enable the `vxfsldlic` service. To do so, use the following commands in the Solaris global zone:

```
# mkdir /zones/zone_name/root/var/svc/manifest/system/vxfs
# cp /var/svc/manifest/system/vxfs/vxfsldlic.xml \
/zones/zone_name/root/var/svc/manifest/system/vxfs
```

5 If you do not inherit `/lib` in the local zone, enter the following command:

```
# cp /lib/svc/method/vxfsldlic /zones/zone_name/root/lib/svc/method
```

6. Enter the following commands in the Solaris local zone:

```
# svccfg import /var/svc/manifest/system/vxfs/vxfsldlic.xml
# svcadm enable vxfsldlic
```

7 Enable `vxodm` service:

```
# svcadm enable vxodm
```

Documentation

Product guides are available in the PDF format on the software media in the `/product_name/docs` 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 1-6](#) lists the documents for Veritas Cluster Server.

Table 1-6 Veritas Cluster Server documentation

| Title | File name |
|--|--|
| <i>Veritas Cluster Server Installation Guide</i> | <code>vcs_install_60_sol.pdf</code> |
| <i>Veritas Cluster Server Release Notes</i> | <code>vcs_notes_60_sol.pdf</code> |
| <i>Veritas Cluster Server Administrator's Guide</i> | <code>vcs_admin_60_sol.pdf</code> |
| <i>Veritas Cluster Server Bundled Agents Reference Guide</i> | <code>vcs_bundled_agents_60_sol.pdf</code> |
| <i>Veritas Cluster Server Agent Developer's Guide</i> | <code>vcs_agent_dev_60_unix.pdf</code> |

Table 1-6 Veritas Cluster Server documentation (*continued*)

| Title | File name |
|--|---------------------------------|
| <i>Veritas Cluster Server Application Note: Dynamic Reconfiguration for Oracle Servers</i> | vcs_dynamic_reconfig_60_sol.pdf |
| <i>Veritas Cluster Server Agent for DB2 Installation and Configuration Guide</i> | vcs_db2_agent_60_sol.pdf |
| <i>Veritas Cluster Server Agent for Oracle Installation and Configuration Guide</i> | vcs_oracle_agent_60_sol.pdf |
| <i>Veritas Cluster Server Agent for Sybase Installation and Configuration Guide</i> | vcs_sybase_agent_60_sol.pdf |

Table 1-7 lists the documentation for Veritas Storage Foundation and High Availability Solutions products.

Table 1-7 Veritas Storage Foundation and High Availability Solutions products documentation

| Document title | File name |
|--|--------------------------------|
| <i>Veritas Storage Foundation and High Availability Solutions Solutions Guide</i> | sfha_solutions_60_sol.pdf |
| <i>Veritas Storage Foundation and High Availability Solutions Virtualization Guide</i> | sfha_virtualization_60_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>

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.

New features related to Virtual Business Services (VBS)

Virtual Business Services (VBS) feature extends the VOM Business Entity (BE) functionality available since VOM 3.x release. VOM BE support Application Entity type which is hence forth referred to as Virtual Business Services (VBS) in VOM 4.1 and SFHA 6.1 releases. Virtual Business Services allow users to define and manage heterogeneous, inter-cluster, multi-tier applications. Each tier is represented by a Service Group which may be configured on separate VCS Clusters or ApplicationHA nodes. VBS builds on top of VCS HA/DR and ApplicationHA to provide business service availability across physical and virtual environments. The application tiers (Service Group) can optionally be linked with configurable dependency types and fault actions.

Ordered Start/Stop operations on a VBS

VBS allows ordered start/stop of the entire business service via a single click or through a single command-line interface. If applications are hosted on VMWare virtual machines, you can configure the virtual machines to be automatically started or stopped when you start or stop the Virtual Business Service.

Ability to perform VBS operations via CLI

You can work on Virtual Business Services using CLI from any node of any participating tier clusters. Thus VOM CS is optional after you have configured VBS.

DR support for VBS

VBS provides a comprehensive DR solution that builds on top of VCS DR. The DR support is based on having one or more GCO Service Groups in the VBS.

VBS support for robust fault management

VBS provides robust fault management with configurable actions like stopping, starting, restarting a Service Group (application tier) when the child Service Group

faults or recovers. Three dependency types (viz. Soft, Firm, Restart) are supported between Service Groups configured within a VBS.

Secure access control for Virtual Business Services

Operations on a VBS via CLI are permitted only for root users in the participating tiers. Operations through VOM support role based access control (RBAC).

Audit trail of operations performed on a VBS

All user actions performed on a VBS are easily traceable via audit trail and logs.