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Veritas Storage Foundation™ and High Availability Solutions 4.1 Maintenance Pack 4 Rolling Patch 2

Introduction

This document provides release information about Rolling Patch 2 for the Veritas Storage Foundation and High Availability Solutions 4.1 Maintenance Pack 4 release on the Linux platform. The Rolling Patch adds kernel support for SUSE Linux Enterprise Server 9 Service Pack 4 and includes some fixed issues.

Supported Platforms

This section provides information on the following:

Supported Platforms for Veritas Storage Foundation and High Availability Solutions

Rolling Patch 2 (RP2) for Veritas Storage Foundation and High Availability Solutions 4.1 Maintenance Pack 4 can only be installed on the following Linux operating systems and kernel binaries distributed by Red Hat and SUSE.

Note SFRAC does not support the following
- RHEL5
- SLES9 on x86 (32-bit) architecture
- SLES10 and SLES10 SP1
- IA64 (Intel) architecture

Operating System	Architecture	Kernel
Red Hat Enterprise Linux 4 Update 1	x86 (32-bit)	2.6.9-11EL, ELsmp, ELhugemem
	x86_64 (Intel Xeon, AMD Opteron)	2.6.9-11EL, ELsmp
	IA64 (Intel)	2.6.9-11EL
Red Hat Enterprise Linux 4 Update 2	x86 (32-bit)	2.6.9-22EL, ELsmp, ELhugemem
	x86_64 (Intel Xeon, AMD Opteron)	2.6.9-22EL, ELsmp
	IA64 (Intel)	2.6.9-22EL
Red Hat Enterprise Linux 4 Update 3	x86 (32-bit)	2.6.9-34EL, ELsmp, ELhugemem
	x86_64 (Intel Xeon, AMD Opteron)	2.6.9-34EL, ELsmp, ELlargesmp
	IA64 (Intel)	2.6.9-34EL, ELlargesmp
Red Hat Enterprise Linux 4 Update 4	x86 (32-bit)	2.6.9-42EL, ELsmp, ELhugemem
	x86_64 (Intel Xeon, AMD Opteron)	2.6.9-42EL, ELsmp, ELlargesmp
	IA64 (Intel)	2.6.9-42EL, ELlargesmp

Operating System	Architecture	Kernel
Red Hat Enterprise Linux 5	x86 (32-bit)	2.6.18-8.el5
	x86_64 (Intel Xeon, AMD Opteron)	2.6.18-8.el5
	IA64 (Intel)	2.6.18-8.el5
SUSE Linux Enterprise Server 9 Service Pack 1	x86 (32-bit)	2.6.5-7.139, 145, 147, 151-smp, bigsmp, default
	x86_64 (Intel Xeon, AMD Opteron)	2.6.5-7.139, 145, 147, 151-smp, default
	IA64 (Intel)	2.6.5-7.139, 145, 147, 151-default
SUSE Linux Enterprise Server 9 Service Pack 2	x86 (32-bit)	2.6.5-7.195, 201, 202-bigsmp, default, smp
	x86_64 (Intel Xeon, AMD Opteron)	2.6.5-7.195, 201, 202-smp, default
	IA64 (Intel)	2.6.5-7.195, 201, 202-default
SUSE Linux Enterprise Server 9 Service Pack 3	x86 (32-bit)	2.6.5-7.244, 252, 276, bigsmp, default, smp
	x86_64 (Intel Xeon, AMD Opteron)	2.6.5-7.244, 252, 276-smp, default
	IA64 (Intel)	2.6.5-7.244, 252, 276-default
SUSE Linux Enterprise Server 9 Service Pack 4	x86_64 (Intel Xeon, AMD Opteron)	2.6.5-7.308
	IA64 (Intel)	2.6.5-7.308-default
SUSE Linux Enterprise Server 10	x86 (32-bit)	2.6.16.21-0.8-smp, default, bigsmp
	x86_64 (Intel Xeon, AMD Opteron)	2.6.16.21-0.8-smp, default
	IA64 (Intel)	2.6.16.21-0.8-default
SUSE Linux Enterprise Server 10 Service Pack 1	x86 (32-bit)	2.6.16.46-0.5-smp, default, bigsmp
	x86_64 (Intel Xeon, AMD Opteron)	2.6.16.46-0.5-smp, default
	IA64 (Intel)	2.6.16.46-0.5-default

Warning Storage Foundation supports SUSE Linux Enterprise Server 9 Service Pack 4 with this Rolling Patch release. However, customers running EMC PowerPath should not upgrade to SUSE Linux Enterprise Server 9 Service Pack 4 until it is officially supported by EMC.

About Updates on Supported Platform Information

In addition to the platforms mentioned in this document, Veritas products will also operate on subsequent kernel and patch releases provided the operating systems maintain kernel ABI (application binary interface) compatibility.

Information about the latest supported Red Hat erratas and updates and SUSE service packs is available in the following TechNote. Read this TechNote *before* installing any Veritas™ product.

http://support.veritas.com/docs/277033

For further details, depending on the product for which you want to install this Rolling Patch, refer to one of the following Release Notes document for 4.1 MP4:

- *Veritas Cluster Server Release Notes*
- *Veritas Storage Foundation Release Notes*
- *Veritas Storage Foundation for Cluster File System Release Notes*
- *Veritas Storage Foundation for Oracle RAC Release Notes*

Fixed Issues

This section provides information on the following:

VCS Fixed Issues

The following Veritas Cluster Server (VCS) incidents are fixed in this Rolling Patch:

Incident	Fix Description
1211385	Revamped the mechanism to load llt/gab modules to support new operating system kernel updates.
1211445	Revamped the mechanism to load diskres module to support new operating system kernel updates.
1211541	Revamped the mechanism to load vxfen module to support new operating system kernel updates.

VxVM Fixed Issues

The following Veritas Volume Manager (VxVM) incidents are fixed in this Rolling Patch:

Incident	Description
1168032	Core dump occurs while starting vxconfigd.
1183235	The `vxdisk scandisk` command shows "ddl_get_dynamic_attr: Could not do stat on path /dev/c1d0" error messages for `/dev/cciss/*` devices.

Incident	Description
1205965	When a DCO volume is grown, it moves to another disk ignoring the storage specifications with constraint allocations.
1210268	The `vxresize` command fails on file systems less than or equal to 4TB.

VxFS Fixed Issues

The following Veritas File System (VxFS) incidents are fixed in this Rolling Patch:

Incident	Description
1135784	The delaylog mode support is to be added to the cluster file system mount options.
1163182	uiomove() does not handle kernel-space copies for cloned processes.
1169621	File record locks are incorrectly taken in vx_frlock.
1198311	Error messages are encountered while running LM commands.
1199279	System panic occurs due to integer overflow in page flush code, when the code is used on volumes with large stripe sizes.
1207161	The mapping provider returns incorrect directory entries.
1256572	The VxFS Management Services Provider's UUID processing on Linux bypasses DMP and causes a trespass.

SFRAC Fixed Issues

The following Storage Foundation for Oracle RAC incidents are fixed in this Rolling Patch:

Incident	Description
1210799	Change vcsmm rc script to use new modload scheme.
1210800	Change lmx rc script to use new modload scheme.

Downloading the RP2 Archive

The patches comprising the RP2 release are available for download from the Veritas website. After downloading the RP2 file, use the `tar` command to uncompress and extract the archive.

Packages Included in this Rolling Patch

This section provides information on the following:

Packages for Cluster Server

The following packages are included in this rolling patch for Cluster Server on Red Hat Enterprise Linux:

Operating System	Arch.	Packages
Red Hat Enterprise Linux 4	x86	VRTSgab-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL4.i686.rpm
	x86_64	VRTSgab-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm
	IA64	VRTSgab-4.1.40.20-MP4RP2_RHEL4.ia64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL4.ia64.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL4.ia64.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL4.ia64.rpm
Red Hat Enterprise Linux 5	x86	VRTSgab-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL5.i686.rpm
	x86_64	VRTSgab-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm
	IA64	VRTSgab-4.1.40.20-MP4RP2_RHEL5.ia64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_RHEL5.ia64.rpm VRTSllt-4.1.40.20-MP4RP2_RHEL5.ia64.rpm VRTSvxfen-4.1.40.20-MP4RP2_RHEL5.ia64.rpm

The following packages are included in this rolling patch for Cluster Server on SUSE Linux Enterprise Server:

Operating System	Arch.	Packages
SUSE Linux Enterprise Server 9	x86	VRTSgab-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSllt-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES9.i586.rpm
	x86_64	VRTSgab-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSllt-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES9.x86_64.rpm
	IA64	VRTSgab-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSllt-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES9.ia64.rpm
SUSE Linux Enterprise Server 10	x86	VRTSgab-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSllt-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES10.i586.rpm
	x86_64	VRTSgab-4.1.40.20-MP4RP2_SLES10.x86_64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES10.x86_64.rpm VRTSllt-4.1.40.20-MP4RP2_SLES10.x86_64.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES10.x86_64.rpm
	IA64	VRTSgab-4.1.40.20-MP4RP2_SLES10.ia64.rpm VRTSvcsdr-4.1.40.20-MP4RP2_SLES10.ia64.rpm VRTSllt-4.1.40.20-MP4RP2_SLES10.ia64.rpm VRTSvxfen-4.1.40.20-MP4RP2_SLES10.ia64.rpm

Packages for Storage Foundation

The following packages are included in this rolling patch for Storage Foundation on Red Hat Enterprise Linux:

Operating System	Arch.	Packages
Red Hat Enterprise Linux 4	x86	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL4.i686.rpm
	x86_64	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL4.i686.rpm
	IA64	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL4.ia64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL4.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL4.ia64.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL4.i686.rpm

Operating System	Arch.	Packages
Red Hat Enterprise Linux 5	x86	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL5.i686.rpm
	x86_64	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL5.x86_64.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL5.i686.rpm
	IA64	VRTSvxfs-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_RHEL5.ia64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_RHEL5.i686.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_RHEL5.ia64.rpm VRTSfspro-4.1.40.20-MP4RP2_RHEL5.i686.rpm

The following packages are included in this rolling patch for Storage Foundation on SUSE Linux Enterprise Server:

Operating System	Arch.	Packages
SUSE Linux Enterprise Server 9	x86	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSglm-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSgms-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSodm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSodm-platform-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES9.i586.rpm
	x86_64	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSglm-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSgms-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSodm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSodm-platform-4.1.40.20-MP4RP2_SLES9.x86_64.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES9.i586.rpm
	IA64	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSglm-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSgms-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSodm-common-4.1.40.20-MP4RP2_SLES9.i586.rpm VRTSodm-platform-4.1.40.20-MP4RP2_SLES9.ia64.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES9.i586.rpm

Operating System	Arch.	Packages
SUSE Linux Enterprise Server 10	x86	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES10.i586.rpm
	x86_64	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES10.x86_64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES10.x86_64.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES10.i586.rpm
	IA64	VRTSvxfs-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxfs-platform-4.1.40.20-MP4RP2_SLES10.ia64.rpm VRTSvxvm-common-4.1.40.20-MP4RP2_SLES10.i586.rpm VRTSvxvm-platform-4.1.40.20-MP4RP2_SLES10.ia64.rpm VRTSfspro-4.1.40.20-MP4RP2_SLES10.i586.rpm

Packages for Storage Foundation for Oracle RAC

In addition to the VCS and SF RP2 packages, the following packages are included in this rolling patch for Storage Foundation for Oracle RAC:

Operating System	Arch.	Packages
Red Hat Enterprise Linux 4	x86 (32-bit)	VRTSdbac-4.1.40.20-MP4RP2_RHEL4.i686.rpm
	x86_64	VRTSdbac-4.1.40.20-MP4RP2_RHEL4.x86_64.rpm
SUSE Linux Enterprise Server 9	x86_64	VRTSdbac-4.1.40.20-MP4RP2_SLES9.x86_64.rpm

Installing RP2

The following sections contain instructions for installing this rolling patch:

- Installing RP2 on a Cluster

  Use the procedures in this section to install RP2 on a cluster that has SFCFS, SFRAC, or VCS installed.

- Installing RP2 on a Standalone System

  Use this procedure to install RP2 on a system that has SF installed.

Installing RP2 on a Cluster

An upgrade on a cluster requires stopping cluster failover functionality during the entire procedure. However, if you use CFS and CVM, the CFS and CVM services remain available. The upgrade is performed in several stages:

- Freeze service group operations and stop VCS on the cluster.
- Select a group of one or more cluster nodes to upgrade, and leave a group of one or more nodes running.
- Take the first group offline and install the software patches.
- Bring the first group (with the newly installed patches) online to restart cluster failover services.
- Upgrade the nodes in the second group, and bring them online. The cluster is fully restored.

Depending on the clusters, you can use the following procedures to install RP2:

- Installing RP2 on a VCS Cluster
- Installing RP2 on an SFCFS cluster
- Installing RP2 on an SFRAC cluster

Installing RP2 on a VCS Cluster

To install RP2 on a cluster:

1. Log in as superuser.
2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.
3. Switch the service group to a node that is running.

   # **hagrp -switch *service_group* -to *nodename***

4. Make the VCS configuration writable. On a node that you want to upgrade, type:

   # **haconf -makerw**

5. Freeze the HA service group operations. Enter the following command on each node if you selected a group of nodes to upgrade:

   # **hasys -freeze -persistent *nodename***

6. Make the VCS configuration read-only:

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

7. Select the group of nodes that are to be upgraded first, and follow step 8 through step 18 for these nodes.

8. Stop VCS. Enter the following command on each node in the group that is upgraded:

   ```
   # hastop -local
   ```

9. Stop the VCS command server:

   ```
   # killall CmdServer
   ```

10. Stop cluster fencing, GAB, and LLT.

    ```
    # /etc/init.d/vxfen stop
    # /etc/init.d/gab stop
    # /etc/init.d/llt stop
    ```

11. If required, you can upgrade the nodes at this stage, and patch them to a supported kernel version.

    See "Supported Platforms" on page 2.

12. On each node, run the following commands to upgrade to 4.1 MP4 RP2.

    ```
    # rpm -Uvh VRTSllt-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSgab-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfen-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvcsdr-4.1.40.20-MP4RP2_dist.arch.rpm
    ```

    where *dist* is the supported Linux distribution and *arch* is the supported Linux architecture.

    See "Supported Platforms" on page 2.

    See "Packages for Cluster Server" on page 6.

13. Shut down and reboot each of the upgraded nodes. After the nodes come back up, application failover capability is available for that group.

14. Run the following commands to start VCS:

    ```
    # /etc/init.d/llt start
    # /etc/init.d/gab start
    # /etc/init.d/vxfen start
    # /etc/init.d/vcs start
    ```

15. Make the VCS configuration writable again from any node in the upgraded group:

    ```
    # haconf -makerw
    ```

16. Unfreeze the service group operations. Perform this task on each node if you had upgraded a group of nodes.:

    ```
    # hasys -unfreeze -persistent nodename
    ```

17. Make the VCS configuration read-only:

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

18. Switch the service group to the original node:

```
# hagrp -switch service_group -to nodename
```

19. Repeat step 8 through step 18 for the second group of nodes.

Installing RP2 on an SFCFS cluster

To install RP2 on a cluster:

1. Log in as superuser.
2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.
3. Switch the service group to a node that is running.

```
# hagrp -switch service_group -to nodename
```

4. From any node in the cluster, make the VCS configuration writable:

```
# haconf -makerw
```

5. Enter the following command to freeze HA service group operations on each node:

```
# hasys -freeze -persistent nodename
```

6. Make the configuration read-only:

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

7. Select the group of nodes that are to be upgraded first, and follow step 8 through step 34 for these nodes.
8. Stop VCS by entering the following command on each node in the group being upgraded:

```
# hastop -local
```

9. Stop the VCS command server:

```
# killall CmdServer
```

10. Unregister CFS from GAB.

```
# fsclustadm cfsdeinit
```

11. Stop cluster fencing, GAB, and LLT.

```
# /etc/init.d/vxfen stop
# /etc/init.d/gab stop
# /etc/init.d/llt stop
```

12. Check if each node's root disk is under VxVM control by running this command.

```
# df -v /
```

The root disk is under VxVM control if `/dev/vx/dsk/rootvol` is listed as being mounted as the root (`/`) file system. If so, unmirror and unencapsulate the root disk as described in the following steps:

a. Use the `vxplex` command to remove all the plexes of the volumes `rootvol`, `swapvol`, `usr`, `var`, `opt` and `home` that are on disks other than the root disk.

For example, the following command removes the plexes `mirrootvol-01`, and `mirswapvol-01` that are configured on a disk other than the root disk:

```
# vxplex -o rm dis mirrootvol-01 mirswapvol-01
```

Note Do not remove the plexes on the root disk that correspond to the original disk partitions.

b. Enter the following command to convert all the encapsulated volumes in the root disk back to being accessible directly through disk partitions instead of through volume devices. There must be at least one other disk in the `rootdg` disk group in addition to the root disk for `vxunroot` to succeed.

```
# /etc/vx/bin/vxunroot
```

Following the removal of encapsulation, the system is rebooted from the unencapsulated root disk.

13. If required, you can upgrade the nodes at this stage, and patch them to a supported kernel version.

See "Supported Platforms" on page 2.

14. On each node, use the following command to check if any Storage Checkpoints are mounted:

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

If any Storage Checkpoints are mounted, on each node in the cluster unmount all Storage Checkpoints.

```
# umount /checkpoint_name
```

15. On each node, use the following command to check if any VxFS file systems are mounted:

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

a. If any VxFS file systems are present, on each node in the cluster unmount all the VxFS file systems:

```
# umount /filesystem
```

b. On each node, verify that all file systems have been cleanly unmounted:

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

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

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

```
# fsck -t vxfs filesystem
```


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

This should complete any extended operations that were outstanding on the file system and unmount the file system cleanly.

There may be a pending large fileset clone removal extended operation if the `umount` command fails with the following error:

```
file system device busy
```

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

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

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

e. Repeat the following command to verify that the unclean file system is now clean:

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

16. If you have created any Veritas Volume Replicator (VVR) replicated volume groups (RVGs) on your system, perform the following steps:

a. Stop all applications that are involved in replication. For example, if a data volume contains a file system, unmount it.

b. Use the `vxrvg stop` command to stop each RVG individually:

```
# vxrvg -g diskgroup stop rvg_name
```

c. On the Primary node, use the `vxrlink status` command to verify that all RLINKs are up-to-date:

```
# vxrlink -g diskgroup status rlink_name
```

Caution To avoid data corruption, do not proceed until all RLINKs are up-to-date.

17. Stop activity to all VxVM volumes.

For example, stop any applications such as databases that access the volumes, and unmount any file systems that have been created on the volumes.

18. On each node, stop all VxVM volumes by entering the following command for each disk group:

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

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

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

19. Check if the VEA service is running:

```
# /opt/VRTS/bin/vxsvcctrl status
```

If the VEA service is running, stop it:

```
# /opt/VRTS/bin/vxsvcctrl stop
```

20. On each node, run the following commands to upgrade to 4.1 MP4 RP2.

    See "Supported Platforms" on page 2.

    See "Packages for Storage Foundation" on page 7.

    ```
    # rpm -Uvh VRTSvxvm-common-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxvm-platform-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfs-common-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfs-platform-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSllt-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSgab-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfen-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvcsdr-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSglm-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSfspro-4.1.40.20-MP4RP2_dist.arch.rpm
    ```

    where *dist* is RHEL4, RHEL5, SLES9, or SLES10 and *arch* is i586, i686, ia64,or x86_64 as appropriate.

21. Shut down and reboot each of the upgraded nodes. After the nodes come back up, application failover capability is available for that group.

22. If you need to re-encapsulate and mirror the root disk on each of the nodes, follow the procedures in the "Administering Disks" chapter of the *Veritas Volume Manager Administrator's Guide*.

23. If necessary, reinstate any missing mount points in the `/etc/fstab` file on each node.

24. Run the following commands to start the SFCFS processes:

    ```
    # /etc/init.d/llt start
    # /etc/init.d/gab start
    # /etc/init.d/vxfen start
    # /etc/init.d/vcs start
    ```

25. Make the VCS configuration writable again from any node in the upgraded group:

    ```
    # haconf -makerw
    ```

26. Enter the following command on each node in the upgraded group to unfreeze HA service group operations:

    ```
    # hasys -unfreeze -persistent nodename
    ```

27. Make the configuration read-only:

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

28. Switch the service group to the original node:

    ```
    # hagrp -switch service_group -to nodename
    ```

29. Bring the CVM service group online on each node in the upgraded group:

    ```
    # hagrp -online cvm -sys nodename
    ```


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

    # **vxvol -g *diskgroup* startall**

31. If you stopped any RVGs in step 16, restart each RVG:

    # **vxrvg -g *diskgroup* start *rvg_name***

32. Remount all VxFS file systems on all nodes:

    # **mount */filesystem***

33. Remount all Storage Checkpoints on all nodes:

    # **mount */checkpoint_name***

34. Check if the VEA service was restarted:

    # **/opt/VRTS/bin/vxsvcctrl status**

    If the VEA service is not running, restart it:

    # **/opt/VRTS/bin/vxsvcctrl start**

35. Repeat step 8 through step 34 for the second group of nodes.

Installing RP2 on an SFRAC cluster

To install RP2 on a cluster:

1. Log in as superuser.
2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.
3. Switch the service group to a node that is running.

    # **hagrp -switch *service_group* -to *nodename***

4. From any node in the cluster, make the VCS configuration writable:

    # **haconf -makerw**

5. Enter the following command to freeze HA service group operations on each node:

    # **hasys -freeze -persistent *nodename***

6. Make the configuration read-only:

    # **haconf -dump -makero**

7. Select the group of nodes that are to be upgraded first, and follow step 8 through step 33 for these nodes.
8. Stop all Oracle resources and the database on all nodes if there are any.

    If you use Oracle 10g, you must also stop CRS on all nodes:

a. If CRS is controlled by VCS:

As superuser, enter the following command on each node in the cluster.

```
# hares -offline cssd-resource -sys nodename
```

b. If CRS is not controlled by VCS:

Use the following command on each node to stop CRS.

```
# /etc/init.d/init.crs stop
```

On stopping CRS if any gsd relevant process remains alive, you must kill that process.

9. Stop VCS by entering the following command on each node in the group being upgraded:

```
# hastop -local
```

10. Stop the VCS command server:

```
# killall CmdServer
```

11. Stop VCSMM and LMX if they are running.

```
# /etc/init.d/vcsmm stop
# /etc/init.d/lmx stop
```

12. Unregister CFS from GAB.

```
# fsclustadm cfsdeinit
```

13. Stop cluster fencing, GAB, and LLT.

```
# /etc/init.d/vxfen stop
# /etc/init.d/gab stop
# /etc/init.d/llt stop
```

14. Check if each node's root disk is under VxVM control by running this command.

```
# df -v /
```

The root disk is under VxVM control if `/dev/vx/dsk/rootvol` is listed as being mounted as the root (`/`) file system. If so, unmirror and unencapsulate the root disk as described in the following steps:

a. Use the `vxplex` command to remove all the plexes of the volumes `rootvol`, `swapvol`, `usr`, `var`, `opt` and `home` that are on disks other than the root disk.

For example, the following command removes the plexes `mirrootvol-01`, and `mirswapvol-01` that are configured on a disk other than the root disk:

```
# vxplex -o rm dis mirrootvol-01 mirswapvol-01
```

Note Do not remove the plexes on the root disk that correspond to the original disk partitions.

b. Enter the following command to convert all the encapsulated volumes in the root disk back to being accessible directly through disk partitions instead of through volume devices. There must be at least one other disk in the `rootdg` disk group in addition to the root disk for `vxunroot` to succeed.

```
# /etc/vx/bin/vxunroot
```


Following the removal of encapsulation, the system is rebooted from the unencapsulated root disk.

15. If required, you can upgrade the nodes at this stage, and patch them to a supported kernel version.

Note If you are upgrading an SFRAC cluster, you must upgrade the nodes at this stage to one of the operating system versions that this RP release supports.

See "Supported Platforms" on page 2.

16. On each node, use the following command to check if any VxFS file systems are mounted:

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

c. If any VxFS file systems are present, on each node in the cluster unmount all the VxFS file systems:

```
# umount /filesystem
```

d. On each node, verify that all file systems have been cleanly unmounted:

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

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

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

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

This should complete any extended operations that were outstanding on the file system and unmount the file system cleanly.

There may be a pending large fileset clone removal extended operation if the `umount` command fails with the following error:

```
file system device busy
```

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

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

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

g. Repeat the following command to verify that the unclean file system is now clean:

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

17. Stop activity to all VxVM volumes.

For example, stop any applications such as databases that access the volumes, and unmount any file systems that have been created on the volumes.

18. On each node, stop all VxVM volumes by entering the following command for each disk group:

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

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

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

19. Check if the VEA service is running:

    ```
    # /opt/VRTS/bin/vxsvcctrl status
    ```

    If the VEA service is running, stop it:

    ```
    # /opt/VRTS/bin/vxsvcctrl stop
    ```

20. On each node, run the following commands to upgrade to 4.1 MP4 RP2.

    ```
    # rpm -Uvh VRTSvxvm-common-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxvm-platform-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfs-common-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfs-platform-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSllt-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSgab-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvxfen-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSvcsdr-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSglm-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSgms-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSodm-common-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSodm-platform-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSdbac-4.1.40.20-MP4RP2_dist.arch.rpm
    # rpm -Uvh VRTSfspro-4.1.40.20-MP4RP2_dist.arch.rpm
    ```

    where *dist* is RHEL4 or SLES9 and *arch* is i686 or x86_64 as appropriate.

    See "Supported Platforms" on page 2.

    See "Packages Included in this Rolling Patch" on page 6.

21. Shut down and reboot each of the upgraded nodes. After the nodes come back up, application failover capability is available for that group.

22. If you need to re-encapsulate and mirror the root disk on each of the nodes, follow the procedures in the "Administering Disks" chapter of the *Veritas Volume Manager Administrator's Guide*.

23. If necessary, reinstate any missing mount points in the `/etc/fstab` file on each node.

24. Run the following commands to start the SFRAC processes:

    ```
    # /etc/init.d/llt start
    # /etc/init.d/gab start
    # /etc/init.d/vxfen start
    # /etc/init.d/vcsmm start
    # /etc/init.d/lmx start
    # /etc/init.d/vcs start
    ```


25. Make the VCS configuration writable again from any node in the upgraded group:

    # **haconf -makerw**

26. Enter the following command on each node in the upgraded group to unfreeze HA service group operations:

    # **hasys -unfreeze -persistent *nodename***

27. Make the configuration read-only:

    # **haconf -dump -makero**

28. Switch the service group to the original node:

    # **hagrp -switch *service_group* -to *nodename***

29. Bring the CVM service group online on each node in the upgraded group:

    # **hagrp -online cvm -sys *nodename***

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

    # **vxvol -g *diskgroup* startall**

31. If CRS is not controlled by VCS, use the following command on each node to start CRS.

    # **/etc/init.d/init.crs start**

32. Remount all VxFS file systems on all nodes:

    # **mount */filesystem***

33. Check if the VEA service was restarted:

    # **/opt/VRTS/bin/vxsvcctrl status**

    If the VEA service is not running, restart it:

    # **/opt/VRTS/bin/vxsvcctrl start**

34. Repeat step 8 through step 33 for the second group of nodes.

35. Relink Oracle's CRS and database libraries for SFRAC:

    a. Run:

    /opt/VRTS/install/installsfrac -configure

    b. Choose the correct relinking option for your version of Oracle:

    - Relink SFRAC for Oracle 9i (Only for RHEL4)
    - Relink SFRAC for Oracle 10g Release 1
    - Relink SFRAC for Oracle 10g Release 2

Installing RP2 on a Standalone System

You can use this procedure to install RP2 on a standalone system that runs SF.

To install RP2 on a standalone system:

1. Log in as superuser.

2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.

3. Check if the root disk is under VxVM control by running this command:

   ```
   # df -v /
   ```

   The root disk is under VxVM control if `/dev/vx/dsk/rootvol` is listed as being mounted as the root (`/`) file system. If so, unmirror and unencapsulate the root disk as described in the following steps:

   a. Use the `vxplex` command to remove all the plexes of the volumes `rootvol`, `swapvol`, `usr`, `var`, `opt` and `home` that are on disks other than the root disk.

      For example, the following command removes the plexes `mirrootvol-01`, and `mirswapvol-01` that are configured on a disk other than the root disk:

      ```
      # vxplex -o rm dis mirrootvol-01 mirswapvol-01
      ```

   Note Do not remove the plexes on the root disk that correspond to the original disk partitions.

   b. Enter the following command to convert all the encapsulated volumes in the root disk back to being accessible directly through disk partitions instead of through volume devices. There must be at least one other disk in the `rootdg` disk group in addition to the root disk for `vxunroot` to succeed.

      ```
      # /etc/vx/bin/vxunroot
      ```

      Following the removal of encapsulation, the system is rebooted from the unencapsulated root disk.

4. If required, you can upgrade the system at this stage, and patch it to a supported kernel version.

5. Use the following command to check if any VxFS file systems or Storage Checkpoints are mounted:

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

6. Unmount all Storage Checkpoints and file systems:

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

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

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

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

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

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

This should complete any extended operations that were outstanding on the file system and unmount the file system cleanly.

There may be a pending large fileset clone removal extended operation if the `umount` command fails with the following error:

```
file system device busy
```

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

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

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

c. Repeat step 7 to verify that the unclean file system is now clean.

8. If you have created any Veritas Volume Replicator (VVR) replicated volume groups (RVGs) on your system, perform the following steps:

a. Stop all applications that are involved in replication. For example, if a data volume contains a file system, unmount it.

b. Use the `vxrvg stop` command to stop each RVG individually:

```
# vxrvg -g diskgroup stop rvg_name
```

c. On the Primary node, use the `vxrlink status` command to verify that all RLINKs are up-to-date:

```
# vxrlink -g diskgroup status rlink_name
```

Caution To avoid data corruption, do not proceed until all RLINKs are up-to-date.

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

10. Stop all VxVM volumes by entering the following command for each disk group:

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

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

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

11. Check if the VEA service is running:

```
# /opt/VRTS/bin/vxsvcctrl status
```

If the VEA service is running, stop it:

```
# /opt/VRTS/bin/vxsvcctrl stop
```

12. Use the following commands to upgrade to 4.1 MP4 RP2.

```
# rpm -U VRTSvxvm-common-4.1.40.20-MP4RP2_dist.arch.rpm
# rpm -U VRTSvxvm-platform-4.1.40.20-MP4RP2_dist.arch.rpm
# rpm -U VRTSvxfs-common-4.1.40.20-MP4RP2_dist.arch.rpm
# rpm -U VRTSvxfs-platform-4.1.40.20-MP4RP2_dist.arch.rpm
# rpm -U VRTSfspro-4.1.40.20-MP4RP2_dist.arch.rpm
```

where *dist* is `RHEL4`, `RHEL5`, `SLES9` or `SLES10`, and *arch* is `i586`, `i686`, `ia64` or `x86_64` as appropriate. (See "Packages Included in this Rolling Patch" on page 6.)

13. Shut down and reboot the system.

14. If necessary, reinstate any missing mount points in the `/etc/fstab` file.

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

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

16. If you stopped any RVGs in step 8, restart each RVG:

```
# vxrvg -g diskgroup start rvg_name
```

17. Remount all VxFS file systems and Storage Checkpoints:

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

18. Check if the VEA service was restarted:

```
# /opt/VRTS/bin/vxsvcctrl status
```

If the VEA service is not running, restart it:

```
# /opt/VRTS/bin/vxsvcctrl start
```

19. If you need to re-encapsulate and mirror the root disk, follow the procedures in the "Administering Disks" chapter of the *Veritas Volume Manager Administrator's Guide*.

Verifying Software Versions

To list the Veritas packages installed on your system, enter the following command:

```
# rpm -qa | egrep VRTS
```

Removing the RP2 packages

Roll back of the RP2 packages to the release 4.1 MP4 version of the packages is not supported. It is recommended that you follow the steps in the following sections to remove all the installed Veritas packages, and then perform a complete reinstallation of the release 4.1 MP4 software.

- Removing the RP2 packages for VCS
- Removing the RP2 packages for SF or SFCFS
- Removing the RP2 packages for SFRAC

Removing the RP2 packages for VCS

Perform the following procedure to uninstall the RP2 packages from a VCS cluster.

To uninstall the Veritas software:

1. Log in as superuser.
2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.
3. Stop VCS along with all the resources. Then, stop the remaining resources manually:

   ```
   # /etc/init.d/vcs stop
   ```

4. Stop the VCS command server:

   ```
   # killall CmdServer
   ```

5. Uninstall VCS:

   ```
   # cd /opt/VRTS/install
   # ./uninstallvcs [-usersh]
   ```

6. If vxfen was originally configured in enabled mode, type the following on all the nodes:

   ```
   # rm /etc/vxfenmode
   ```

7. Reboot all nodes.

After uninstalling the packages, refer to the *Veritas Cluster Server Release Notes* for 4.1 MP4 to reinstall the 4.1 MP4 software.

Removing the RP2 packages for SF or SFCFS

Perform the following procedure to uninstall the RP2 packages from SF or SFCFS systems.

To uninstall the Veritas software:

1. Log in as superuser.
2. Verify that `/opt/VRTS/bin` is in your PATH so you can execute all product commands.

3. Stop VCS along with all the resources. Then, stop the remaining resources manually:

```
# /etc/init.d/vcs stop
```

4. Stop the VCS command server:

```
# killall CmdServer
```

5. Uninstall VCS:

```
# cd /opt/VRTS/install
# ./uninstallvcs [-usersh]
```

6. If cluster fencing was originally configured in enabled mode, type the following on all the nodes:

```
# rm /etc/vxfenmode
```

7. Check if the root disk is under VxVM control by running this command:

```
# df -v /
```

The root disk is under VxVM control if `/dev/vx/dsk/rootvol` is listed as being mounted as the root (`/`) file system. If so, unmirror and unencapsulate the root disk as described in the following steps:

a. Use the `vxplex` command to remove all the plexes of the volumes `rootvol`, `swapvol`, `usr`, `var`, `opt` and `home` that are on disks other than the root disk.

For example, the following command removes the plexes `mirrootvol-01`, and `mirswapvol-01` that are configured on a disk other than the root disk:

```
# vxplex -o rm dis mirrootvol-01 mirswapvol-01
```

Note Do not remove the plexes on the root disk that correspond to the original disk partitions.

b. Enter the following command to convert all the encapsulated volumes in the root disk back to being accessible directly through disk partitions instead of through volume devices. There must be at least one other disk in the `rootdg` disk group in addition to the root disk for `vxunroot` to succeed.

```
# /etc/vx/bin/vxunroot
```

Following the removal of encapsulation, the system is rebooted from the unencapsulated root disk.

8. Use the following command to check if any VxFS file systems or Storage Checkpoints are mounted:

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

9. Unmount all Storage Checkpoints and file systems:

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

10. If you have created any Veritas Volume Replicator (VVR) replicated volume groups (RVGs) on your system, perform the following steps:

    a. Stop all applications that are involved in replication. For example, if a data volume contains a file system, unmount it.

    b. Use the `vxrvg stop` command to stop each RVG individually:

    ```
    # vxrvg -g diskgroup stop rvg_name
    ```

    c. On the Primary node, use the `vxrlink status` command to verify that all RLINKs are up-to-date:

    ```
    # vxrlink -g diskgroup status rlink_name
    ```

    Caution To avoid data corruption, do not proceed until all RLINKs are up-to-date.

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

12. Stop all VxVM volumes by entering the following command for each disk group:

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

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

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

13. Check if the VEA service is running:

    ```
    # /opt/VRTS/bin/vxsvcctrl status
    ```

    If the VEA service is running, stop it:

    ```
    # /opt/VRTS/bin/vxsvcctrl stop
    ```

14. To shut down and remove the installed Veritas packages, use the appropriate command in the `/opt/VRTS/install` directory. For example, to uninstall the Storage Foundation or Veritas Storage Foundation *for DB2* packages, use the following commands:

    ```
    # cd /opt/VRTS/install
    # ./uninstallsf [-usersh]
    ```

    You can use this command to remove the packages from one or more systems. The `-usersh` option is required if you are using the remote shell (RSH) rather than the secure shell (SSH) to uninstall the software simultaneously on several systems.

    Note Provided that the remote shell (RSH) or secure shell (SSH) has been configured correctly, this command can be run on a single node of the cluster to install the software on all the cluster nodes.

After uninstalling the Veritas software, refer to the appropriate product's 4.1 MP4 Release Notes document to reinstall the 4.1 MP4 software.

Removing the RP2 packages for SFRAC

Perform the following procedure to uninstall the RP2 packages from SFRAC systems.

To uninstall the Veritas software:

1. Stop Oracle and CRS on each cluster node.
   - If CRS is controlled by VCS, log in as superuser on any system in the cluster and enter the following command for each node in the cluster:

     # **/opt/VRTSvcs/bin/hares -offline cssd-resource -sys galaxy**

     Where galaxy is the name of the cluster node.
   - If CRS is not controlled by VCS, use the following command on each node to stop CRS:

     # **/etc/init.d/init.crs stop**

2. Unencapsulate root disk if necessary.

   # **df /**

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

   ```
   # vxplex -o rm dis mirrootvol-01 mirswapvol-01
   # /etc/vx/bin/vxunroot
   ```

3. Unmount all vxfs mounts and all file systems on VxVM volumes.

4. Stop all volumes for each disk group.

   # **vxvol -g diskgroup stopall**

5. Stop VCS along with all the resources. Then stop remaining resources manually.

   # **hastop -all**

6. Back up current configuration files on each cluster node. Note that some of the files may not exist.

   ```
   # mkdir -p /var/sfrac41mp4-config-save/etc/vx/vras
   # mkdir -p
   /var/sfrac41mp4-config-save/etc/VRTSvcs/conf/config
   # cp -p /etc/lltab /etc/llthosts /etc/gabtab /etc/vxfendg
   /etc/vxfenmode
   /var/sfrac41mp4-config-save/etc/
   # cp -p /etc/VRTSvcs/conf/config/main.cf
   /var/sfrac41mp4-config-save/etc/VRTSvcs/conf/config/
   # cp -p /etc/vx/vxddl.exclude /etc/vx/darecs
   /etc/vx/disk.info /etc/vx/jbod.info /etc/vx/.aascsi3
   /etc/vx/.apscsi3 /etc/vx/volboot
   /etc/vx/array.info /etc/vx/ddl.support /etc/vx/disks.exclude
   /etc/vx/cntrls.exclude
   /etc/vx/enclr.exclude /etc/vx/.newnames /etc/vx/guid.state
   /etc/vx/vxvm_tunables
   /etc/vx/vxdmp_tunables /etc/vx/vvrports
   /var/sfrac41mp4-config-save/etc/vx
   # cp -p /etc/vx/vras/.rdg /etc/vx/vras/vras_env
   /var/sfrac41mp4-config-save/etc/vx/vras/
   ```

7. Uninstall SFRAC.

   # **cd /opt/VRTS/install**

```
# ./uninstallsfrac galaxy nebula
```

8. Uninstall all the remaining infrastructure VRTS rpms manually on each cluster node.

```
# ./uninstallinfr galaxy nebula
```

After uninstalling the packages, refer to the S*torage Foundation for Oracle RAC Release Notes* for 4.1 MP4 to reinstall the 4.1 MP4 software. After reinstalling 4.1MP4 software, restore the configuration files from the backup created in step 6.

Getting Help

For technical assistance, visit http://www.symantec.com/business/support/assistance_care.jsp and select phone or email support. Use the Knowledge Base search feature to access resources such as TechNotes, product alerts, software downloads, hardware compatibility lists, and our customer email notification service.

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