



VERITAS Volume Manager™ 4.0

Troubleshooting Guide

Solaris

N10010F

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Preface

The *VERITAS Volume Manager™ Troubleshooting Guide* provides information about how to recover from hardware failure, and how to understand and deal with VERITAS Volume Manager (VxVM) error messages during normal operation.

For detailed information about VERITAS Volume Manager and how to use it, refer to the *VERITAS Volume Manager Administrator's Guide*. Details on how to use the VERITAS Enterprise Administrator™ graphical user interface can be found in the *VERITAS Volume Manager User's Guide — VEA*. For a description of VERITAS Volume Replicator™ error messages, see the *VERITAS Volume Replicator Administrator's Guide*.

Audience and Scope

This guide is intended for system administrators responsible for installing, configuring, and maintaining systems under the control of VERITAS Volume Manager.

This guide assumes that the user has a:

- ◆ working knowledge of the Solaris operating system
- ◆ basic understanding of Solaris system administration
- ◆ basic understanding of storage management

The purpose of this guide is to help the system administrator recover from the failure of disks and other hardware upon which virtual software objects such as subdisks, plexes and volumes are constructed in VERITAS Volume Manager. Guidelines are also included on how to configure command and transaction logging, to back up and restore disk group configurations, and to understand and react to the various VxVM error messages that you may see.

Organization

This guide is organized as follows:

- ◆ Recovery from Hardware Failure
- ◆ Recovery from Failure of Instant Snapshot Operations
- ◆ Recovery from Boot Disk Failure
- ◆ Logging Commands and Transactions
- ◆ Backing Up and Restoring Disk Group Configurations
- ◆ Error Messages

Related Documents

The following documents provide information related to the Volume Manager:

- ◆ *Cross-platform Data Sharing for VERITAS Volume Manager Administrator's Guide*
- ◆ *VERITAS FlashSnap Point-In-Time Copy Solutions Administrator's Guide*
- ◆ *VERITAS Volume Manager Administrator's Guide*
- ◆ *VERITAS Volume Manager Hardware Notes*
- ◆ *VERITAS Volume Manager Installation Guide*
- ◆ *VERITAS Volume Manager Intelligent Storage Provisioning Administrator's Guide*
- ◆ *VERITAS Volume Manager Release Notes*
- ◆ *VERITAS Volume Manager User's Guide — VEA*
- ◆ VERITAS Volume Manager manual pages

Conventions

The following table describes the typographic conventions used in this guide.

Typeface	Usage	Examples
monospace	Computer output, file contents, files, directories, software elements such as command options, function names, and parameters	Read tunables from the <code>/etc/vx/tunefstab</code> file. See the <code>ls(1)</code> manual page for more information.
<i>italic</i>	New terms, book titles, emphasis, variables to be replaced by a name or value	See the <i>User's Guide</i> for details. The variable <code>ncsize</code> determines the value of...
monospace (bold)	User input; the “#” symbol indicates a command prompt	# mount -F vxfs /h/filesys
<i>monospace (bold and italic)</i>	Variables to be replaced by a name or value in user input	# mount -F fstype mount_point

Symbol	Usage	Examples
%	C shell prompt	
\$	Bourne/Korn/Bash shell prompt	
#	Superuser prompt (all shells)	
\	Continued input on the following line	# mount -F vxfs \ /h/filesys
[]	In a command synopsis, brackets indicates an optional argument	<code>ls [-a]</code>
	In a command synopsis, a vertical bar separates mutually exclusive arguments	<code>mount [suid nosuid]</code>

Getting Help

If you have any comments or problems with VERITAS products, contact VERITAS Technical Support:

- ◆ U.S. and Canadian Customers: 1-800-342-0652
- ◆ International Customers: +1 (650) 527-8555
- ◆ Email: support@veritas.com

For license information (U.S. and Canadian Customers):

- ◆ Phone: 1-650-527-0300
- ◆ Email: license@veritas.com
- ◆ Fax: 1-650-527-0952

For software updates:

- ◆ Email: swupdate@veritas.com

For information on purchasing VERITAS products:

- ◆ Phone: 1-800-327-2232
- ◆ Email: sales.mail@veritas.com

For additional technical support information, such as TechNotes, product alerts, and hardware compatibility lists, visit the VERITAS Technical Support Web site at:

- ◆ <http://support.veritas.com>

For additional information about VERITAS and VERITAS products, visit the Web site at:

- ◆ <http://www.veritas.com>

Unique Message Number

If you encounter a product error message, record the unique message number preceding the text of the message. When contacting VERITAS Technical Support, either by telephone or by visiting the VERITAS Technical Support website, be sure to provide the relevant message number. VERITAS Technical Support will use this message number to quickly determine if there are TechNotes or other information available for you.

A unique message number is an alpha-numeric string beginning with the letter “V”. For example, in the message number:

```
V-5-732-8018 At least one disk must be specified
```

the “V” indicates that this is a VERITAS product error message. The text of the error message follows the unique message number.

Using VRTSexplorer

The `VRTSexplorer` program can help VERITAS Technical Support engineers diagnose the cause of technical problems associated with VERITAS products. You can download this program from the VERITAS FTP site or install it from the VERITAS Installation CD. For more information, consult the *VERITAS Volume Manager Release Notes* and the README file in the `preface` directory on the VERITAS Installation CD.



Getting Help



Recovery from Hardware Failure

1

VERITAS Volume Manager (VxVM) protects systems from disk and other hardware failures and helps you to recover from such events. This chapter describes recovery procedures and information to help you prevent loss of data or system access due to disk and other hardware failures.

If a volume has a disk I/O failure (for example, because the disk has an uncorrectable error), VxVM can detach the plex involved in the failure. I/O stops on that plex but continues on the remaining plexes of the volume.

If a disk fails completely, VxVM can detach the disk from its disk group. All plexes on the disk are disabled. If there are any unmirrored volumes on a disk when it is detached, those volumes are also disabled.

Note Apparent disk failure may not be due to a fault in the physical disk media or the disk controller, but may instead be caused by a fault in an intermediate or ancillary component such as a cable, host bus adapter, or power supply.

The hot-relocation feature in VxVM automatically detects disk failures, and notifies the system administrator and other nominated users of the failures by electronic mail. Hot-relocation also attempts to use spare disks and free disk space to restore redundancy and to preserve access to mirrored and RAID-5 volumes. For more information, see the "Administering Hot-Relocation" chapter in the *VERITAS Volume Manager Administrator's Guide*.

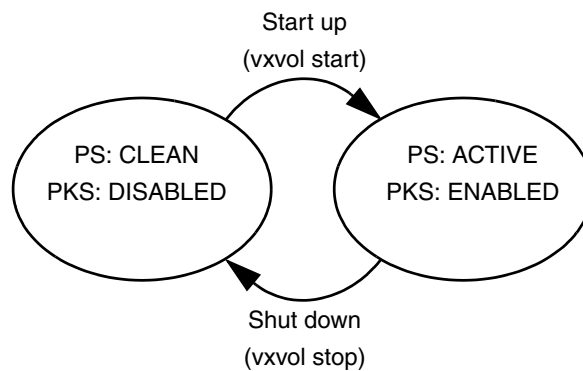
Recovery from failures of the boot (`root`) disk requires the use of the special procedures described in "Recovery from Boot Disk Failure" on page 27. The chapter also includes procedures for repairing the `root (/)` and `usr` file systems.

Understanding the Plex State Cycle

Changing plex states are part of normal operations, and do not necessarily indicate abnormalities that must be corrected. A clear understanding of the various plex states and their interrelationship is necessary if you want to be able to perform the recovery procedure described in this chapter.

The figure, "Main Plex State Cycle," shows the main transitions that take place between plex states in VxVM. (For more information about plex states, see the chapter "Creating and Administering Plexes" in the *VERITAS Volume Manager Administrator's Guide*.)

Main Plex State Cycle



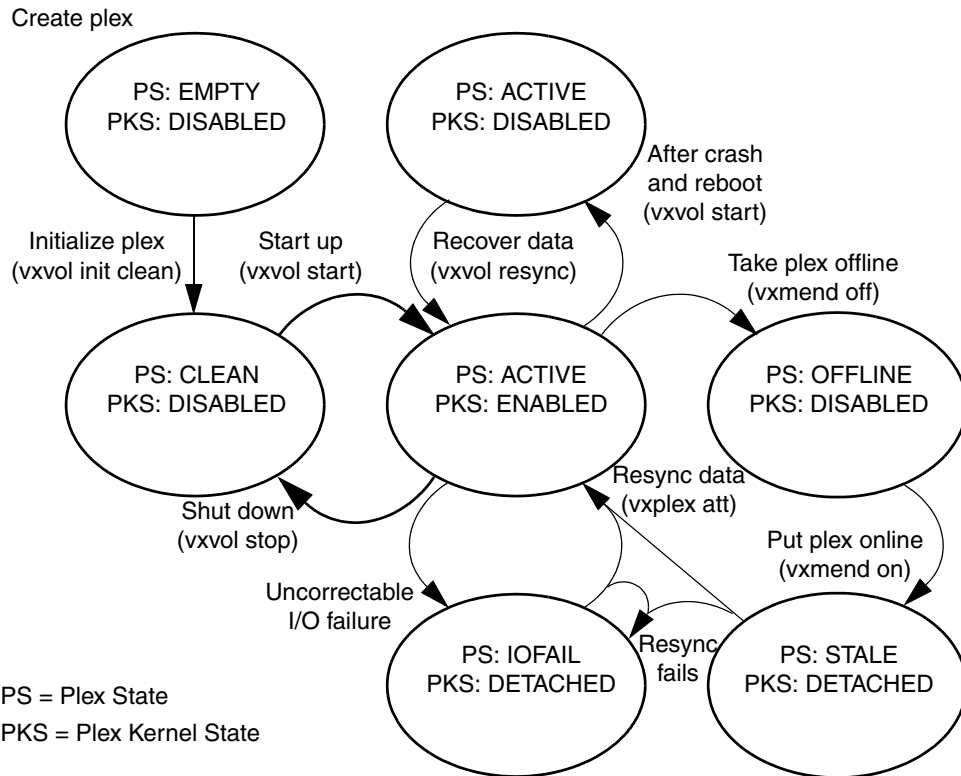
PS = Plex State
PKS = Plex Kernel State

At system startup, volumes are started automatically and the `vxvol start` task makes all CLEAN plexes ACTIVE. At shutdown, the `vxvol stop` task marks all ACTIVE plexes CLEAN. If all plexes are initially CLEAN at startup, this indicates that a controlled shutdown occurred and optimizes the time taken to start up the volumes.

The figure, "Additional Plex State Transitions" on page 3, shows additional transitions that are possible between plex states as a result of hardware problems, abnormal system shutdown, and intervention by the system administrator.

When first created, a plex has state EMPTY until the volume to which it is attached is initialized. Its state is then set to CLEAN. Its plex kernel state remains set to DISABLED and is not set to ENABLED until the volume is started.

Additional Plex State Transitions



After a system crash and reboot, all plexes of a volume are ACTIVE but marked with plex kernel state DISABLED until their data is recovered by the `vxvol resync` task.

A plex may be taken offline with the `vxmend off` command, made available again using `vxmend on`, and its data resynchronized with the other plexes when it is reattached using `vxplex att`. A failed resynchronization or uncorrectable I/O failure places the plex in the IOFAIL state.

The section, “Listing Unstartable Volumes” on page 4, describes the actions that you can take if a system crash or I/O error leaves no plexes of a mirrored volume in a CLEAN or ACTIVE state.

For information on the recovery of RAID-5 volumes, see “Failures on RAID-5 Volumes” on page 6 and subsequent sections.

Listing Unstartable Volumes

An unstartable volume can be incorrectly configured or have other errors or conditions that prevent it from being started. To display unstartable volumes, use the `vxinfo` command. This displays information about the accessibility and usability of volumes:

```
# vxinfo [-g diskgroup] [volume ...]
```

The following example output shows one volume, `mkting`, as being unstartable:

```
home          fsgen        Started
mkting        fsgen        Unstartable
src           fsgen        Started
rootvol       root         Started
swapvol       swap         Started
```

Restarting a Disabled Volume

If a disk failure caused a volume to be disabled, you must restore the volume from a backup after replacing the failed disk. Any volumes that are listed as `Unstartable` must be restarted using the `vxvol` command before restoring their contents from a backup. For example, to restart the volume `mkting` so that it can be restored from backup, use the following command:

```
# vxvol -o bg -f start mkting
```

The `-f` option forcibly restarts the volume, and the `-o bg` option resynchronizes plexes as a background task.

Recovering a Mirrored Volume

A system crash or an I/O error can corrupt one or more plexes of a mirrored volume and leave no plex `CLEAN` or `ACTIVE`. You can mark one of the plexes `CLEAN` and instruct the system to use that plex as the source for reviving the others as follows:

1. Place the desired plex in the `CLEAN` state using the following command:

```
# vxmend fix clean plex
```

For example, to place the plex `vo101-02` in the `CLEAN` state:

```
# vxmend fix clean vo101-02
```


2. To recover the other plexes in a volume from the CLEAN plex, the volume must be disabled, and the other plexes must be STALE. If necessary, make any other CLEAN or ACTIVE plexes STALE by running the following command on each of these plexes in turn:

```
# vxmend fix stale plex
```

3. To enable the CLEAN plex and to recover the STALE plexes from it, use the following command:

```
# vxvol start volume
```

For example, to recover volume vo101:

```
# vxvol start vo101
```

For more information about the `vxmend` and `vxvol` command, see the `vxmend(1M)` and `vxvol(1M)` manual pages.

Note Following severe hardware failure of several disks or other related subsystems underlying all the mirrored plexes of a volume, it may be impossible to recover the volume using `vxmend`. In this case, remove the volume, recreate it on hardware that is functioning correctly, and restore the contents of the volume from a backup or from a snapshot image.

Reattaching Disks

You can perform a reattach operation if a disk fails completely and hot-relocation is not possible, or if VxVM is started with some disk drivers unloaded and unloadable (causing disks to enter the failed state). If the underlying problem has been fixed, you can use the `vxreattach` command to reattach the disks without plexes being flagged as STALE. However, the reattach must occur before any volumes on the disk are started.

The `vxreattach` command is called as part of disk recovery from the `vxdiskadm` menus and during the boot process. If possible, `vxreattach` reattaches the failed disk media record to the disk with the same device name. Reattachment places a disk in the same disk group that it was located in before and retains its original disk media name.

After reattachment takes place, recovery may not be necessary. Reattachment can fail if the original (or another) cause for the disk failure still exists.

You can use the command `vxreattach -c` to check whether reattachment is possible, without performing the operation. Instead, it displays the disk group and disk media name where the disk can be reattached.

See the `vxreattach(1M)` manual page for more information on the `vxreattach` command.

Failures on RAID-5 Volumes

Failures are seen in two varieties: *system failures* and *disk failures*. A system failure means that the system has abruptly ceased to operate due to an operating system panic or power failure. Disk failures imply that the data on some number of disks has become unavailable due to a system failure (such as a head crash, electronics failure on disk, or disk controller failure).

System Failures

RAID-5 volumes are designed to remain available with a minimum of disk space overhead, if there are disk failures. However, many forms of RAID-5 can have data loss after a system failure. Data loss occurs because a system failure causes the data and parity in the RAID-5 volume to become unsynchronized. Loss of synchronization occurs because the status of writes that were outstanding at the time of the failure cannot be determined.

If a loss of sync occurs while a RAID-5 volume is being accessed, the volume is described as having *stale parity*. The parity must then be reconstructed by reading all the non-parity columns within each stripe, recalculating the parity, and writing out the parity stripe unit in the stripe. This must be done for every stripe in the volume, so it can take a long time to complete.

Caution While the resynchronization of a RAID-5 volume *without* log plexes is being performed, any failure of a disk within the volume causes its data to be lost.

Besides the vulnerability to failure, the resynchronization process can tax the system resources and slow down system operation.

RAID-5 logs reduce the damage that can be caused by system failures, because they maintain a copy of the data being written at the time of the failure. The process of resynchronization consists of reading that data and parity from the logs and writing it to the appropriate areas of the RAID-5 volume. This greatly reduces the amount of time needed for a resynchronization of data and parity. It also means that the volume never becomes truly stale. The data and parity for all stripes in the volume are known at all times, so the failure of a single disk cannot result in the loss of the data within the volume.

Disk Failures

An uncorrectable I/O error occurs when disk failure, cabling or other problems cause the data on a disk to become unavailable. For a RAID-5 volume, this means that a subdisk becomes unavailable. The subdisk cannot be used to hold data and is considered *stale* and *detached*. If the underlying disk becomes available or is replaced, the subdisk is still considered stale and is not used.

If an attempt is made to read data contained on a stale subdisk, the data is reconstructed from data on all other stripe units in the stripe. This operation is called a *reconstructing-read*. This is a more expensive operation than simply reading the data and can result in degraded read performance. When a RAID-5 volume has stale subdisks, it is considered to be in *degraded mode*.

A RAID-5 volume in degraded mode can be recognized from the output of the `vxprint -ht` command as shown in the following display:

```
V  NAME          RVG/VSET/COKSTATE STATE LENGTH  READPOL  PREFPLEX  UTYPE
PL NAME          VOLUME  KSTATE  STATE  LENGTH  LAYOUT   NCOL/WID  MODE
SD NAME          PLEX    DISK    DISKOFFSLENGTH [COL/]OFF DEVICE  MODE
SV NAME          PLEX    VOLNAME NVOLLAYRLENGTH [COL/]OFF AM/NM  MODE
...
v  r5vol         -        ENABLED DEGRADED 204800 RAID      -          raid5
pl r5vol-01     r5vol   ENABLED ACTIVE  204800 RAID      3/16      RW
sd disk01-01   r5vol-01disk01  0        102400 0/0      c2t9d0    ENA
sd disk02-01   r5vol-01disk02  0        102400 1/0      c2t10d0   dS
sd disk03-01   r5vol-01disk03  0        102400 2/0      c2t11d0   ENA
pl r5vol-02     r5vol   ENABLED LOG    1440    CONCAT   -          RW
sd disk04-01   r5vol-02disk04  0        1440    0        c2t12d0   ENA
pl r5vol-03     r5vol   ENABLED LOG    1440    CONCAT   -          RW
sd disk05-01   r5vol-03disk05  0        1440    0        c2t14d0   ENA
```

The volume `r5vol` is in degraded mode, as shown by the volume state, which is listed as `DEGRADED`. The failed subdisk is `disk02-01`, as shown by the `MODE` flags; `d` indicates that the subdisk is detached, and `S` indicates that the subdisk's contents are stale.

Note Do not run the `vxr5check` command on a RAID-5 volume that is in degraded mode.

Failures on RAID-5 Volumes

A disk containing a RAID-5 log plex can also fail. The failure of a single RAID-5 log plex has no direct effect on the operation of a volume provided that the RAID-5 log is mirrored. However, loss of all RAID-5 log plexes in a volume makes it vulnerable to a complete failure. In the output of the `vxprint -ht` command, failure within a RAID-5 log plex is indicated by the plex state being shown as `BADLOG` rather than `LOG`. This is shown in the following display, where the RAID-5 log plex `r5vol-11` has failed:

```
V  NAME          RVG/VSET/COKSTATESTATE  LENGTH  READPOL  PREFPLEX  UTYPE
PL  NAME          VOLUME  KSTATE  STATE  LENGTH  LAYOUT  NCOL/WID  MODE
SD  NAME          PLEX    DISK    DISKOFFSLENGTH  [COL/]OFF DEVICE  MODE
SV  NAME          PLEX    VOLNAME NVOLLAYRLENGTH  [COL/]OFF AM/NM  MODE
...
v  r5vol         -        ENABLED ACTIVE  204800  RAID    -        raid5
pl  r5vol-01     r5vol   ENABLED ACTIVE  204800  RAID    3/16     RW
sd  disk01-01   r5vol-01disk01  0        102400  0/0     c2t9d0   ENA
sd  disk02-01   r5vol-01disk02  0        102400  1/0     c2t10d0  ENA
sd  disk03-01   r5vol-01disk03  0        102400  2/0     c2t11d0  ENA
pl  r5vol-02     r5vol   DISABLEDBADLOG  1440    CONCAT  -        RW
sd  disk04-01   r5vol-11disk04  0        1440    0        c2t12d0  ENA
pl  r5vol-03     r5vol   ENABLED LOG      1440    CONCAT  -        RW
sd  disk05-01   r5vol-12disk05  0        1440    0        c2t14d0  ENA
```

Default Startup Recovery Process for RAID-5

VxVM may need to perform several operations to restore fully the contents of a RAID-5 volume and make it usable. Whenever a volume is started, any RAID-5 log plexes are zeroed before the volume is started. This prevents random data from being interpreted as a log entry and corrupting the volume contents. Also, some subdisks may need to be recovered, or the parity may need to be resynchronized (if RAID-5 logs have failed).

VxVM takes the following steps when a RAID-5 volume is started:

1. If the RAID-5 volume was not cleanly shut down, it is checked for valid RAID-5 log plexes.
 - ◆ If valid log plexes exist, they are replayed. This is done by placing the volume in the `DETACHED` volume kernel state and setting the volume state to `REPLAY`, and enabling the RAID-5 log plexes. If the logs can be successfully read and the replay is successful, move on to Step 2.
 - ◆ If no valid logs exist, the parity must be resynchronized. Resynchronization is done by placing the volume in the `DETACHED` volume kernel state and setting the volume state to `SYNC`. Any log plexes are left in the `DISABLED` plex kernel state.

The volume is not made available while the parity is resynchronized because any subdisk failures during this period makes the volume unusable. This can be overridden by using the `-o unsafe` start option with the `vxvol` command. If any stale subdisks exist, the RAID-5 volume is unusable.

Caution The `-o unsafe` start option is considered dangerous, as it can make the contents of the volume unusable. Using it is not recommended.

2. Any existing log plexes are zeroed and enabled. If all logs fail during this process, the start process is aborted.
3. If no stale subdisks exist or those that exist are recoverable, the volume is put in the `ENABLED` volume kernel state and the volume state is set to `ACTIVE`. The volume is now started.

Recovering a RAID-5 Volume

The types of recovery that may typically be required for RAID-5 volumes are the following:

- ◆ Parity Resynchronization
- ◆ Log Plex Recovery
- ◆ Stale Subdisk Recovery

Parity resynchronization and stale subdisk recovery are typically performed when the RAID-5 volume is started, or shortly after the system boots. They can also be performed by running the `vxrecover` command.

For more information on starting RAID-5 volumes, see “Starting RAID-5 Volumes” on page 12.

If hot-relocation is enabled at the time of a disk failure, system administrator intervention is not required unless no suitable disk space is available for relocation. Hot-relocation is triggered by the failure and the system administrator is notified of the failure by electronic mail.

Hot relocation automatically attempts to relocate the subdisks of a failing RAID-5 plex. After any relocation takes place, the hot-relocation daemon (`vxrelocd`) also initiates a parity resynchronization.

In the case of a failing RAID-5 log plex, relocation occurs only if the log plex is mirrored; the `vxrelocd` daemon then initiates a mirror resynchronization to recreate the RAID-5 log plex. If hot-relocation is disabled at the time of a failure, the system administrator may need to initiate a resynchronization or recovery.

Failures on RAID-5 Volumes

Note Following severe hardware failure of several disks or other related subsystems underlying a RAID-5 plex, it may be impossible to recover the volume using the methods described in this chapter. In this case, remove the volume, recreate it on hardware that is functioning correctly, and restore the contents of the volume from a backup.

Parity Resynchronization

In most cases, a RAID-5 array does not have stale parity. Stale parity only occurs after all RAID-5 log plexes for the RAID-5 volume have failed, and then only if there is a system failure. Even if a RAID-5 volume has stale parity, it is usually repaired as part of the volume start process.

If a volume without valid RAID-5 logs is started and the process is killed before the volume is resynchronized, the result is an active volume with stale parity. For an example of the output of the `vxprint -ht` command, see the following example for a stale RAID-5 volume:

```
V NAME          RVG/VSET/COKSTATESTATE LENGTH READPOL  PREFPLEX  UTYPE
PL NAME        VOLUME  KSTATE  STATE  LENGTH LAYOUT  NCOL/WID  MODE
SD NAME        PLEX    DISK    DISKOFFSLENGTH [COL/]OFF DEVICE  MODE
SV NAME        PLEX    VOLNAME NVOLLAYRLENGTH [COL/]OFF AM/NM  MODE
...
v  r5vol        -        ENABLED NEEDSYNC204800 RAID      -         raid5
pl r5vol-01    r5vol   ENABLED ACTIVE  204800 RAID      3/16      RW
sd disk01-01  r5vol-01disk01  0        102400  0/0      c2t9d0    ENA
sd disk02-01  r5vol-01disk02  0        102400  1/0      c2t10d0   dS
sd disk03-01  r5vol-01disk03  0        102400  2/0      c2t11d0   ENA
...
```

This output lists the volume state as `NEEDSYNC`, indicating that the parity needs to be resynchronized. The state could also have been `SYNC`, indicating that a synchronization was attempted at start time and that a synchronization process should be doing the synchronization. If no such process exists or if the volume is in the `NEEDSYNC` state, a synchronization can be manually started by using the `resync` keyword for the `vxvol` command. For example, to resynchronize the RAID-5 volume in the figure “Invalid RAID-5 Volume” on page 13, use the following command:

```
# vxvol resync r5vol
```

Parity is regenerated by issuing `VOL_R5_RESYNC ioctl`s to the RAID-5 volume. The resynchronization process starts at the beginning of the RAID-5 volume and resynchronizes a region equal to the number of sectors specified by the `-o iosize` option. If the `-o iosize` option is not specified, the default maximum I/O size is used. The `resync` operation then moves onto the next region until the entire length of the RAID-5 volume has been resynchronized.

For larger volumes, parity regeneration can take a long time. It is possible that the system could be shut down or crash before the operation is completed. In case of a system shutdown, the progress of parity regeneration must be kept across reboots. Otherwise, the process has to start all over again.

To avoid the restart process, parity regeneration is *checkpointed*. This means that the offset up to which the parity has been regenerated is saved in the configuration database. The `-o checkpoint=size` option controls how often the checkpoint is saved. If the option is not specified, the default checkpoint size is used.

Because saving the checkpoint offset requires a transaction, making the checkpoint size too small can extend the time required to regenerate parity. After a system reboot, a RAID-5 volume that has a checkpoint offset smaller than the volume length starts a parity resynchronization at the checkpoint offset.

Log Plex Recovery

RAID-5 log plexes can become detached due to disk failures. These RAID-5 logs can be reattached by using the `att` keyword for the `vxplex` command. To reattach the failed RAID-5 log plex, use the following command:

```
# vxplex att r5vol r5vol-11
```

Stale Subdisk Recovery

Stale subdisk recovery is usually done at volume start time. However, the process doing the recovery can crash, or the volume may be started with an option such as `-o delayrecover` that prevents subdisk recovery. In addition, the disk on which the subdisk resides can be replaced without recovery operations being performed. In such cases, you can perform subdisk recovery using the `vxvol recover` command. For example, to recover the stale subdisk in the RAID-5 volume shown in the figure “Invalid RAID-5 Volume” on page 13, use the following command:

```
# vxvol recover r5vol disk01-00
```

A RAID-5 volume that has multiple stale subdisks can be recovered in one operation. To recover multiple stale subdisks, use the `vxvol recover` command on the volume, as follows:

```
# vxvol recover r5vol
```

Recovery After Moving RAID-5 Subdisks

When RAID-5 subdisks are moved and replaced, the new subdisks are marked as `STALE` in anticipation of recovery. If the volume is active, the `vxsd` command may be used to recover the volume. If the volume is not active, it is recovered when it is next started. *The RAID-5 volume is degraded for the duration of the recovery operation.*

Any failure in the stripes involved in the move makes the volume unusable. The RAID-5 volume can also become invalid if its parity becomes stale. To avoid this occurring, `vxsd` does not allow a subdisk move in the following situations:

- ◆ a stale subdisk occupies any of the same stripes as the subdisk being moved
- ◆ the RAID-5 volume is stopped but was not shut down cleanly; that is, the parity is considered stale
- ◆ the RAID-5 volume is active and has no valid log areas

Only the third case can be overridden by using the `-o force` option.

Subdisks of RAID-5 volumes can also be split and joined by using the `vxsd split` command and the `vxsd join` command. These operations work the same way as those for mirrored volumes.

Note RAID-5 subdisk moves are performed in the same way as subdisk moves for other volume types, but without the penalty of degraded redundancy.

Starting RAID-5 Volumes

When a RAID-5 volume is started, it can be in one of many states. After a normal system shutdown, the volume should be clean and require no recovery. However, if the volume was not closed, or was not unmounted before a crash, it can require recovery when it is started, before it can be made available. This section describes actions that can be taken under certain conditions.

Under normal conditions, volumes are started automatically after a reboot and any recovery takes place automatically or is done through the `vxrecover` command.

Unstartable RAID-5 Volumes

A RAID-5 volume is unusable if some part of the RAID-5 plex does not map the volume length:

- ◆ the RAID-5 plex cannot be sparse in relation to the RAID-5 volume length
- ◆ the RAID-5 plex does not map a region where two subdisks have failed within a stripe, either because they are stale or because they are built on a failed disk

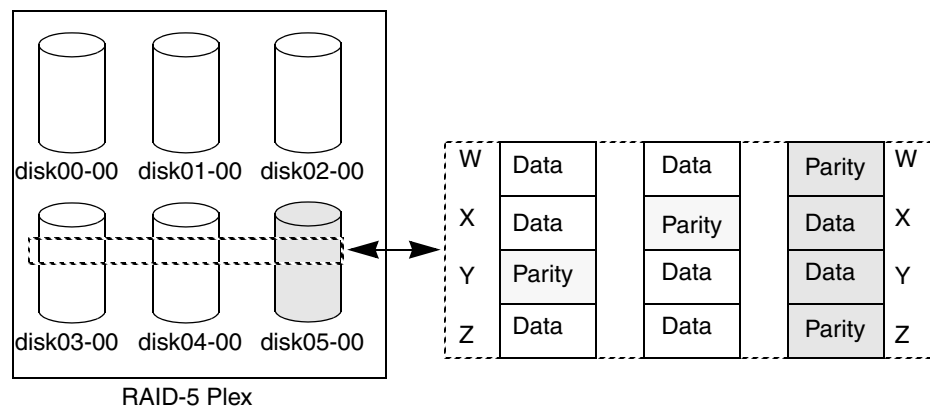
When this occurs, the `vxvol start` command returns the following error message:

```
VxVM vxvol ERROR V-5-1-1236 Volume r5vol is not startable; RAID-5
plex does not map entire volume length.
```

At this point, the contents of the RAID-5 volume are unusable.

Another possible way that a RAID-5 volume can become unstartable is if the parity is stale and a subdisk becomes detached or stale. This occurs because within the stripes that contain the failed subdisk, the parity stripe unit is invalid (because the parity is stale) *and* the stripe unit on the bad subdisk is also invalid. The figure, "Invalid RAID-5 Volume," illustrates a RAID-5 volume that has become invalid due to stale parity and a failed subdisk.

Invalid RAID-5 Volume



This example shows four stripes in the RAID-5 array. All parity is stale and subdisk `disk05-00` has failed. This makes stripes X and Y unusable because two failures have occurred within those stripes.

This qualifies as two failures within a stripe and prevents the use of the volume. In this case, the output display from the `vxvol start` command is as follows:

```
VxVM vxvol ERROR V-5-1-1237 Volume r5vol is not startable; some
subdisks are unusable and the parity is stale.
```

This situation can be avoided by *always* using two or more RAID-5 log plexes in RAID-5 volumes. RAID-5 log plexes prevent the parity within the volume from becoming stale which prevents this situation (see "System Failures" on page 6 for details).

Forcibly Starting RAID-5 Volumes

You can start a volume even if subdisks are marked as stale: for example, if a stopped volume has stale parity and no RAID-5 logs, and a disk becomes detached and then reattached.

The subdisk is considered stale even though the data is not out of date (because the volume was in use when the subdisk was unavailable) and the RAID-5 volume is considered invalid. To prevent this case, always have multiple valid RAID-5 logs associated with the array whenever possible.

To start a RAID-5 volume with stale subdisks, you can use the `-f` option with the `vxvol start` command. This causes all stale subdisks to be marked as non-stale. Marking takes place before the `start` operation evaluates the validity of the RAID-5 volume and what is needed to start it. Also, you can mark individual subdisks as non-stale by using the following command:

```
# vxmend fix unstale subdisk
```

- ◆ If some subdisks are stale and need recovery, and if valid logs exist, the volume is enabled by placing it in the `ENABLED` kernel state and the volume is available for use during the subdisk recovery. Otherwise, the volume kernel state is set to `DETACHED` and it is not available during subdisk recovery.

This is done because if the system were to crash or the volume was ungracefully stopped while it was active, the parity becomes stale, making the volume unusable. If this is undesirable, the volume can be started with the `-o unsafe start` option.

Caution The `-o unsafe start` option is considered dangerous, as it can make the contents of the volume unusable. It is therefore not recommended.

- ◆ The volume state is set to `RECOVER` and stale subdisks are restored. As the data on each subdisk becomes valid, the subdisk is marked as no longer stale.

If any subdisk recovery fails and there are no valid logs, the volume start is aborted because the subdisk remains stale and a system crash makes the RAID-5 volume unusable. This can also be overridden by using the `-o unsafe start` option.

Caution The `-o unsafe start` option is considered dangerous, as it can make the contents of the volume unusable. It is therefore not recommended.

If the volume has valid logs, subdisk recovery failures are noted but they do not stop the start procedure.

- ◆ When all subdisks have been recovered, the volume is placed in the `ENABLED` kernel state and marked as `ACTIVE`. It is now started.

Recovering from Incomplete Disk Group Moves

If the system crashes or a subsystem fails while a disk group move, split or join operation is being performed, VxVM attempts either to reverse or to complete the operation when the system is restarted or the subsystem is repaired. Whether the operation is reversed or completed depends on how far it had progressed.

Automatic recovery depends on being able to import both the source and target disk groups. If this is not possible (for example, if one of the disk groups has been imported on another host), perform the following steps to recover the disk group:

1. Use the `vxprint` command to examine the configuration of both disk groups. Objects in disk groups whose move is incomplete have their TUTIL0 fields set to MOVE.
2. Enter the following command to attempt completion of the move:

```
# vxdg recover sourcedg
```

This operation fails if one of the disk groups cannot be imported because it has been imported on another host or because it does not exist:

```
VxVM vxdg ERROR V-5-1-2907 diskgroup: Disk group does not exist
```

If the recovery fails, perform one of the following steps as appropriate.

- ❖ If the disk group has been imported on another host, export it from that host, and import it on the current host. If all the required objects already exist in either the source or target disk group, use the following command to reset the MOVE flags in that disk group:

```
# vxdg -o clean recover diskgroup1
```

Use the following command on the other disk group to remove the objects that have TUTIL0 fields marked as MOVE:

```
# vxdg -o remove recover diskgroup2
```

- ❖ If only one disk group is available to be imported, use the following command to reset the MOVE flags on this disk group:

```
# vxdg -o clean recover diskgroup
```

Recovery from Failure of a DCO Volume

Note The procedures in this section depend on the DCO version number. See the *VERITAS Volume Manager Administrator's Guide* for information about DCO versioning.

Persistent FastResync uses a data change object (DCO) volume to perform tracking of changed regions in a volume. If an error occurs while reading or writing a DCO volume, it is detached and the `badlog` flag is set on the DCO. All further writes to the volume are not tracked by the DCO.

The following sample output from the `vxprint` command shows a complete volume with a detached DCO volume (the `TUTIL0` and `PUTIL0` fields are omitted for clarity):

TY	NAME	ASSOC	KSTATE	LENGTH	PLOFFS	STATE ...
dg	mydg	mydg	-	-	-	-
dm	mydg01	c4t50d0s2	-	35521408	-	-
dm	mydg02	c4t51d0s2	-	35521408	-	-
dm	mydg03	c4t52d0s2	-	35521408	-	FAILING
dm	mydg04	c4t53d0s2	-	35521408	-	FAILING
dm	mydg05	c4t54d0s2	-	35521408	-	-
v	SNAP-vol1	fsgen	ENABLED	204800	-	ACTIVE
pl	vol1-03	SNAP-vol1	ENABLED	204800	-	ACTIVE
sd	mydg05-01	vol1-03	ENABLED	204800	0	-
dc	SNAP-vol1_dco	SNAP-vol1	-	-	-	-
v	SNAP-vol1_dcl	gen	ENABLED	144	-	ACTIVE
pl	vol1_dcl-03	SNAP-vol1_dcl	ENABLED	144	-	ACTIVE
sd	mydg05-02	vol1_dcl-03	ENABLED	144	0	-
sp	vol1_snp	SNAP-vol1	-	-	-	-
v	vol1	fsgen	ENABLED	204800	-	ACTIVE
pl	vol1-01	vol1	ENABLED	204800	-	ACTIVE
sd	mydg01-01	vol1-01	ENABLED	204800	0	-
pl	vol1-02	vol1	ENABLED	204800	-	ACTIVE
sd	mydg02-01	vol1-01	ENABLED	204800	0	-
dc	vol1_dco	vol1	-	-	-	BADLOG
v	vol1_dcl	gen	DETACHED	144	-	DETACH
pl	vol1_dcl-01	vol1_dcl	ENABLED	144	-	ACTIVE
sd	mydg03-01	vol1_dcl-01	ENABLED	144	0	-
pl	vol1_dcl-02	vol1_dcl	DETACHED	144	-	IOFAIL
sd	mydg04-01	vol1_dcl-02	ENABLED	144	0	RELOCATE
sp	SNAP-vol1_snp	vol1	-	-	-	-

This output shows the mirrored volume, `vol1`, its snapshot volume, `SNAP-vol1`, and their respective DCOs, `vol1_dco` and `SNAP-vol1_dco`. The two disks, `mydg03` and `mydg04`, that hold the DCO plexes for the DCO volume, `vol1_dcl`, of `vol1` have failed.

As a result, the DCO volume, `voll_dcl`, of the volume, `voll`, has been detached and the state of `voll_dco` has been set to `BADLOG`. For future reference, note the entries for the snap objects, `voll_snp` and `SNAP-voll_snp`, that point to `voll` and `SNAP-voll` respectively.

You can use such output to deduce the name of a volume's DCO (in this example, `voll_dco`), or you can use the following `vxprint` command to display the name of a volume's DCO:

```
# vxprint [-g diskgroup] -F%dco_name volume
```

You can use the `vxprint` command to check if the `badlog` flag is set for the DCO of a volume as shown here:

```
# vxprint [-g diskgroup] -F%badlog dco_name
```

This command returns the value `on` if the `badlog` flag is set. For the example output, the command would take this form:

```
# vxprint -g mydg -F%badlog voll_dco
on
```

Use the following command to verify the version number of the DCO:

```
# vxprint [-g diskgroup] -F%version dco_name
```

This returns a value of 0 or 20. For the example output, the command would take this form:

```
# vxprint -g mydg -F%version voll_dco
```

The DCO version number determines the recovery procedure that you should use:

- ◆ "Recovering a Version 0 DCO" on page 18
- ◆ "Recovering a Version 20 DCO" on page 19

Recovering a Version 0 DCO

For a version 0 DCO, perform the following steps to recover the DCO volume:

1. Correct the problem that caused the I/O failure.
2. Use the following command to remove the `badlog` flag from the DCO:

```
# vxdco [-g diskgroup] -o force enable dco_name
```

For the example output, the command would take this form:

```
# vxdco -g mydg -o force enable voll_dco
```

The entry for `voll_dco` in the output from `vxprint` now looks like this:

```
dc voll_dco      voll      -      -      -      -
```

3. Restart the DCO volume using the following command:

```
# vxvol [-g diskgroup] start dco_log_vol
```

For the example output, the command would take this form:

```
# vxvol -g mydg start voll_dcl
```

4. Use the `vxassist snapclear` command to clear the FastResync maps for the original volume and for all its snapshots. This ensures that potentially stale FastResync maps are not used when the snapshots are snapped back (a full resynchronization is performed). FastResync tracking is re-enabled for any subsequent snapshots of the volume.

Caution You must use the `vxassist snapclear` command on all the snapshots of the volume after removing the `badlog` flag from the DCO. Otherwise, data may be lost or corrupted when the snapshots are snapped back.

If a volume and its snapshot volume are in the same disk group, the following command clears the FastResync maps for both volumes:

```
# vxassist [-g diskgroup] snapclear volume snap_obj_to_snapshot
```

Here `snap_obj_to_snapshot` is the name of the snap object associated with `volume` that points to the snapshot volume.

For the example output, the command would take this form:

```
# vxassist -g mydg snapclear voll SNAP-voll_snp
```

If a snapshot volume and the original volume are in different disk groups, you must perform a separate `snapclear` operation on each volume:

```
# vxassist -g diskgroup1 snapclear volume snap_obj_to_snapshot
# vxassist -g diskgroup2 snapclear snapvol snap_obj_to_volume
```

Here `snap_obj_to_volume` is the name of the snap object associated with the snapshot volume, `snapvol`, that points to the original volume.

For the example output, the commands would take this form if `SNAP-vol1` had been moved to the disk group, `snapdg`:

```
# vxassist -g mydg snapclear vol1 SNAP-vol1_snp
# vxassist -g snapdg snapclear SNAP-vol1 vol1_snp
```

5. To snap back the snapshot volume on which you performed a `snapclear` in the previous step, use the following command (after using the `vxchg move` command to move the snapshot plex back to the original disk group, if necessary):

```
# vxplex -f [-g diskgroup] snapback volume snapvol_plex
```

For the example output, the command would take this form:

```
# vxplex -f -g mydg snapback vol1 vol1-03
```

Note You cannot use `vxassist snapback` because the `snapclear` operation removes the snapshot association information.

Recovering a Version 20 DCO

For a version 20 DCO, perform the following steps to recover the DCO volume:

1. Correct the problem that caused the I/O failure.
2. Use the `vxsnap` command to dissociate each full-sized instant snapshot volume that is associated with the volume:

```
# vxsnap [-g diskgroup] dis snapvol
```

For the example output, the command would take this form:

```
# vxsnap -g mydg dis SNAP-vol1
```

3. Unprepare the volume using the following command:

```
# vxsnap [-g diskgroup] unprepare volume
```

For the example output, the command would take this form:

```
# vxsnap -g mydg unprepare vol1
```

Recovery from Failure of a DCO Volume

4. Start the volume using the `vxvol` command:

```
# vxvol [-g diskgroup] start volume
```

For the example output, the command would take this form:

```
# vxvol -g mydg start vol1
```

5. Prepare the volume again using the following command:

```
# vxsnap [-g diskgroup] prepare volume [ndcomirs=number] \  
  [regionsize=size] [drl=on|sequential|off] \  
  [storage_attribute ...]
```

For the example output, the command might take this form:

```
# vxsnap -g mydg prepare vol1 ndcomirs=2 drl=on
```

This adds a DCO volume with 2 plexes, and also enables DRL and FastResync (if licensed).

See the *VERITAS Volume Manager Administrator's Guide* and the `vxsnap(1M)` manual page for full details of how to use the `vxsnap prepare` command.

Recovery from Failure of Instant Snapshot Operations

2

This chapter describes how to recover from various failure and error conditions that may occur during instant snapshot operations:

- ◆ Failure of vxsnap prepare
- ◆ Failure of vxsnap make for Full-Sized Instant Snapshots
- ◆ Failure of vxsnap make for Break-Off Instant Snapshots
- ◆ Failure of vxsnap make for Space-Optimized Instant Snapshots
- ◆ Failure of vxsnap restore
- ◆ Failure of vxsnap reattach or refresh
- ◆ Copy-on-write Failure
- ◆ I/O Errors During Resynchronization
- ◆ I/O Failure on a DCO Volume

See the *VERITAS Volume Manager Administrator's Guide* and the vxsnap(1M) manual page for full details of the creation and administration of instant snapshots.

Failure of vxsnap prepare

If a vxsnap prepare operation fails prematurely, the vxprint command may show the new DCO volume in the INSTSNAPTMP state. VxVM can usually recover the DCO volume without intervention. However, in certain situations, this recovery may not succeed. If this happens, use the following command to delete the DCO volume:

```
# vxedit [-g diskgroup] rm DCO_volume
```

Alternatively, the DCO volume is removed automatically when the system is next restarted. When the DCO volume has been removed, run the vxsnap prepare command again.

Failure of vxsnap make for Full-Sized Instant Snapshots

If a `vxsnap make` operation fails during the creation of a full-sized instant snapshot, the snapshot volume may go into the DISABLED state, be marked invalid and be rendered unstartable. You can use the following command to check that the `inst_invalid` flag is set to on:

```
# vxprint [-g diskgroup] -F%inst_invalid snapshot_volume
```

VxVM can usually recover the snapshot volume without intervention. However, in certain situations, this recovery may not succeed. If this happens, use the following steps to delete the DCO volume:

1. Use the `vxmend` command to clear the snapshot volume's `tut10` field:

```
# vxmend [-g diskgroup] clear tut10 snapshot_volume
```

2. Run the following command on the snapshot volume:

```
# vxsnap [-g diskgroup] unprepare snapshot_volume
```

3. Prepare the snapshot volume again for snapshot operations:

```
# vxsnap [-g diskgroup] prepare snapshot_volume
```

Failure of vxsnap make for Break-Off Instant Snapshots

If a `vxsnap make` operation fails during the creation of a third-mirror break-off instant snapshot, the snapshot volume may go into the INSTSNAPTMP state. VxVM can usually recover the snapshot volume without intervention. However, in certain situations, this recovery may not succeed. If this happens, use the following command to delete the snapshot volume:

```
# vxedit [-g diskgroup] rm snapshot_volume
```

Alternatively, the snapshot volume is removed automatically when the system is next restarted.

Failure of vxsnap make for Space-Optimized Instant Snapshots

If a `vxsnap make` operation fails during the creation of a space-optimized instant snapshot, the snapshot volume may go into the `INSTSNAPTMP` state. VxVM can usually recover the snapshot volume without intervention. However, in certain situations, this recovery may not succeed. If this happens, use the following command to delete the snapshot volume:

```
# vxedit [-g diskgroup] rm snapshot_volume
```

Alternatively, the snapshot volume is removed automatically when the system is next restarted.

If the `vxsnap make` operation was being performed on a prepared cache object by specifying the `cache` attribute was specified, the cache object remains intact after deleting the snapshot. If the `cachesize` attribute was used to specify a new cache object, the cache object does not exist after deleting the snapshot.

Failure of vxsnap restore

If a `vxsnap restore` operation fails, the volume being restored may go into the `DISABLED` state. Use the following command to start the volume:

```
# vxvol [-g diskgroup] start volume
```

Failure of vxsnap reattach or refresh

If a `vxsnap reattach` or `refresh` operation fails, the volume being refreshed may go into the `DISABLED` state, be marked invalid and be rendered unstartable. You can use the following command to check that the `inst_invalid` flag is set to on:

```
# vxprint [-g diskgroup] -F%inst_invalid volume
```

Use the following steps to recover the volume:

1. Use the `vxmend` command to clear the volume's `tut10` field:

```
# vxmend [-g diskgroup] clear tut10 volume
```

2. Use the `vxsnap` command to dissociate the volume from the snapshot hierarchy:

```
# vxsnap [-g diskgroup] dis volume
```

Copy-on-write Failure

3. Use the following command to start the volume:

```
# vxvol [-g diskgroup] start volume
```
4. Re-run the failed `reattach` or `refresh` command.

Note This results in a full resynchronization of the volume. Alternatively, remove the snapshot volume and recreate it if required.

Copy-on-write Failure

If an error is encountered while performing an internal resynchronization of a volume's snapshot, the snapshot volume goes into the `INVALID` state, and is made inaccessible for I/O and instant snapshot operations.

Use the following steps to recover the snapshot volume:

1. Use the `vxsnap` command to dissociate the volume from the snapshot hierarchy:

```
# vxsnap [-g diskgroup] dis snapshot_volume
```

2. Unprepare the volume using the following command:

```
# vxsnap [-g diskgroup] unprepare snapshot_volume
```

3. Prepare the volume using the following command:

```
# vxsnap [-g diskgroup] prepare volume [ndcomirs=number] \  
  [regionsize=size] [drl=on|sequential|off] \  
  [storage_attribute ...]
```

See the *VERITAS Volume Manager Administrator's Guide* and the `vxsnap(1M)` manual page for full details of how to use the `vxsnap prepare` command.

The volume can now be used again for snapshot operations.

Alternatively, you can remove the snapshot volume and recreate it if required.

I/O Errors During Resynchronization

Snapshot resynchronization (started by `vxsnap syncstart`, or by specifying `sync=on` to `vxsnap`) stops if an I/O error occurs, and displays the following message on the system console:

```
VxVM vxsnap ERROR V-5-1-6840 Synchronization of the volume volume
stopped due to I/O error
```

After correcting the source of the error, use the following command to restart the resynchronization operation:

```
# vxsnap [-b] [-g diskgroup] syncstart volume
```

See the *VERITAS Volume Manager Administrator's Guide* and the `vxsnap(1M)` manual page for full details of how to use the `vxsnap syncstart` command.

I/O Failure on a DCO Volume

If an I/O failure occurs on a DCO volume, its FastResync maps and DRL log cannot be accessed, and the DCO volume is marked with the BADLOG flag. DRL logging and recovery, and instant snapshot operations are not possible with the volume until you recover its DCO volume using the procedure described in "Recovering a Version 20 DCO" on page 19.

Note If the I/O failure also affects the data volume, it must be recovered before its DCO volume can be recovered.

I/O Failure on a DCO Volume

Recovery from Boot Disk Failure

3

VERITAS Volume Manager (VxVM) protects systems from disk and other hardware failures and helps you to recover from such events. This chapter describes recovery procedures and information to help you prevent loss of data or system access due to the failure of the boot (root) disk. It also includes procedures for repairing the `root (/)` and `usr` file systems.

For information about recovering volumes and their data on non-boot disks, see “Recovery from Hardware Failure” on page 1.

For more information about protecting your system, see the *VERITAS Volume Manager Installation Guide*.

Note The examples in this chapter assume that the boot (root) disk is configured on the device `c0t0d0s2`. Your system may be configured to use a different device.

Possible root, swap, and usr Configurations

During installation, it is possible to set up a variety of configurations for the `root (/)` and `usr` file systems, and for `swap`. The following cases are possible:

- ◆ `usr` is a directory under `/` and no separate partition is allocated for it. In this case, `usr` becomes part of the `rootvol` volume when the root disk is encapsulated and put under VERITAS Volume Manager control.
- ◆ `usr` is on a separate partition from the root partition on the root disk. In this case, a separate volume is created for the `usr` partition. `vxmirror` mirrors the `usr` volume on the destination disk.
- ◆ `usr` is on a disk other than the root disk. In this case, a volume is created for the `usr` partition only if you use VxVM to encapsulate the disk. Note that encapsulating the root disk and having mirrors of the root volume is ineffective in maintaining the availability of your system if the separate `usr` partition becomes inaccessible for any reason. For maximum availability of the system, it is recommended that you encapsulate both the `root` disk and the disk containing the `usr` partition, and have mirrors for the `usr`, `rootvol`, and `swapvol` volumes.

Booting from Alternate Boot Disks

The `rootvol` volume must exist in the boot disk group. See “Boot-time Volume Restrictions” in the “Administering Disks” chapter of the *VERITAS Volume Manager Administrator’s Guide* for information on `rootvol` and `usr` volume restrictions.

VxVM allows you to put `swap` partitions on any disk; it does not need an initial `swap` area during early phases of the boot process. By default, the VERITAS Volume Manager installation chooses partition 0 on the selected root disk as the `root` partition, and partition 1 as the `swap` partition. However, it is possible to have the `swap` partition on a partition not located on the root disk. In such cases, you are advised to encapsulate that disk and create mirrors for the `swap` volume. If you do not do this, damage to the `swap` partition eventually causes the system to crash. It may be possible to boot the system, but having mirrors for the `swapvol` volume prevents system failures.

Booting from Alternate Boot Disks

If the root disk is encapsulated and mirrored, you can use one of its mirrors to boot the system if the primary boot disk fails. To boot the system after failure of the primary boot disk on a SPARC system, follow these steps:

1. Check that the EEPROM variable `use-nvramrc?` is set to `true` by entering the following command at the boot prompt:

```
ok printenv use-nvramrc?
```

If set to `true`, this variable allows the use of alternate boot disks. To set the value of `use-nvramrc?` to `true`, enter the following command at the boot prompt:

```
ok setenv use-nvramrc? true
```

If `use-nvramrc?` is set to `false`, the system fails to boot from the `devalias` and displays an error message such as the following:

```
Rebooting with command: boot vx-mirdisk
Boot device: /pci@1f,4000/scsi@3/disk@0,0 File and args:vx-mirdisk
boot: cannot open vx-mirdisk
Enter filename [vx-mirdisk]:
```

2. Check for available boot disk aliases using the following command at the boot prompt:

```
ok devalias
```

Suitable mirrors of the root disk are listed with names of the form `vx-diskname`.

3. Enter this command:

```
ok boot alias
```

where *alias* is the name of an alternate root mirror found from the previous step.

If a selected disk contains a root mirror that is stale, `vxconfigd` displays an error stating that the mirror is unusable and lists any non-stale alternate bootable disks.

More information about the boot process may be found in “The Boot Process on SPARC Systems” on page 29.

The Boot Process on SPARC Systems

A Sun SPARC system prompts for a boot command unless the `autoboot` flag has been set in the nonvolatile storage area used by the firmware. Machines with older PROMs have different prompts than that for the newer V2 and V3 versions. These newer versions of PROM are also known as OpenBoot PROMs (OBP). The `boot` command syntax for the newer types of PROMs is:

```
ok boot [OBP names] [filename] [boot-flags]
```

OBP names specify the OpenBoot PROM designations. For example, on Desktop SPARC systems, the designation `sbus/esp@0,800000/sd@3,0:a` indicates a SCSI disk (`sd`) at target 3, lun 0 on the SCSI bus, with the `esp` host bus adapter plugged into slot 0.

Note You can use VERITAS Volume Manager boot disk alias names instead of OBP names. Example aliases are `vx-rootdisk` or `vx-disk01`. To list the available boot devices, use the `devalias` command at the OpenBoot prompt.

filename is the name of a file that contains the kernel. The default is `/kernel/unix` in the root partition. If necessary, you can specify another program (such as `/stand/diag`) by specifying the `-a` flag. (Some versions of the firmware allow the default filename to be saved in the nonvolatile storage area of the system.)

Note Do not boot a system running VxVM with rootability enabled using all the defaults presented by the `-a` flag. See “Restoring a Copy of /etc/system on the Root Disk” on page 36 for the correct responses.

Boot flags are not interpreted by the `boot` program. The `boot` program passes all *boot-flags* to the file identified by *filename*. See the `kernel (1)` and `kadb (1M)` manual pages for information on the options available with the default standalone program, `/kernel/unix`.

Hot-Relocation and Boot Disk Failure

If the boot (`root`) disk fails and it is mirrored, hot-relocation automatically attempts to replace the failed `root` disk mirror with a new mirror. To achieve this, hot-relocation uses a surviving mirror of the root disk to create a new mirror, either on a spare disk, or on a disk with sufficient free space. This ensures that there are always at least two mirrors of the `root` disk that can be used for booting. The hot-relocation daemon also calls the `vxbootsetup` utility to configure the disk with the new mirror as a bootable disk.

Hot-relocation can fail for a `root` disk if the boot disk group does not contain sufficient spare or free space to fit the volumes from the failed `root` disk. The `rootvol` and `swapvol` volumes require contiguous disk space. If the `root` volume and other volumes on the failed `root` disk cannot be relocated to the same new disk, each of these volumes may be relocated to different disks.

Mirrors of `rootvol` and `swapvol` volumes must be cylinder-aligned. This means that they can only be created on disks that have enough space to allow their subdisks to begin and end on cylinder boundaries. Hot-relocation fails to create the mirrors if these disks are not available.

Unrelocating Subdisks to a Replacement Boot Disk

When a boot disk is encapsulated, the `root` file system and other system areas, such as the swap partition, are made into volumes. VxVM creates a private region using part of the existing swap area, which is usually located in the middle of the disk. However, when a disk is initialized as a VM disk, VxVM creates the private region at the beginning of the disk.

If a mirrored encapsulated boot disk fails, hot-relocation creates new copies of its subdisks on a spare disk. The name of the disk that failed and the offsets of its component subdisks are stored in the subdisk records as part of this process. After the failed boot disk is replaced with one that has the same storage capacity, it is “initialized” and added back to the disk group. `vxunreloc` can be run to move all the subdisks back to the disk.

However, the difference of the disk layout between an initialized disk and an encapsulated disk affects the way the offset into a disk is calculated for each unrelocated subdisk. Use the `-f` option to `vxunreloc` to move the subdisks to the disk, but not to the same offsets. For this to be successful, the replacement disk should be at least 2 megabytes larger than the original boot disk.

`vxunreloc` makes the new disk bootable after it moves all the subdisks to the disk.

Note The system dump device is usually configured to be the swap partition of the `root` disk. Whenever a swap subdisk is moved (by hot-relocation, or using `vxunreloc`) from one disk to another, the dump device must be re-configured on the new disk.

In Solaris 2.6 and earlier releases, the name of the dump device is stored in the `dumpfile` structure. Use the following command to discover its setting:

```
# echo dumpfile+0x10/s | adb -k /dev/ksyms /dev/mem
```

This displays output similar to the following:

```
phymem 3d24
dumpfile+0x10: /dev/dsk/c0t0d0s1
```

In this example, the dump device is configured to be `/dev/dsk/c0t0d0s1`. To change this setting, shut down and reboot the system. This configures the first swap partition as the dump device.

In Solaris 7, and later releases, use the `dumpadm` command to view and set the dump device. For details, see the `dumpadm(1M)` manual page.

Recovery from Boot Failure

While there are many types of failures that can prevent a system from booting, the same basic procedure can be taken to bring the system up. When a system fails to boot, you should first try to identify the failure by the evidence left behind on the screen and then attempt to repair the problem (for example, by turning on a drive that was accidentally powered off). If the problem is one that cannot be repaired (such as data errors on the boot disk), boot the system from an alternate boot disk that contains a mirror of the `root` volume, so that the damage can be repaired or the failing disk can be replaced.

The following sections outline some possible failures and provide instructions on the corrective actions:

- ◆ “Boot Device Cannot be Opened” on page 31
- ◆ “Cannot Boot From Unusable or Stale Plexes” on page 32
- ◆ “Invalid UNIX Partition” on page 34
- ◆ “Incorrect Entries in `/etc/vfstab`” on page 34
- ◆ “Missing or Damaged Configuration Files” on page 36

Boot Device Cannot be Opened

Early in the boot process, immediately following system initialization, there may be messages similar to the following:

```
SCSI device 0,0 is not responding
Can't open boot device
```

Recovery from Boot Failure

This means that the system PROM was unable to read the boot program from the boot drive. Common causes for this problem are:

- ◆ The boot disk is not powered on.
- ◆ The SCSI bus is not terminated.
- ◆ There is a controller failure of some sort.
- ◆ A disk is failing and locking the bus, preventing any disks from identifying themselves to the controller, and making the controller assume that there are no disks attached.

The first step in diagnosing this problem is to check carefully that everything on the SCSI bus is in order. If disks are powered off or the bus is unterminated, correct the problem and reboot the system. If one of the disks has failed, remove the disk from the bus and replace it.

If no hardware problems are found, the error is probably due to data errors on the boot disk. In order to repair this problem, attempt to boot the system from an alternate boot disk (containing a mirror of the root volume). If you are unable to boot from an alternate boot disk, there is still some type of hardware problem. Similarly, if switching the failed boot disk with an alternate boot disk fails to allow the system to boot, this also indicates hardware problems.

Cannot Boot From Unusable or Stale Plexes

If a disk is unavailable when the system is running, any mirrors of volumes that reside on that disk become stale. This means that the data on that disk is inconsistent relative to the other mirrors of that volume. During the boot process, the system accesses only one copy of the `root` volume (the copy on the boot disk) until a complete configuration for this volume can be obtained.

If it turns out that the plex of this volume that was used for booting is stale, the system must be rebooted from an alternate boot disk that contains non-stale plexes. This problem can occur, for example, if the system was booted from one of the disks made bootable by VxVM with the original boot disk turned off. The system boots normally, but the plexes that reside on the unpowered disk are stale. If the system reboots from the original boot disk with the disk turned back on, the system boots using that stale plex.

Another possible problem can occur if errors in the VERITAS Volume Manager headers on the boot disk prevent VxVM from properly identifying the disk. In this case, VxVM does not know the name of that disk. This is a problem because plexes are associated with disk names, so any plexes on the unidentified disk are unusable.

A problem can also occur if the root disk has a failure that affects the root volume plex. At the next boot attempt, the system still expects to use the failed root plex for booting. If the root disk was mirrored at the time of the failure, an alternate root disk (with a valid root plex) can be specified for booting.

If any of these situations occur, the configuration daemon, `vxconfigd`, notes it when it is configuring the system as part of the `init` processing of the boot sequence. `vxconfigd` displays a message describing the error and what can be done about it, and then halts the system. For example, if the plex `rootvol-01` of the root volume `rootvol` on disk `rootdisk` is stale, `vxconfigd` may display this message:

```
VxVM vxconfigd ERROR V-5-1-1049: System boot disk does not have a
valid root plex
Please boot from one of the following disks:
Disk: disk01           Device: c0t1d0s2
vxvm:vxconfigd:      Error: System startup failed
The system is down.
```

This informs the administrator that the alternate boot disk named `disk01` contains a usable copy of the root plex and should be used for booting. When this message is displayed, reboot the system from the alternate boot disk as described in "Booting from Alternate Boot Disks" on page 28.

Once the system has booted, the exact problem needs to be determined. If the plexes on the boot disk were simply stale, they are caught up automatically as the system comes up. If, on the other hand, there was a problem with the private area on the disk or the disk failed, you need to re-add or replace the disk.

If the plexes on the boot disk are unavailable, you should receive mail from VERITAS Volume Manager utilities describing the problem. Another way to determine the problem is by listing the disks with the `vxdisk` utility. In the above example, if the problem is a failure in the private area of root disk (such as due to media failures or accidentally overwriting the VERITAS Volume Manager private region on the disk), `vxdisk list` shows this display:

DEVICE	TYPE	DISK	GROUP	STATUS
-	-	rootdisk	bootdg	failed was: c0t3d0s2
c0t1d0s2	sliced	disk01	bootdg	ONLINE

Invalid UNIX Partition

Once the boot program has loaded, it attempts to access the boot disk through the normal UNIX partition information. If this information is damaged, the boot program fails with an error such as:

```
File just loaded does not appear to be executable
```

If this message appears during the boot attempt, the system should be booted from an alternate boot disk. While booting, most disk drivers display errors on the console about the invalid UNIX partition information on the failing disk. The messages are similar to this:

```
WARNING: unable to read label  
WARNING: corrupt label_sdo
```

This indicates that the failure was due to an invalid disk partition. You can attempt to re-add the disk as described in “Re-Adding a Failed Boot Disk” on page 42. However, if the reattach fails, then the disk needs to be replaced as described in “Replacing a Failed Boot Disk” on page 43.

Incorrect Entries in /etc/vfstab

When the root disk is encapsulated and put under VERITAS Volume Manager control, as part of the normal encapsulation process, volumes are created for all of the partitions on the disk. VxVM modifies the `/etc/vfstab` to use the corresponding volumes instead of the disk partitions. Care should be taken while editing the `/etc/vfstab` file manually, and you should always make a backup copy before committing any changes to it. The most important entries are those corresponding to `/` and `/usr`. The `vfstab` that existed prior to VERITAS Volume Manager installation is saved in `/etc/vfstab.prevm`.

Damaged Root (/) Entry in /etc/vfstab

If the entry in `/etc/vfstab` for the root file system (`/`) is lost or is incorrect, the system boots in single-user mode. Messages similar to the following are displayed on booting the system:

```
INIT: Cannot create /var/adm/utmp or /var/adm/utmpx  
INIT: failed write of utmpx entry: " "
```

It is recommended that you first run `fsck` on the root partition as shown in this example:

```
# fsck -F ufs /dev/rdisk/c0t0d0s0
```

At this point in the boot process, / is mounted read-only, not read/write. Since the entry in /etc/vfstab was either incorrect or deleted, mount / as read/write manually, using this command:

```
# mount -o remount /dev/vx/dsk/rootvol /
```

After mounting / as read/write, exit the shell. The system prompts for a new run level. For multi-user mode, enter run level 3:

```
ENTER RUN LEVEL (0-6,s or S): 3
```

Restore the entry in /etc/vfstab for / after the system boots.

Damaged /usr Entry in /etc/vfstab

The /etc/vfstab file has an entry for /usr only if /usr is located on a separate disk partition. After encapsulation of the disk containing the /usr partition, VxVM changes the entry in /etc/vfstab to use the corresponding volume.

In the event of loss of the entry for /usr from /etc/vfstab, the system cannot be booted (even if you have mirrors of the /usr volume). In this case, boot the system from the CD-ROM and restore /etc/vfstab using the following procedure:

1. Boot the operating system into single-user mode from its installation CD-ROM using the following command at the boot prompt:

```
ok boot cdrom -s
```

2. Mount /dev/dsk/c0t0d0s0 on a suitable mount point such as /a or /mnt:

```
# mount /dev/dsk/c0t0d0s0 /a
```

3. Edit /a/etc/vfstab, and ensure that there is an entry for the /usr file system, such as the following:

```
/dev/vx/dsk/usr /dev/vx/rdisk/usr /usr ufs 1 yes -
```

4. Shut down and reboot the system from the same root partition on which the vfstab file was restored.

Missing or Damaged Configuration Files

Note VxVM no longer maintains entries for tunables in `/etc/system` as was the case for VxVM 3.2 and earlier releases. All entries for VERITAS Volume Manager device driver tunables are now contained in files named `/kernel/drv/vx*.conf`, such as `/kernel/drv/vxio.conf`. For more information, see the “Performance Monitoring and Tuning” chapter of the *VERITAS Volume Manager Administrator’s Guide*.

Caution If you need to modify configuration files such as `/etc/system`, make a copy of the file in the `root` file system before editing it.

If your changes to the `/etc/system` file are incorrect, the saved copy can be specified to the `boot` program. To specify the saved system file to the `boot` program, follow the procedure in the next section.

Restoring a Copy of `/etc/system` on the Root Disk

If the `/etc/system` file is damaged and a saved copy of the `/etc/system` file is available, the system can be booted as follows:

1. Boot the system with the following command:

```
ok boot -a
```

2. Press Return to accept the default for all prompts *except* the following:

- a. The default pathname for the kernel program, `/kernel/unix`, may not be appropriate for your system’s architecture. If this is so, enter the correct pathname, such as `/platform/sun4u/kernel/unix`, at the following prompt:

```
Enter filename [/kernel/unix]: /platform/sun4u/kernel/unix
```

- b. Enter the name of the saved system file, such as `/etc/system.save` at the following prompt:

```
Name of system file [/etc/system]: /etc/system.save
```

- c. Enter `/pseudo/vxio@0:0` as the physical name of the root device at the following prompt:

```
Enter physical name of root device  
[...]: /pseudo/vxio@0:0
```


Copy of /etc/system is not Available on the Root Disk

If `/etc/system` is damaged or missing, and a saved copy of this file is not available on the root disk, the system cannot be booted with the VERITAS Volume Manager rootability feature turned on.

The following procedure assumes the device name of the root disk to be `c0t0d0s2`, and that the root (`/`) file system is on partition `s0`.

To boot the system without VERITAS Volume Manager rootability and restore the configuration files:

1. Boot the operating system into single-user mode from its installation CD-ROM using the following command at the boot prompt:

```
ok boot cdrom -s
```

2. Mount `/dev/dsk/c0t0d0s0` on a suitable mount point such as `/a` or `/mnt`:

```
# mount /dev/dsk/c0t0d0s0 /a
```

3. If a backup copy of `/etc/system` is available, restore this as the file `/a/etc/system`. If a backup copy is not available, create a new `/a/etc/system` file. Ensure that `/a/etc/system` contains the following entries that are required by VxVM:

```
set vxio:vol_rootdev_is_volume=1
forceload: drv/driver
...
forceload: drv/vxio
forceload: drv/vxspec
forceload: drv/vxdmp
rootdev: /pseudo/vxio@0:0
```

Lines of the form `forceload: drv/driver` are used to forcibly load the drivers that are required for the root mirror disks. Example *driver* names are `pci`, `sd`, `ssd`, `dad` and `ide`. To find out the names of the drivers, use the `ls` command to obtain a long listing of the special files that correspond to the devices used for the root disk, for example:

```
# ls -al /dev/dsk/c0t0d0s2
```

This produces output similar to the following (with irrelevant detail removed):

```
lrwxrwxrwx ... /dev/dsk/c0t0d0s2 ->
../../../../devices/pci@1f,0/pci@1/pci@1/SUNW,ispstwo@4/sd@0,0:c
```

This example would require lines to force load both the `pci` and the `sd` drivers:

```
forceload: drv/pci
forceload: drv/sd
```

Repairing Root or /usr File Systems on Mirrored Volumes

4. Shut down and reboot the system from the same `root` partition on which the configuration files were restored.

Repairing Root or /usr File Systems on Mirrored Volumes

If the `root` or `/usr` file system is defined on a mirrored volume, errors in the partition that underlies one of the mirrors can result in data corruption or system errors at boot time (when VxVM is started and assumes that the mirrors are synchronized).

Two alternate workarounds exist for this situation:

- ◆ Mount one plex of the `root` or `/usr` file system, repair it, unmount it, and use `dd` to copy the fixed plex to all other plexes. This procedure is not recommended as it can be error prone.
- ◆ Restore the system from a valid backup tape. This procedure is described in the following section. It does not require the operating system to be re-installed from the base CD-ROM. It provides a simple, efficient, and reliable means of recovery when both the root disk and its mirror are damaged.

Recovering a Root Disk and Root Mirror from Backup Tape

This procedure assumes that you have:

- ◆ A listing of the partition table for the original `root` disk before you encapsulated it.
- ◆ A current full backup of all the file systems on the original `root` disk that was under VERITAS Volume Manager control. If the `root` file system is of type `ufs`, you can back it up using the `ufsdump` command. See the `ufsdump(1M)` manual page for more information.
- ◆ A new boot disk installed to replace the original failed boot disk if the original boot disk was physically damaged.

This procedure requires the reinstallation of the `root` disk. To prevent the loss of data on disks not involved in the reinstallation, only involve the `root` disk in the reinstallation procedure.

Several of the automatic options for installation access disks other than the root disk without requiring confirmation from the administrator. Therefore, disconnect all other disks containing volumes from the system prior to starting this procedure. This will ensure that these disks are unaffected by the reinstallation. Reconnect the disks after completing the procedure.

The following procedure assumes the device name of the new `root` disk to be `c0t0d0s2`, and that you need to recover both the `root (/)` file system on partition `s0`, and the `/usr` file system on partition `s6`. If your system does not have a separate `/usr` file system, omit steps 7 and 8.

1. Boot the operating system into single-user mode from its installation CD-ROM using the following command at the boot prompt:

```
ok boot cdrom -s
```

2. Use the `format` command to create partitions on the new root disk (`c0t0d0s2`). These should be identical in size to those on the original root disk before encapsulation unless you are using this procedure to change their sizes. If you change the size of the partitions, ensure that they are large enough to store the data that is restored to them. See the `format(1M)` manual page for more information.

Note A maximum of five partitions may be created for file systems or swap areas as encapsulation reserves two partitions for VERITAS Volume Manager `private` and `public` regions.

3. Use the `mkfs` command to make new file systems on the `root` and `usr` partitions that you created in the previous step. For example, to make a `ufs` file system on the `root` partition, enter:

```
# mkfs -F ufs /dev/rdisk/c0t0d0s0
```

See the `mkfs(1M)` and `mkfs_ufs(1M)` manual pages for more information.

4. Mount `/dev/dsk/c0t0d0s0` on a suitable mount point such as `/a` or `/mnt`:

```
# mount /dev/dsk/c0t0d0s0 /a
```

5. Restore the `root` file system from tape into the `/a` directory hierarchy. For example, if you used `ufsdump` to back up the file system, use the `ufsrestore` command to restore it. See the `ufsrestore(1M)` manual page for more information.

6. Use the `installboot` command to install a bootblock device on `/a`.

7. Use the `mkdir` command to create a suitable mount point, such as `/a/usr/`, and mount `/dev/dsk/c0t0d0s6` on it:

```
# mkdir -p /a/usr
# mount /dev/dsk/c0t0d0s6 /a/usr
```

8. Restore the `/usr` file system from tape into the `/a/usr` directory hierarchy.

Repairing Root or /usr File Systems on Mirrored Volumes

9. Disable startup of VxVM by modifying files in the restored root file system as follows:
 - a. Create the file `/a/etc/vx/reconfig.d/state.d/install-db` to prevent the configuration daemon, `vxconfigd`, from starting:


```
# touch /a/etc/vx/reconfig.d/state.d/install-db
```
 - b. Copy `/a/etc/system` to a backup file such as `/a/etc/system.old`.
 - c. Comment out the following lines from `/a/etc/system` by putting a `*` character in front of them:


```
set vxio:vol_rootdev_is_volume=1
rootdev:/pseudo/vxio@0:0
```

 These lines should then read:


```
* set vxio:vol_rootdev_is_volume=1
* rootdev:/pseudo/vxio@0:0
```
 - d. Copy `/a/etc/vfstab` to a backup file such as `/a/etc/vfstab.old`.
 - e. Edit `/a/etc/vfstab`, and replace the volume device names (beginning with `/dev/vx/dsk`) for the `/` and `/usr` file system entries with their standard disk devices, `/dev/dsk/c0t0d0s0` and `/dev/dsk/c0t0d0s6`. For example, replace the following lines:


```
/dev/vx/dsk/rootvol /dev/vx/rdisk/rootvol / ufs 1 no -
/dev/vx/dsk/usrvol /dev/vx/rdisk/usrvol /usr ufs 1 yes -
```

 with this line:


```
/dev/dsk/c0t0d0s0 /dev/rdsk/c0t0d0s0 / ufs 1 no -
/dev/dsk/c0t0d0t6 /dev/rdsk/c0t0d0s6 /usr ufs 1 yes -
```
10. Shut down the system cleanly using the `init 0` command, and reboot from the new root disk. The system comes up thinking that VxVM is *not* installed.

The next step in the procedure depends on whether there are root disk mirrors in the old boot disk group:

- ◆ If there are other disks in the old boot disk group that are *not* used as root disk mirrors, perform only step 11.
- ◆ If there are only root disk mirrors in the old boot disk group, perform only step 12.

11. If there are other disks in the old boot disk group that are *not* used as *root* disk mirrors, follow these steps to bring in the old boot disk group (minus the boot disk which VxVM will think has failed) and set up the new boot disk:
 - a. Remove files involved with the installation that are no longer needed:

```
# rm -r /etc/vx/reconfig.d/state.d/install-db
```
 - b. Start the VERITAS Volume Manager I/O daemons:

```
# vxiod set 10
```
 - c. Start the VERITAS Volume Manager configuration daemon in disabled mode:

```
# vxconfigd -m disable
```
 - d. Initialize the `volboot` file:

```
# vxdctl init
```
 - e. Enable `vxconfigd`:

```
# vxdctl enable
```

Steps *a* through *e* enable the old boot disk group excluding the *root* disk which VxVM interprets as failed.

 - f. Use the `vxedit` command (or the VERITAS Enterprise Administrator (VEA)) to remove the old *root* disk volumes and the *root* disk itself from VERITAS Volume Manager control.
 - g. Use the `vxdiskadm` command to encapsulate the new *root* disk and initialize any disks that are to serve as *root* disk mirrors. After the required reboot, mirror the *root* disk onto the *root* disk mirrors.
12. If there are only *root* disk mirrors in the old boot disk group:
 - a. Run the `vxinstall` command to encapsulate the new boot disk, and initialize the *root* disk mirrors.
 - b. After the required reboot, mirror the *root* disk onto the *root* disk mirrors.

Re-Adding and Replacing Boot Disks

Data that is not critical for booting the system is only accessed by VxVM after the system is fully operational, so it does not have to be located in specific areas. VxVM can find it. However, boot-critical data must be placed in specific areas on the bootable disks for the boot process to find it.

On some systems, the controller-specific actions performed by the disk controller in the process and the system BIOS constrain the location of this critical data.

If a boot disk fails, one of the following procedures can be used to correct the problem:

- ◆ If the errors are transient or correctable, re-use the same disk. This is known as *re-adding* a disk. In some cases, reformatting a failed disk or performing a surface analysis to rebuild the alternate-sector mappings are sufficient to make a disk usable for re-addition.
- ◆ If the disk has failed completely, replace it.

The following sections describe how to re-add or replace a failed boot disk.

Re-Adding a Failed Boot Disk

Re-adding a disk is the same procedure as replacing the disk, except that the same physical disk is used. Normally, a disk that needs to be re-added has been *detached*. This means that VxVM has detected the disk failure and has ceased to access the disk.

Note Your system may use a *device name* or *path* that differs from the examples. See “Disk Devices” in the “Administering Disks” chapter of the *VERITAS Volume Manager Administrator’s Guide* for more information on device names.

For example, consider a system that has two disks, `disk01` and `disk02`, which are normally mapped into the system configuration during boot as disks `c0t0d0s2` and `c0t1d0s2`, respectively. A failure has caused `disk01` to become detached. This can be confirmed by listing the disks with the `vxdisk` utility with this command:

```
# vxdisk list
```

`vxdisk` displays this (example) list:

DEVICE	TYPE	DISK	GROUP	STATUS
<code>c0t0d0s2</code>	sliced	-	-	error
<code>c0t1d0s2</code>	sliced	<code>disk02</code>	<code>bootdg</code>	online
-	-	<code>disk01</code>	<code>bootdg</code>	failed was: <code>c0t0d0s2</code>

Note that the disk `disk01` has no device associated with it, and has a status of `failed` with an indication of the device that it was detached from. It is also possible for the device (such as `c0t0d0s2` in the example) not to be listed at all should the disk fail completely.

In some cases, the `vxdisk list` output can differ. For example, if the boot disk has uncorrectable failures associated with the UNIX partition table, a missing root partition cannot be corrected but there are no errors in the VERITAS Volume Manager private area. The `vxdisk list` command displays a listing such as this:

DEVICE	TYPE	DISK	GROUP	STATUS
c0t0d0s2	sliced	disk01	bootdg	online
c0t1d0s2	sliced	disk02	bootdg	online

However, because the error was not correctable, the disk is viewed as failed. In such a case, remove the association between the failing device and its disk name using the `vxdiskadm` "Remove a disk for replacement" menu item. (See the `vxdiskadm (1M)` manual page for more information.) You can then perform any special procedures to correct the problem, such as reformatting the device.

To re-add the disk, select the `vxdiskadm` "Replace a failed or removed disk" menu item to replace the disk, and specify the *same* device as the replacement. For the example above, you would replace `disk01` with the device `c0t0d0s2`.

If hot-relocation is enabled when a mirrored boot disk fails, an attempt is made to create a new mirror and remove the failed subdisks from the failing boot disk. If a re-add succeeds after a successful hot-relocation, the `root` and other volumes affected by the disk failure no longer exist on the re-added disk. Run `vxunreloc` to move the hot-relocated subdisks back to the newly replaced disk.

Replacing a Failed Boot Disk

The replacement disk must have at least as much storage capacity as was in use on the disk being replaced. It must be large enough to accommodate all subdisks of the original disk at their current disk offsets.

To estimate the size of the replacement disk, use this command:

```
# vxprint [-g diskgroup] -st -e 'sd_disk="diskname"'
```

where *diskname* is the name of the disk that failed or of one of its mirrors.

Re-Adding and Replacing Boot Disks

The following is sample output from running this command:

```
# vxprint -g rtdg -st -e 'sd_disk="rtdg01"'
Disk group: rtdg

SD NAME      PLEX      DISK  DISKOFFS  LENGTH  [COL/]OFF  DEVICE  MODE
...
sd rtdg01-01 swapvol-01 rtdg01 0          1045296  0        c0t0d0  ENA
sd rtdg01-02 rootvol-01 rtdg01 1045296   16751952 0        c0t0d0  ENA
```

From the resulting output, add the `DISKOFFS` and `LENGTH` values for the last subdisk listed for the disk. This size is in 512-byte sectors. Divide this number by 2 for the size in kilobytes. In this example, the `DISKOFFS` and `LENGTH` values for the subdisk `rtdg01-02` are 1,045,296 and 16,751,952, so the disk size is $(1,045,296 + 16,751,952)/2$, which equals 8,898,624 kilobytes or approximately 8.5 gigabytes.

Note Disk sizes reported by manufacturers usually represent the unformatted capacity of disks. Also, most manufacturers use the terms *megabyte* and *gigabyte* to mean a million (1,000,000) and a billion (1,000,000,000) bytes respectively, rather than the usual meaning of 1,048,576 and 1,073,741,824 bytes. For the above example, the actual size for the disk as quoted by the manufacturer was 9.6 gigabytes.

To replace a boot disk:

1. Boot the system from an alternate boot disk (see “Booting from Alternate Boot Disks” on page 28).
2. Remove the association between the failing device and its disk name using the “Remove a disk for replacement” function of `vxdiskadm`. (See the `vxdiskadm (1M)` manual page for more information.)
3. Shut down the system and replace the failed hardware.
4. After rebooting from the alternate boot disk, use the `vxdiskadm` “Replace a failed or removed disk” menu item to notify VxVM that you have replaced the failed disk.

Caution If the replacement disk was previously an encapsulated root disk under VxVM control, select to reorganize the disk when prompted. Otherwise, the disk is left with an invalid VTOC that renders the system unbootable. Ensure that you have made at least one valid copy of any existing data on the disk.

5. Use `vxdiskadm` to mirror the alternate boot disk to the replacement boot disk.
6. When the volumes on the boot disk have been restored, shut down the system, and test that the system can be booted from the replacement boot disk.

Recovery by Reinstallation

Reinstallation is necessary if all copies of your boot (`root`) disk are damaged, or if certain critical files are lost due to file system damage.

If these types of failures occur, attempt to preserve as much of the original VxVM configuration as possible. Any volumes that are not directly involved in the failure do not need to be reconfigured. You do not have to reconfigure any volumes that are preserved.

General Reinstallation Information

This section describes procedures used to reinstall VxVM and preserve as much of the original configuration as possible after a failure.

Note System reinstallation destroys the contents of any disks that are used for reinstallation.

All VxVM-related information is removed during reinstallation. Data removed includes data in private areas on removed disks that contain the disk identifier and copies of the VxVM configuration. The removal of this information makes the disk unusable as a VM disk.

The system `root` disk is always involved in reinstallation. Other disks can also be involved. If the root disk was placed under VxVM control, either during VERITAS Volume Manager installation or by later encapsulation, that disk and any volumes or mirrors on it are lost during reinstallation. Any other disks that are involved in the reinstallation, or that are removed and replaced, can lose VxVM configuration data (including volumes and mirrors).

If a disk, including the root disk, is not under VxVM control prior to the failure, no VxVM configuration data is lost at reinstallation. For information on replacing disks, see “Removing and Replacing Disks” in the “Administering Disks” chapter of the *VERITAS Volume Manager Administrator’s Guide*.

Although it simplifies the recovery process after reinstallation, not having the root disk under VERITAS Volume Manager control increases the possibility of a reinstallation being necessary. By having the root disk under VxVM control and creating mirrors of the root disk contents, you can eliminate many of the problems that require system reinstallation.

When reinstallation is necessary, the only volumes saved are those that reside on, or have copies on, disks that are not directly involved with the failure and reinstallation. Any volumes on the root disk and other disks involved with the failure or reinstallation are lost during reinstallation. If backup copies of these volumes are available, the volumes can be restored after reinstallation.

Reinstalling the System and Recovering VxVM

To reinstall the system and recover the VERITAS Volume Manager configuration, use the following procedure. These steps are described in detail in the sections that follow:

1. "Prepare the System for Reinstallation" on page 46.
Replace any failed disks or other hardware, and detach any disks not involved in the reinstallation.
2. "Reinstall the Operating System" on page 47.
Reinstall the base system and any other unrelated Volume Manager packages.
3. "Reinstall VxVM" on page 47.
Add the Volume Manager package, but do *not* execute the `vxinstall` command.
4. "Recover the VERITAS Volume Manager Configuration" on page 47.
5. "Clean up the System Configuration" on page 49.
Restore any information in volumes affected by the failure or reinstallation, and recreate system volumes (`rootvol`, `swapvol`, `usr`, and other system volumes).
6. "Start up Hot-Relocation" on page 54.

Prepare the System for Reinstallation

To prevent the loss of data on disks not involved in the reinstallation, involve only the root disk and any other disks that contain portions of the operating system in the reinstallation procedure. For example, if the `/usr` file system is configured on a separate disk, leave that disk connected. Several of the automatic options for installation access disks other than the `root` disk without requiring confirmation from the administrator.

Disconnect all other disks containing volumes (or other data that should be preserved) prior to reinstalling the operating system. For example, if you originally installed the operating system with the `home` file system on a separate disk, disconnect that disk to ensure that the `home` file system remains intact.

Reinstall the Operating System

Once any failed or failing disks have been replaced and disks not involved with the reinstallation have been detached, reinstall the operating system as described in your operating system documentation. Install the operating system prior to installing VxVM.

Ensure that no disks other than the root disk are accessed in any way while the operating system installation is in progress. If anything is written on a disk other than the root disk, the VERITAS Volume Manager configuration on that disk may be destroyed.

Note During reinstallation, you can change the system's host name (or host ID). It is recommended that you keep the existing host name, as this is assumed by the procedures in the following sections.

Reinstall VxVM

To reinstall VERITAS Volume Manager, follow these steps:

1. Load VERITAS Volume Manager from CD-ROM. Follow the instructions in the *VERITAS Volume Manager Installation Guide*.

Caution To reconstruct the Volume Manager configuration that remains on the non-root disks, do *not* use `vxinstall` to initialize VxVM after loading the software from CD-ROM.

2. Use the `vxlicinst` command to install the VERITAS Volume Manager license key (see the `vxlicinst(1)` manual page for more information).

Recover the VERITAS Volume Manager Configuration

Once the VERITAS Volume Manager packages have been loaded, and you have installed the license for VxVM, recover the VERITAS Volume Manager configuration using the following procedure:

1. Touch `/etc/vx/reconfig.d/state.d/install-db`.
2. Shut down the system.
3. Reattach the disks that were removed from the system.
4. Reboot the system.

Recovery by Reinstallation

5. When the system comes up, bring the system to single-user mode using the following command:

```
# exec init S
```

6. When prompted, enter the password and press Return to continue.
7. Remove files involved with installation that were created when you loaded VxVM, but which are no longer needed, using the following command:

```
# rm -rf /etc/vx/reconfig.d/state.d/install-db
```

8. Start some VERITAS Volume Manager I/O daemons using the following command:

```
# vxiod set 10
```

9. Start the VERITAS Volume Manager configuration daemon, `vxconfigd`, in disabled mode using the following command:

```
# vxconfigd -m disable
```

10. Initialize the `vxconfigd` daemon using the following command:

```
# vxdctl init
```

11. Initialize the DMP subsystem using the following command:

```
# vxdctl initdmp
```

12. Enable `vxconfigd` using the following command:

```
# vxdctl enable
```

The configuration preserved on the disks not involved with the reinstallation has now been recovered. However, because the root disk has been reinstalled, it does not appear to VxVM as a VM disk. The configuration of the preserved disks does not include the root disk as part of the VxVM configuration.

If the root disk of your system and any other disks involved in the reinstallation were not under VxVM control at the time of failure and reinstallation, then the reconfiguration is complete at this point. For information on replacing disks, see "Removing and Replacing Disks" in the "Administering Disks" chapter of the *VERITAS Volume Manager Administrator's Guide*. There are several methods available to replace a disk; choose the method that you prefer.

If the root disk (or another disk) was involved with the reinstallation, any volumes or mirrors on that disk (or other disks no longer attached to the system) are now inaccessible. If a volume had only one plex contained on a disk that was reinstalled, removed, or replaced, then the data in that volume is lost and must be restored from backup.

Clean up the System Configuration

To clean up the configuration of your system after reinstallation of VxVM, you must address the following issues:

- ◆ Clean up Rootability
- ◆ Clean up Volumes
- ◆ Clean up Disk Configuration
- ◆ Reconfigure Rootability
- ◆ Final Volume Reconfiguration

Clean up Rootability

To begin the cleanup of the VERITAS Volume Manager configuration, remove any volumes associated with rootability. This must be done if the root disk (and any other disk involved in the system boot process) was under VERITAS Volume Manager control. The volumes to remove are:

- ◆ `rootvol`, that contains the `root` file system
- ◆ `swapvol`, that contains the `swap` area
- ◆ (on some systems) `standvol`, that contains the `stand` file system
- ◆ `usr`, that contains the `/usr` file system

To remove the root volume, use the `vxedit` command:

```
# vxedit -fr rm rootvol
```

Repeat this command, using `swapvol` and `usr` (`standvol`) in place of `rootvol`, to remove the `swap`, `stand`, and `usr` volumes.

Clean up Volumes

After completing the rootability cleanup, you must determine which volumes need to be restored from backup. The volumes to be restored include those with all mirrors (all copies of the volume) residing on disks that have been reinstalled or removed. These volumes are invalid and must be removed, recreated, and restored from backup. If only some mirrors of a volume exist on reinitialized or removed disks, these mirrors must be removed. The mirrors can be re-added later.

To restore the volumes, perform these steps:

1. Establish which VM disks have been removed or reinstalled using the following command:

```
# vxdisk list
```

This displays a list of system disk devices and the status of these devices. For example, for a reinstalled system with three disks and a reinstalled root disk, the output of the `vxdisk list` command is similar to this:

DEVICE	TYPE	DISK	GROUP	STATUS
c0t0d0s2	sliced	-	-	error
c0t1d0s2	sliced	disk02	mydg	online
c0t2d0s2	sliced	disk03	mydg	online
-	-	disk01	mydg	failed was:c0t0d0s2

The display shows that the reinstalled root device, `c0t0d0s2`, is not associated with a VM disk and is marked with a status of `error`. The disks `disk02` and `disk03` were not involved in the reinstallation and are recognized by VxVM and associated with their devices (`c0t1d0s2` and `c0t2d0s2`). The former `disk01`, which was the VM disk associated with the replaced disk device, is no longer associated with the device (`c0t0d0s2`).

If other disks (with volumes or mirrors on them) had been removed or replaced during reinstallation, those disks would also have a disk device listed in `error` state and a VM disk listed as not associated with a device.

2. Once you know which disks have been removed or replaced, locate all the mirrors on failed disks using the following command:

```
# vxprint [-g diskgroup] -sF "%vname" -e'sd_disk = "disk"
```

where *disk* is the access name of a disk with a `failed` status. Be sure to enclose the disk name in quotes in the command. Otherwise, the command returns an error message. The `vxprint` command returns a list of volumes that have mirrors on the failed disk. Repeat this command for every disk with a `failed` status.

The following is sample output from running this command:

```
# vxprint -g mydg -sF "%vname" -e'sd_disk = "disk01"'
v01
```

3. Check the status of each volume and print volume information using the following command:

```
# vxprint -th volume
```

where *volume* is the name of the volume to be examined. The `vxprint` command displays the status of the volume, its plexes, and the portions of disks that make up those plexes. For example, a volume named `v01` with only one plex resides on the reinstalled disk named `disk01`. The `vxprint -th v01` command produces the following output:

V NAME	RVG/VSET/COKSTATE	STATE	LENGTH	READPOL	PREFPLEX	UTYPE
PL NAME	VOLUME	KSTATE	STATE	LENGTH	LAYOUT	NCOL/WIDMODE
SD NAME	PLEX	DISK	DISKOFFS	LENGTH	[COL/]OFF	DEVICE MODE
v v01	-	DISABLED	ACTIVE	24000	SELECT	- fsgen
pl v01-01	v01	DISABLED	NODEVICE	24000	CONCAT	- RW
sd disk01-06	v01-01	disk01	245759	24000	0	c1t5d1 ENA

The only plex of the volume is shown in the line beginning with `pl`. The `STATE` field for the plex named `v01-01` is `NODEVICE`. The plex has space on a disk that has been replaced, removed, or reinstalled. The plex is no longer valid and must be removed.

4. Because `v01-01` was the only plex of the volume, the volume contents are irrecoverable except by restoring the volume from a backup. The volume must also be removed. If a backup copy of the volume exists, you can restore the volume later. Keep a record of the volume name and its length, as you will need it for the backup procedure.

Remove irrecoverable volumes (such as `v01`) using the following command:

```
# vxedit -r rm v01
```

5. It is possible that only part of a plex is located on the failed disk. If the volume has a striped plex associated with it, the volume is divided between several disks. For example, the volume named `v02` has one striped plex striped across three disks, one of which is the reinstalled disk `disk01`. The `vxprint -th v02` command produces the following output:

Recovery by Reinstallation

```

V  NAME      RVG/VSET/COKSTATESTATE  LENGTH  READPOL  PREFPLEXUTYPE
PL  NAME      VOLUME  KSTATE  STATE  LENGTH  LAYOUT  NCOL/WIDMODE
SD  NAME      PLEX    DISK    DISKOFFSLENGTH  [COL/]OFF DEVICE  MODE

v  v02        -          DISABLEDACTIVE  30720  SELECT  v02-01  fsgen
pl  v02-01    v02        DISABLEDNODEVICE30720  STRIPE  3/128  RW
sd  disk02-02v02-01  disk01  424144  10240  0/0     c1t5d2  ENA
sd  disk01-05v02-01  disk01  620544  10240  1/0     c1t5d3  DIS
sd  disk03-01v02-01  disk03  620544  10240  2/0     c1t5d4  ENA

```

The display shows three disks, across which the plex `v02-01` is striped (the lines starting with `sd` represent the stripes). One of the stripe areas is located on a failed disk. This disk is no longer valid, so the plex named `v02-01` has a state of `NODEVICE`. Since this is the only plex of the volume, the volume is invalid and must be removed. If a copy of `v02` exists on the backup media, it can be restored later. Keep a record of the volume name and length of any volume you intend to restore from backup.

Remove invalid volumes (such as `v02`) using the following command:

```
# vxedit -r rm v02
```

6. A volume that has one mirror on a failed disk can also have other mirrors on disks that are still valid. In this case, the volume does not need to be restored from backup, since the data is still valid on the valid disks.

The output of the `vxprint -th` command for a volume with one plex on a failed disk (`disk01`) and another plex on a valid disk (`disk02`) is similar to the following:

```

V  NAME      RVG/VSET/COKSTATESTATE  LENGTH  READPOL  PREFPLEX  UTYPE
PL  NAME      VOLUME  KSTATE  STATE  LENGTH  LAYOUT  NCOL/WIDMODE
SD  NAME      PLEX    DISK    DISKOFFSLENGTH  [COL/]OFFDEVICE  MODE

v  v03        -          DISABLEDACTIVE  0720  SELECT  -        fsgen
pl  v03-01    v03        DISABLEDACTIVE  30720  CONCAT  -        RW
sd  disk02-01 v03-01  disk01  620544  30720  0        c1t5d5  ENA
pl  v03-02    v03        DISABLEDNODEVICE30720  CONCAT  -        RW
sd  disk01-04 v03-02  disk03  262144  30720  0        c1t5d6  DIS

```

This volume has two plexes, `v03-01` and `v03-02`. The first plex (`v03-01`) does not use any space on the invalid disk, so it can still be used. The second plex (`v03-02`) uses space on invalid disk `disk01` and has a state of `NODEVICE`. Plex `v03-02` must be removed. However, the volume still has one valid plex containing valid data. If the volume needs to be mirrored, another plex can be added later. Note the name of the volume to create another plex later.

To remove an invalid plex, use the `vxplex` command to dissociate and then remove the plex from the volume. For example, to dissociate and remove the plex `v03-02`, use the following command:

```
# vxplex -o rm dis v03-02
```


7. Once all the volumes have been cleaned up, clean up the disk configuration as described in the section, "Clean up Disk Configuration" on page 53.

Clean up Disk Configuration

Once all invalid volumes and plexes have been removed, the disk configuration can be cleaned up. Each disk that was removed, reinstalled, or replaced (as determined from the output of the `vxdisk list` command) must be removed from the configuration.

To remove the disk, use the `vxdg` command. To remove the failed disk `disk01`, use the following command:

```
# vxdg rmdisk disk01
```

If the `vxdg` command returns an error message, some invalid mirrors exist. Repeat the processes described in "Clean up Volumes" on page 50 until all invalid volumes and mirrors are removed.

Reconfigure Rootability

Once all the invalid disks have been removed, the replacement or reinstalled disks can be added to VERITAS Volume Manager control. If the root disk was originally under VERITAS Volume Manager control or you now wish to put the root disk under VERITAS Volume Manager control, add this disk first.

To add the root disk to VERITAS Volume Manager control, use the `vxdiskadm` command:

```
# vxdiskadm
```

From the `vxdiskadm` main menu, select menu item 2 (Encapsulate a disk). Follow the instructions and encapsulate the root disk for the system.

When the encapsulation is complete, reboot the system to multi-user mode.

Final Volume Reconfiguration

Once the root disk is encapsulated, any other disks that were replaced should be added using the `vxdiskadm` command. If the disks were reinstalled during the operating system reinstallation, they should be encapsulated; otherwise, they can be added.

Once all the disks have been added to the system, any volumes that were completely removed as part of the configuration cleanup can be recreated and their contents restored from backup. The volume recreation can be done by using the `vxassist` command or the graphical user interface.

Recovery by Reinstallation

For example, to recreate the volumes v01 and v02, use the following command:

```
# vxassist make v01 24000
# vxassist make v02 30720 layout=stripe nstripe=3
```

Once the volumes are created, they can be restored from backup using normal backup/restore procedures.

Recreate any plexes for volumes that had plexes removed as part of the volume cleanup. To replace the plex removed from volume v03, use the following command:

```
# vxassist mirror v03
```

Once you have restored the volumes and plexes lost during reinstallation, recovery is complete and your system is configured as it was prior to the failure.

The final step is to start up hot-relocation, if this is required.

Start up Hot-Relocation

To start up the hot-relocation service, either reboot the system or manually start the relocation watch daemon, `vxrelocd` (this also starts the `vxnotify` process).

Note Hot-relocation should only be started when you are sure that it will not interfere with other reconfiguration procedures.

See “Modifying the Behavior of Hot-Relocation” in the “Administering Hot-Relocation” chapter of the *VERITAS Volume Manager Administrator’s Guide* for more information about running `vxrelocd` and about modifying its behavior.

To determine if hot-relocation has been started, use the following command to search for its entry in the process table:

```
# ps -ef | grep vxrelocd
```

Logging Commands and Transactions 4

This chapter provides information on how to administer logging of commands and transactions in VERITAS Volume Manager (VxVM). For information on how to administer error logging, see “Error Messages” on page 67.

Logging Commands

The `vxcmdlog` command allows you to log the invocation of other VxVM commands to a file. The following table demonstrates the usage of `vxcmdlog`:

Command	Description
<code>vxcmdlog -l</code>	List current settings for command logging.
<code>vxcmdlog -m on</code>	Turn on command logging.
<code>vxcmdlog -s 512k</code>	Set the maximum command log file size to 512KB.
<code>vxcmdlog -n 10</code>	Set the maximum number of historic command log files to 10.
<code>vxcmdlog -n no_limit</code>	Remove any limit on the number of historic command log files.
<code>vxcmdlog -m off</code>	Turn off command logging.

Command lines are logged to the file, `cmdlog`, in the directory `/etc/vx/log`. This path name is a symbolic link to a directory whose location depends on the operating system. If required, you can redefine the directory which is linked. If you want to preserve the settings of the `vxcmdlog` utility, you must also copy the settings file, `.cmdlog`, to the new directory.

Logging Commands

Note The `.cmdlog` file is a binary and should not be edited.

The size of the command log is checked after an entry has been written so the actual size may be slightly larger than that specified. When the log reaches a maximum size, the current command log file, `cmdlog`, is renamed as the next available historic log file, `cmdlog.number`, where *number* is an integer from 1 up to the maximum number of historic log files that is currently defined, and a new current log file is created.

A limited number of historic log files is preserved to avoid filling up the file system. If the maximum number of historic log files has been reached, the oldest historic log file is removed, and the current log file is renamed as that file.

Each log file contains a header that records the host name, host ID, and the date and time that the log was created.

The following are sample entries from a command log file:

```
# 0, 2329, Wed Feb 12 21:19:31 2003
/usr/sbin/vxdctl mode
# 17051, 2635, Wed Feb 12 21:19:33 2003
/usr/sbin/vxdisk -q -o alldgs list
# 0, 2722, Wed Feb 12 21:19:34 2003
/etc/vx/diag.d/vxprivutil dumpconfig /dev/vx/rdmp/Disk_4s2
# 26924, 3001, Thu Feb 13 19:30:57 2003
/usr/sbin/vxdisk list SENA0_1
```

Each entry usually contains a client ID that identifies the command connection to the `vxconfigd` daemon, the process ID of the command that is running, a time stamp, and the command line including any arguments.

If the client ID is 0, as in the third entry shown here, this means that the command did not open a connection to `vxconfigd`.

Note The client ID is the same as that recorded for the corresponding transactions in the transactions log. See “Logging Transactions” on page 57 and “Associating Command and Transaction Logs” on page 59 for more information.

Most command scripts are not logged, but the command binaries that they call are logged. Exceptions are the `vxdisksetup`, `vxinstall`, and `vxdiskunsetup` scripts, which are logged.

If there is an error reading from the settings file, command logging switches to its built-in default settings. This may mean, for example, that logging remains enabled after being disabled using `vxcmdlog -m off` command. If this happens, use the `vxcmdlog` utility to recreate the settings file, or restore the file from a backup.

See the `vxcmdlog(1M)` manual page for more information about the `vxcmdlog` utility.

Logging Transactions

The `vxtranslog` command allows you to log VxVM transactions to a file. The following table demonstrates the usage of `vxtranslog`:

Command	Description
<code>vxtranslog -l</code>	List current settings for transaction logging.
<code>vxtranslog -m on</code>	Turn on transaction logging.
<code>vxtranslog -s 512k</code>	Set the maximum transaction log file size to 512KB.
<code>vxtranslog -n 10</code>	Set the maximum number of historic transaction log files to 10.
<code>vxtranslog -n no_limit</code>	Remove any limit on the number of historic transaction log files.
<code>vxtranslog -q on</code>	Turn on query logging.
<code>vxtranslog -q off</code>	Turn off query logging.
<code>vxtranslog -m off</code>	Turn off transaction logging.

Transactions are logged to the file, `translog`, in the directory `/etc/vx/log`. This path name is a symbolic link to a directory whose location depends on the operating system. If required, you can redefine the directory which is linked. If you want to preserve the settings of the `vxtranslog` utility, you must also copy the settings file, `.translog`, to the new directory.

Note The `.translog` file is a binary and should not be edited.

The size of the transaction log is checked after an entry has been written so the actual size may be slightly larger than that specified. When the log reaches a maximum size, the current transaction log file, `translog`, is renamed as the next available historic log file, `translog.number`, where *number* is an integer from 1 up to the maximum number of historic log files that is currently defined, and a new current log file is created.

A limited number of historic log files is preserved to avoid filling up the file system. If the maximum number of historic log files has been reached, the oldest historic log file is removed, and the current log file is renamed as that file.

Logging Transactions

Each log file contains a header that records the host name, host ID, and the date and time that the log was created.

The following are sample entries from a transaction log file:

```
Thu Feb 13 19:30:57 2003
Clid = 26924, PID = 3001, Part = 0, Status = 0, Abort Reason = 0
DA_GET SENA0_1
DISK_GET_ATTRS SENA0_1
DISK_DISK_OP SENA0_1 8
DEVNO_GET SENA0_1
DANAME_GET 0x1d801d8 0x1d801a0
GET_ARRAYNAME SENA 50800200000e78b8
CTLR_PTOLNAME /pci@1f,4000/pci@5/SUNW,qlc@4/fp@0,0
GET_ARRAYNAME SENA 50800200000e78b8
CTLR_PTOLNAME /pci@1f,4000/pci@5/SUNW,qlc@5/fp@0,0
DISCONNECT <no request data>
```

The first line of each log entry is the time stamp of the transaction. The `Clid` field corresponds to the client ID for the connection that the command opened to `vxconfigd`. The `PID` field shows the process ID of the utility that is requesting the operation. The `Status` and `Abort Reason` fields contain error codes if the transaction does not complete normally. The remainder of the record shows the data that was used in processing the transaction.

Note The client ID is the same as that recorded for the corresponding command line in the command log. See “Logging Commands” on page 55 and “Associating Command and Transaction Logs” on page 59 for more information.

If there is an error reading from the settings file, transaction logging switches to its built-in default settings. This may mean, for example, that logging remains enabled after being disabled using `vxtranslog -m off` command. If this happens, use the `vxtranslog` utility to recreate the settings file, or restore the file from a backup.

Associating Command and Transaction Logs

The Client and process IDs that are recorded for every request and command assist you in correlating entries in the command and transaction logs. To find out which command issued a particular request in transaction log, use a command such as the following to search for the process ID and the client ID in the command log:

```
# egrep -n PID cmdlog | egrep Clid
```

In this example, the following request was recorded in the transaction log:

```
Wed Feb 12 21:19:36 2003
Clid = 8309, PID = 2778, Part = 0, Status = 0, Abort Reason = 0
  DG_IMPORT foodg
  DG_IMPORT foodg
  DISCONNECT <no request data>
```

To locate the utility that issued this request, the command would be:

```
# egrep -n 2778 cmdlog | egrep 8309
7310:# 8309, 2778, Wed Feb 12 21:19:36 2003
```

The output from the example shows a match at line 7310 in the command log. Examining lines 7310 and 7311 in the command log indicates that the `vx dg import` command was run on the `foodg` disk group:

```
# sed -e '7310,7311!d' cmdlog
# 8309, 2778, Wed Feb 12 21:19:36 2003 7311
/usr/sbin/vxdg -m import foodg
```

Note If there are multiple matches for the combination of the client and process ID, you can determine the correct match by examining the time stamp.

If a utility opens a conditional connection to `vxconfigd`, its client ID is shown as zero in the command log, and as a non-zero value in the transaction log. You can use the process ID and time stamp to relate the log entries in such cases.

Associating Command and Transaction Logs

Backing Up and Restoring Disk Group Configurations

5

Disk group configuration backup and restoration allows you to backup and restore all configuration data for VERITAS Volume Manager (VxVM) disk groups, and for VxVM objects such as volumes that are configured within the disk groups. Using this feature, you can recover from corruption of a disk group's configuration that is stored as metadata in the private region of a VM disk. After the disk group configuration has been restored, and the volume enabled, the user data in the public region is available again without the need to restore this from backup media.

Caution The backup and restore utilities act only on VxVM configuration data. They do not back up or restore any user or application data that is contained within volumes or other VxVM objects. If you use `vxdiskunsetup` and `vxdisksetup` on a disk, and specify attributes that differ from those in the configuration backup, this may corrupt the public region and any user data therein.

The `vxconfigbackupd` daemon monitors changes to the VxVM configuration and automatically records any configuration changes that occur. Two utilities, `vxconfigbackup` and `vxconfigrestore`, are provided for backing up and restoring a VxVM configuration for a disk group.

When importing a disk group, any of the following errors indicate that the disk group configuration and/or disk private region headers have become corrupted:

```
VxVM vxconfigd ERROR V-5-1-569 Disk group group, Disk disk: Cannot
auto-import group: reason
```

The *reason* for the error is usually one of the following:

```
Configuration records are inconsistent
Disk group has no valid configuration copies
Duplicate record in configuration
Errors in some configuration copies
Format error in configuration copy
Invalid block number
Invalid magic number
```

Backing Up a Disk Group Configuration

If VxVM cannot update a disk group's configuration because of disk errors, it disables the disk group and displays the following error:

```
VxVM vxconfigd ERROR V-5-1-123 Disk group group: Disabled by errors
```

If such errors occur, you can restore the disk group configuration from a backup after you have corrected any underlying problem such as failed or disconnected hardware.

Configuration data from a backup allows you to reinstall the private region headers of VxVM disks in a disk group whose headers have become damaged, to recreate a corrupted disk group configuration, or to recreate a disk group and the VxVM objects within it. You can also use the configuration data to recreate a disk group on another system if the original system is not available.

Note Restoration of a disk group configuration requires that the same physical disks are used as were configured in the disk group when the backup was taken.

The following sections describe how to back up and restore disk group configurations.

Backing Up a Disk Group Configuration

VxVM uses the disk group configuration daemon to monitor the configuration of disk groups, and to back up the configuration whenever it is changed. By default, the five most recent backups are preserved. If required, you can also back up a disk group configuration by running the `vxconfigbackup` command.

The following table describes the files that record disk group configuration information:

Backup Files	Description
<code>/etc/vx/cbr/bk/diskgroup.dgid/dgid.dginfo</code>	Disk group information.
<code>/etc/vx/cbr/bk/diskgroup.dgid/dgid.diskinfo</code>	Disk attributes.
<code>/etc/vx/cbr/bk/diskgroup.dgid/dgid.binconfig</code>	Binary configuration copy.
<code>/etc/vx/cbr/bk/diskgroup.dgid/dgid.cfgrc</code>	Configuration records in <code>vxprint -m</code> format.

Here *diskgroup* is the name of the disk group, and *dgid* is the disk group ID. If a disk group is to be recreated on another system, copy these files to that system.

Caution Take care that you do not overwrite any files on the target system that are used by a disk group on that system.

To back up a disk group manually, use this command:

```
# /etc/vx/bin/vxconfigbackup diskgroup
```

To back up all disk groups, use this version of the command:

```
# /etc/vx/bin/vxconfigbackup
```

For more information, see the `vxconfigbackup(1M)` manual page.

Restoring a Disk Group Configuration

You can use the `vxconfigrestore` utility to restore or recreate a disk group from its configuration backup. The restoration process has two stages: *precommit* and *commit*. In the precommit stage, you can examine the configuration of the disk group that would be restored from the backup. The actual disk group configuration is not permanently restored until you choose to commit the changes.

Note None of the disks or VxVM objects in the disk group may be open or in use by any application while the restoration is being performed.

You can choose whether or not any corrupted disk headers are to be reinstalled at this stage. If any of the disks' private region headers are invalid, restoration may not be possible without reinstalling the headers for the affected disks.

The following command performs a precommit analysis of the state of the disk group configuration, and reinstalls the disk headers where these have become corrupted:

```
# /etc/vx/bin/vxconfigrestore -p [-l directory] {diskgroup | dgid}
```

The disk group can be specified either by name or by ID.

The `-l` option allows you to specify a directory for the location of the backup configuration files other than the default location, `/etc/vx/cbr/bk`. See "Backing Up a Disk Group Configuration" on page 62 for details.

To specify that the disk headers are not to be reinstalled, use this form of the command:

```
# /etc/vx/bin/vxconfigrestore -n [-l directory] {diskgroup | dgid}
```

At the precommit stage, you can use the `vxprint` command to examine the configuration that the restored disk group will have. You can choose to proceed to commit the changes and restore the disk group configuration. Alternatively, you can cancel the restoration before any permanent changes have been made.

To abandon restoration at the precommit stage, use this command:

```
# /etc/vx/bin/vxconfigrestore -d [-l directory] {diskgroup | dgid}
```

Restoring a Disk Group Configuration

To commit the changes that are required to restore the disk group configuration, use the following command:

```
# /etc/vx/bin/vxconfigrestore -c [-l directory] {diskgroup | dgid}
```

If no disk headers are reinstalled, the configuration copies in the disks' private regions are updated from the latest binary copy of the configuration that was saved for the disk group.

If any of the disk headers are reinstalled, a saved copy of the disks' attributes is used to recreate their private and public regions. These disks are also assigned new disk IDs. The VxVM objects within the disk group are then recreated using the backup configuration records for the disk group. This process also has the effect of creating new configuration copies in the disk group.

Volumes are synchronized in the background. For large volume configurations, it may take some time to perform the synchronization. You can use the `vxtask -l list` command to monitor the progress of this operation.

Note Disks that are in use or whose layout has been changed are excluded from the restoration process.

For more information, see the `vxconfigrestore(1M)` manual page.

Resolving Conflicting Backups for a Disk Group

In some circumstances where disks have been replaced on a system, there may exist several conflicting backups for a disk group. In this case, you see a message similar to the following from the `vxconfigrestore` command:

```
VxVM vxconfigrestore ERROR V-5-1-6012 There are two backups that
have the same diskgroup name with different diskgroup id :
1047336696.19.xxx.veritas.com
1049135264.31.xxx.veritas.com
```

The solution is to specify the disk group by its ID rather than by its name to perform the restoration. The backup file, `/etc/vx/cbr/bk/diskgroup.dgid/dgid.dginfo`, contains a timestamp that records when the backup was taken.

The following is a sample extract from such a backup file that shows the timestamp and disk group ID information:

```
TIMESTAMP
Tue Apr 15 23:27:01 PDT 2003
.
.
DISK_GROUP_CONFIGURATION
Group:      mydg
dgid: 1047336696.19.xxx.veritas.com
.
.
.
```

Use the timestamp information to decide which backup contains the relevant information, and use the `vxconfigrestore` command to restore the configuration by specifying the disk group ID instead of the disk group name.

Restoring a Disk Group Configuration

Error Messages

6

This chapter provides information on error messages associated with the VERITAS Volume Manager (VxVM) configuration daemon (`vxconfigd`), the kernel, and other utilities. It covers most informational, failure, and error messages displayed on the console by `vxconfigd`, and by the VERITAS Volume Manager kernel driver, `vxio`. These include some errors that are infrequently encountered and difficult to troubleshoot.

Note Some error messages described here may not apply to your system.

Clarifications are included to elaborate on the situation or problem that generated a particular message. Wherever possible, a recovery procedure (*Action*) is provided to help you to locate and correct the problem.

You may find it useful to consult the VxVM command and transaction logs to understand the context in which an error occurred. See “Logging Commands and Transactions” on page 55 for more information.

Logging Error Messages

VxVM provides the option of logging console output to a file. This logging is useful in that any messages output just before a system crash will be available in the log file (presuming that the crash does not result in file system corruption). `vxconfigd` controls whether such logging is turned on or off. If enabled, the default log file is `/var/vxvm/vxconfigd.log`.

`vxconfigd` also supports the use of `syslog` to log all of its regular console messages. When this is enabled, all console output is directed through the `syslog` interface.

`syslog` and log file logging can be used together to provide reliable logging to a private log file, along with distributed logging through `syslogd`.

Note `syslog` logging is enabled by default. Log file logging is disabled by default.

Configuring Logging in the Startup Script

To enable logging of console output to the file `/var/vxvm/vxconfigd.log`, edit the startup script for `vxconfigd` as described in “Configuring Logging in the Startup Script,” or invoke `vxconfigd` under the C locale as shown here:

```
# vxconfigd [-x [1-9]] -x log
```

There are 9 possible levels of debug logging; 1 provides the least detail, and 9 the most.

To enable `syslog` logging of console output, specify the option `-x syslog` to `vxconfigd` as shown here:

```
# vxconfigd [-x [1-9]] -x syslog
```

Messages with a priority higher than Debug are written to `/var/adm/syslog/syslog.log`, and all other messages are written to `/var/vxvm/vxconfigd.log`.

If you do not specify a debug level, only Error, Fatal Error, Warning, and Notice messages are logged. Debug messages are not logged.

Configuring Logging in the Startup Script

To enable log file or `syslog` logging, you can edit the following portion of the `/etc/init.d/vxvm-sysboot` script that starts the VxVM configuration daemon, `vxconfigd`:

```
# comment-out or uncomment any of the following lines to enable or
# disable the corresponding feature in vxconfigd.

opts="$opts -x syslog"           # use syslog for console messages
#opts="$opts -x log"             # messages to vxconfigd.log
#opts="$opts -x logfile=/foo/bar" # specify an alternate log file
#opts="$opts -x timestamp"       # timestamp console messages

# To turn on debugging console output, uncomment the following line.
# The debug level can be set higher for more output. The highest
# debug level is 9.

#debug=1                         # enable debugging console output
```

Comment or uncomment the lines corresponding to the features that you want to be disabled or enabled at startup. For example, the `opts="$opts -x syslog"` string is usually uncommented so that `vxconfigd` uses `syslog` logging by default. Inserting a `#` character at the beginning of the line turns off `syslog` logging for `vxconfigd`.

Note By default, `vxconfigd` is started at boot time with the `-x syslog` option. This redirects `vxconfigd` console messages to `syslog`. If you want to retain this behavior when restarting `vxconfigd` from the command line, include the `-x syslog` argument, as restarting `vxconfigd` does not preserve the option settings with which it was previously running. Similarly, any VERITAS Volume Manager operations that require `vxconfigd` to be restarted may not retain the behavior that was previously specified by option settings.

For more information on logging options for `vxconfigd`, refer to the `vxconfigd(1M)` manual page.

Understanding Messages

VxVM is fault-tolerant and resolves most problems without system administrator intervention. If the configuration daemon (`vxconfigd`) recognizes the actions that are necessary, it queues up the transactions that are required. VxVM provides atomic changes of system configurations; either a transaction completes fully, or the system is left in the same state as though the transaction was never attempted. If `vxconfigd` is unable to recognize and fix system problems, the system administrator needs to handle the task of problem solving using the diagnostic messages that are returned from the software. The following sections describe error message numbers and the types of error message that may be seen, and provide a list of the more common errors, a detailed description of the likely cause of the problem together with suggestions for any actions that can be taken.

Messages have the following generic format:

```
product component severity message_number message_text
```

For VERITAS Volume Manager, the product is set to `VxVM`. The component can be the name of a kernel module or driver such as `vxdump`, a configuration daemon such as `vxconfigd`, or a command such as `vxassist`.

Messages are divided into the following types of severity in decreasing order of impact on the system:

- ◆ PANIC

A panic is a severe event as it halts a system during its normal operation. A panic message from the kernel module or from a device driver indicates a hardware problem or software inconsistency so severe that the system cannot continue. The operating system may also provide a dump of the CPU register contents and a stack trace to aid in identifying the cause of the panic. The following is an example of such a message:

```
VxVM vxio PANIC V-5-0-239 Object association depth overflow
```

Understanding Messages

Note For full information about saving system crash information, see the *Solaris System Administration Guide*.

◆ FATAL ERROR

A fatal error message from a configuration daemon, such as `vxconfigd`, indicates a severe problem with the operation of VxVM that prevents it from running. The following is an example of such a message:

```
VxVM vxconfigd FATAL ERROR V-5-0-591 Disk group bootdg:  
Inconsistency -- Not loaded into kernel
```

◆ ERROR

An error message from a command indicates that the requested operation cannot be performed correctly. The following is an example of such a message:

```
VxVM vxassist ERROR V-5-1-5150 Insufficient number of active  
snapshot mirrors in snapshot_volume.
```

◆ WARNING

A warning message from the kernel indicates that a non-critical operation has failed, possibly because some resource is not available or the operation is not possible. The following is an example of such a message:

```
VxVM vxio WARNING V-5-0-55 Cannot find device number for boot_path
```

◆ NOTICE

A notice message indicates that an error has occurred that should be monitored. Shutting down the system is unnecessary, although you may need to take action to remedy the fault at a later date. The following is an example of such a message:

```
VxVM vxio NOTICE V-5-0-252 read error on object subdisk of mirror  
plex in volume volume (start offset, length length) corrected.
```

◆ INFO

An informational message does not indicate an error, and requires no action.

The unique message number consists of an alpha-numeric string that begins with the letter "V". For example, in the message number, V-5-1-3141, "V" indicates that this is a VERITAS product error message, the first numeric field (5) encodes the product (in this case, VxVM), the second field (1) represents information about the product component, and the third field (3141) is the message index. The text of the error message follows the message number.

Messages

This section contains a list of messages that you may encounter during the operation of VERITAS Volume Manager. However, the list is not exhaustive and the second field may contain the name of different command, driver or module from that shown here.

If you encounter a product error message, record the unique message number preceding the text of the message. When contacting VERITAS Technical Support, either by telephone or by visiting the VERITAS Technical Support website, be sure to provide the relevant message number. VERITAS Technical Support will use this message number to quickly determine if there are TechNotes or other information available for you.

V-5-0-2

```
VxVM vxio WARNING V-5-0-2 object_type object_name block offset:Uncorrectable read error ...
```

```
VxVM vxio WARNING V-5-0-2 object_type object_name block offset:Uncorrectable write error ...
```

- ◆ *Description:* A read or write operation from or to the specified VERITAS Volume Manager object failed. An error is returned to the application.
- ◆ *Action:* These errors may represent lost data. Data may need to be restored and failed media may need to be repaired or replaced. Depending on the type of object failing and on the type of recovery suggested for the object type, an appropriate recovery operation may be necessary.

V-5-0-4

```
VxVM vxio WARNING V-5-0-4 Plex plex detached from volume volume
```

- ◆ *Description:* An uncorrectable error was detected by the mirroring code and a mirror copy was detached.
- ◆ *Action:* To restore redundancy, it may be necessary to add another mirror. The disk on which the failure occurred should be reformatted or replaced.

Note This message may also appear during a plex detach operation in a cluster. In this case, no action is required.

V-5-0-34

```
VxVM vxdmp NOTICE V-5-0-34 added disk array disk_array_serial_number
```

- ◆ *Description:* A new disk array has been added to the host.
- ◆ *Action:* None.

Understanding Messages

V-5-0-35

VxVM vxdmp NOTICE V-5-0-35 Attempt to disable controller *controller_name* failed. Rootdisk has just one enabled path.

- ◆ *Description:* An attempt is being made to disable the one remaining active path to the root disk controller.
- ◆ *Action:* The path cannot be disabled.

V-5-0-55

VxVM vxio WARNING V-5-0-55 Cannot find device number for *boot_path*
vxvm vxdmp WARNING V-5-0-55 Cannot find device number for *boot_path*

- ◆ *Description:* The boot path retrieved from the system PROMs cannot be converted to a valid device number.
- ◆ *Action:* Check your PROM settings for the correct boot string.

If a target driver, such as an ATF, coexists with VxVM, and the target driver claims the boot disk, the message may be ignored if the device path corresponds to the boot disk.

V-5-0-64

VxVM vxio WARNING V-5-0-64 cannot log commit record for Diskgroup
bootdg: error 28

- ◆ *Description:* Usually means that multipathing is misconfigured.
- ◆ *Action:* See “V-5-1-5929” on page 114 for possible causes and solutions.

V-5-0-106

VxVM vxio WARNING V-5-0-106 detaching RAID-5 *volume*

- ◆ *Description:* Either a double-failure condition in the RAID-5 volume has been detected in the kernel or some other fatal error is preventing further use of the array.
- ◆ *Action:* If two or more disks have been lost due to a controller or power failure, use the `vxrecover` utility to recover them once they have been re-attached to the system. Check for other console error messages that may provide additional information about the failure.

V-5-0-108

VxVM vxio WARNING V-5-0-108 Device *major, minor*: Received spurious close

- ◆ *Description*: A close was received for an object that was not open. This can only happen if the operating system is not correctly tracking opens and closes.
- ◆ *Action*: No action is necessary; the system will continue.

V-5-0-110

VxVM vxdmp NOTICE V-5-0-110 disabled controller *controller_name* connected to disk array *disk_array_serial_number*

- ◆ *Description*: All paths through the controller connected to the disk array are disabled. This usually happens if a controller is disabled for maintenance.
- ◆ *Action*: None.

V-5-0-111

VxVM vxdmp NOTICE V-5-0-111 disabled dmpnode *dmpnode_device_number*

- ◆ *Description*: A DMP node has been marked disabled in the DMP database. It will no longer be accessible for further IO requests. This occurs when all paths controlled by a DMP node are in the disabled state, and therefore inaccessible.
- ◆ *Action*: Check hardware or enable the appropriate controllers to enable at least one path under this DMP node.

V-5-0-112

VxVM vxdmp NOTICE V-5-0-112 disabled path *path_device_number* belonging to dmpnode *dmpnode_device_number*

- ◆ *Description*: A path has been marked disabled in the DMP database. This path is controlled by the DMP node indicated by the specified device number. This may be due to a hardware failure.
- ◆ *Action*: Check the underlying hardware if you want to recover the desired path.

Understanding Messages

V-5-0-144

VxVM vxio WARNING V-5-0-144 Double failure condition detected on RAID-5 *volume*

- ◆ *Description:* I/O errors have been received in more than one column of a RAID-5 volume. This could be caused by:
 - ◆ a controller failure making more than a single drive unavailable
 - ◆ the loss of a second drive while running in degraded mode
 - ◆ two separate disk drives failing simultaneously (unlikely)
- ◆ *Action:* Correct the hardware failures if possible. Then recover the volume using the `vxrecover` command.

V-5-0-145

VxVM vxio WARNING V-5-0-145 DRL volume *volume* is detached

- ◆ *Description:* A Dirty Region Logging volume became detached because a DRL log entry could not be written. If this is due to a media failure, other errors may have been logged to the console.
- ◆ *Action:* The volume containing the DRL log continues in operation. If the system fails before the DRL has been repaired, a full recovery of the volume's contents may be necessary and will be performed automatically when the system is restarted. To recover from this error, use the `vxassist addlog` command to add a new DRL log to the volume.

V-5-0-146

VxVM vxdmp NOTICE V-5-0-146 enabled controller *controller_name* connected to disk array *disk_array_serial_number*

- ◆ *Description:* All paths through the controller connected to the disk array are enabled. This usually happens if a controller is enabled after maintenance.
- ◆ *Action:* None.

V-5-0-147

VxVM vxdmp NOTICE V-5-0-147 enabled dmpnode *dmpnode_device_number*

- ◆ *Description:* A DMP node has been marked enabled in the DMP database. This happens when at least one path controlled by the DMP node has been enabled.
- ◆ *Action:* None.

V-5-0-148

VxVM vxdump NOTICE V-5-0-148 enabled path *path_device_number* belonging to dmpnode *dmpnode_device_number*

- ◆ *Description:* A path has been marked enabled in the DMP database. This path is controlled by the DMP node indicated by the specified device number. This happens if a previously disabled path has been repaired, the user has reconfigured the DMP database using the `vxctl(1M)` command, or the DMP database has been reconfigured automatically.
- ◆ *Action:* None.

V-5-0-164

VxVM vxio WARNING V-5-0-164 Failed to join cluster *name*, aborting

- ◆ *Description:* A node failed to join a cluster. This may be caused by the node being unable to see all the shared disks. Other error messages may provide more information about the disks that cannot be found.
- ◆ *Action:* Use the `vxdisk -s list` command on the master node to see what disks should be visible to the slave node. Then check that the operating system and VxVM on the failed node can also see these disks. If the operating system cannot see the disks, check the cabling and hardware configuration of the node. If only VxVM cannot see the disks, use the `vxctl enable` command to make it scan again for the disks. When the disks are visible to VxVM on the node, retry the join.

V-5-0-166

VxVM vxio WARNING V-5-0-166 Failed to log the detach of the DRL volume *volume*

- ◆ *Description:* An attempt failed to write a kernel log entry indicating the loss of a DRL volume. The attempted write to the log failed either because the kernel log is full, or because of a write error to the drive. The volume becomes detached.
- ◆ *Action:* Messages about log failures are usually fatal, unless the problem is transient. However, the kernel log is sufficiently redundant that such errors are unlikely to occur.

If the problem is not transient (that is, the drive cannot be fixed and brought back online without data loss), recreate the disk group from scratch and restore all of its volumes from backups. Even if the problem is transient, reboot the system after correcting the problem.

Understanding Messages

If error messages are seen from the disk driver, it is likely that the last copy of the log failed due to a disk error. Replace the failed drive in the disk group. The log re-initializes on the new drive. Finally force the failed volume into an active state and recover the data.

V-5-0-168

VxVM vxio WARNING V-5-0-168 Failure in RAID-5 logging operation

- ◆ *Description:* Indicates that a RAID-5 log has failed.
- ◆ *Action:* To restore RAID-5 logging to a RAID-5 volume, create a new log plex and attach it to the volume.

V-5-0-181

VxVM vxio WARNING V-5-0-181 Illegal vminor encountered

- ◆ *Description:* An attempt was made to open a volume device other than the root volume device before vxconfigd loaded the volume configuration.
- ◆ *Action:* None; under normal startup conditions, this message should not occur. If necessary, start VxVM and re-attempt the operation.

V-5-0-194

VxVM vxio WARNING V-5-0-194 Kernel log full: *volume* detached

- ◆ *Description:* A plex detach failed because the kernel log was full. As a result, the mirrored volume will become detached.
- ◆ *Action:* It is unlikely that this condition ever occurs. The only corrective action is to reboot the system.

V-5-0-196

VxVM vxio WARNING V-5-0-196 Kernel log update failed: *volume* detached

- ◆ *Description:* Detaching a plex failed because the kernel log could not be flushed to disk. As a result, the mirrored volume became detached. This may be caused by all the disks containing a kernel log going bad.
- ◆ *Action:* Repair or replace the failed disks so that kernel logging can once again function.

V-5-0-207

VxVM vxio WARNING V-5-0-207 log object *object_name* detached from RAID-5 volume

- ◆ *Description:* Indicates that a RAID-5 log has failed.
- ◆ *Action:* To restore RAID-5 logging to a RAID-5 volume, create a new log plex and attach it to the volume.

V-5-0-216

VxVM vxio WARNING V-5-0-216 mod_install returned *errno*

- ◆ *Description:* A call made to the operating system mod_install function to load the vxio driver failed.
- ◆ *Action:* Check for additional console messages that may explain why the load failed. Also check the console messages log file for any additional messages that were logged but not displayed on the console.

V-5-0-237

VxVM vxio WARNING V-5-0-237 object *subdisk* detached from RAID-5 *volume* at column *column* offset *offset*

- ◆ *Description:* A subdisk was detached from a RAID-5 volume because of the failure of a disk or an uncorrectable error occurring on that disk.
- ◆ *Action:* Check for other console error messages indicating the cause of the failure. Replace a failed disk as soon as possible.

V-5-0-243

VxVM vxio WARNING V-5-0-243 Overlapping mirror plex detached from volume *volume*

- ◆ *Description:* An error has occurred on the last complete plex in a mirrored volume. Any sparse mirrors that map the failing region are detached so that they cannot be accessed to satisfy that failed region inconsistently.
- ◆ *Action:* The message indicates that some data in the failing region may no longer be stored redundantly.

Understanding Messages

V-5-0-244

VxVM vxdump NOTICE V-5-0-244 Path failure on *major/minor*

- ◆ *Description:* A path under the control of the DMP driver failed. The device major and minor numbers of the failed device is supplied in the message.
- ◆ *Action:* None.

V-5-0-249

VxVM vxio WARNING V-5-0-249 RAID-5 *volume* entering degraded mode operation

- ◆ *Description:* An uncorrectable error has forced a subdisk to detach. At this point, not all data disks exist to provide the data upon request. Instead, parity regions are used to regenerate the data for each stripe in the array. Consequently, access takes longer and involves reading from all drives in the stripe.
- ◆ *Action:* Check for other console error messages that indicate the cause of the failure. Replace any failed disks as soon as possible.

V-5-0-251

VxVM vxio WARNING V-5-0-251 read error on object *object* of mirror *plex* in volume *volume* (start *offset* length *length*)

- ◆ *Description:* An error was detected while reading from a mirror. This error may lead to further action shown by later error messages.
- ◆ *Action:* If the volume is mirrored, no further action is necessary since the alternate mirror's contents will be written to the failing mirror; this is often sufficient to correct media failures. If this error occurs often, but never leads to a plex detach, there may be a marginally defective region on the disk at the position indicated. It may eventually be necessary to remove data from this disk (see the `vxevac(1M)` manual page) and then to reformat the drive.

If the volume is not mirrored, this message indicates that some data could not be read. The file system or other application reading the data may report an additional error, but in either event, data has been lost. The volume can be partially salvaged and moved to another location if desired.

Note This message may also appear during a plex detach operation in a cluster. In this case, no action is required.

V-5-0-252

VxVM vxio NOTICE V-5-0-252 read error on object *subdisk* of mirror plex in volume *volume* (start *offset* length *length*) corrected

- ◆ *Description:* A read error occurred, which caused a read of an alternate mirror and a writeback to the failing region. This writeback was successful and the data was corrected on disk.
- ◆ *Action:* None; the problem was corrected automatically. Note the location of the failure for future reference. If the same region of the subdisk fails again, this may indicate a more insidious failure and the disk should be reformatted at the next reasonable opportunity.

V-5-0-258

VxVM vxdmp NOTICE V-5-0-258 removed disk array *disk_array_serial_number*

- ◆ *Description:* A disk array has been disconnected from the host, or some hardware failure has resulted in the disk array becoming inaccessible to the host.
- ◆ *Action:* Replace disk array hardware if this has failed.

V-5-0-281

VxVM vxio WARNING V-5-0-281 Root volumes are not supported on your PROM version.

- ◆ *Description:* If your system's PROMs are not a recent OpenBoot PROM type, root volumes are unusable.
- ◆ *Action:* If you have set up a root volume, undo the configuration by running `vxunroot` or removing the `rootdev` line from `/etc/system` as soon as possible. Contact your hardware vendor for an upgrade to your PROM level.

V-5-0-386

VxVM vxio WARNING V-5-0-386 subdisk *subdisk* failed in plex *plex* in volume *volume*

- ◆ *Description:* The kernel has detected a subdisk failure, which may mean that the underlying disk is failing.
- ◆ *Action:* Check for obvious problems with the disk (such as a disconnected cable). If hot-relocation is enabled and the disk is failing, recovery from subdisk failure is handled automatically.

Understanding Messages

V-5-1-90

VxVM vxconfigd ERROR V-5-1-90 *mode*: Unrecognized operating mode

- ◆ *Description*: An invalid string was specified as an argument to the `-m` option. Valid strings are: `enable`, `disable`, and `boot`.
- ◆ *Action*: Supply a correct option argument.

VxVM vxconfigd WARNING V-5-1-91 Cannot create device *device_path*: *reason*

- ◆ *Description*: `vxconfigd` cannot create a device node either under `/dev/vx/dsk` or under `/dev/vx/rdsk`. This should happen only if the `root` file system has run out of inodes.
- ◆ *Action*: Remove some unwanted files from the `root` file system. Then, regenerate the device node using the command:

```
# vxdctl enable
```

V-5-1-92

VxVM vxconfigd WARNING V-5-1-92 Cannot exec `/usr/bin/rm` to remove directory: *reason*

- ◆ *Description*: The given directory could not be removed because the `/usr/bin/rm` utility could not be executed by `vxconfigd`. This is not a serious error. The only side effect of a directory not being removed is that the directory and its contents continue to use space in the `root` file system. However, this does imply that the `/usr` file system is not mounted, or on some systems, that the `rm` utility is missing or is not in its usual location. This may be a serious problem for the general running of your system.
- ◆ *Action*: If the `/usr` file system is not mounted, you need to determine how to get it mounted. If the `rm` utility is missing, or is not in the `/usr/bin` directory, restore it.

V-5-1-111

VxVM vxconfigd WARNING V-5-1-111 Cannot fork to remove directory
directory: reason

- ◆ *Description:* The given directory could not be removed because vxconfigd could not fork in order to run the rm utility. This is not a serious error. The only side effect of a directory not being removed is that the directory and its contents will continue to use space in the root file system. The most likely cause for this error is that your system does not have enough memory or paging space to allow vxconfigd to fork.
- ◆ *Action:* If your system is this low on memory or paging space, your overall system performance is probably substantially degraded. Consider adding more memory or paging space.

V-5-1-116

VxVM vxconfigd WARNING V-5-1-116 Cannot open log file *log_filename:*
reason

- ◆ *Description:* The vxconfigd console output log file could not be opened for the given reason.
- ◆ *Action:* Create any needed directories, or use a different log file path name as described in “Logging Error Messages” on page 67.

V-5-1-117

VxVM vxconfigd ERROR V-5-1-117 Cannot start *volume* volume, no valid plexes

- ◆ *Description:* This error indicates that the volume cannot be started because it does not contain any valid plexes. This can happen, for example, if disk failures have caused all plexes to be unusable. It can also happen as a result of actions that caused all plexes to become unusable (for example, forcing the dissociation of subdisks or detaching, dissociation, or offlining of plexes).
- ◆ *Action:* It is possible that this error results from a drive that failed to spin up. If so, rebooting may fix the problem. If that does not fix the problem, then the only recourse is to repair the disks involved with the plexes and restore the file system from a backup. Restoring the root or /usr file system requires that you have a valid backup. See “Repairing Root or /usr File Systems on Mirrored Volumes” on page 38 for information on how to fix problems with root or /usr file system volumes.

Understanding Messages

V-5-1-121

VxVM vxconfigd NOTICE V-5-1-121 Detached disk *disk*

- ◆ *Description:* The named disk appears to have become unusable and was detached from its disk group. Additional messages may appear to indicate other records detached as a result of the disk detach.
- ◆ *Action:* If hot-relocation is enabled, VERITAS Volume Manager objects affected by the disk failure are taken care of automatically. Mail is sent to `root` indicating what actions were taken by VxVM and what further actions the administrator should take.

V-5-1-122

VxVM vxconfigd WARNING V-5-1-122 Detaching plex *plex* from volume *volume*

- ◆ *Description:* This error only happens for volumes that are started automatically by `vxconfigd` at system startup (that is, for the `root` and `/usr` file system volumes). The plex is being detached as a result of I/O failure, disk failure during startup or prior to the last system shutdown or crash, or disk removal prior to the last system shutdown or crash.
- ◆ *Action:* To ensure that the `root` or `/usr` file system retains the same number of active mirrors, remove the given plex and add a new mirror using the `vxassist mirror` operation. Also consider replacing any bad disks before running this command.

V-5-1-123

VxVM vxconfigd ERROR V-5-1-123 Disk group *group*: Disabled by errors

- ◆ *Description:* This message indicates that some error condition has made it impossible for VxVM to continue to manage changes to a disk group. The major reason for this is that too many disks have failed, making it impossible for `vxconfigd` to continue to update configuration copies. There should be a preceding error message that indicates the specific error that was encountered.

If the disk group that was disabled is the boot disk group, the following additional error is displayed:

```
VxVM vxconfigd ERROR V-5-1-104 All transactions are disabled
```

This additional message indicates that `vxconfigd` has entered the disabled state, which makes it impossible to change the configuration of any disk group, not just the boot disk group.

- ◆ *Action:* If the underlying error resulted from a transient failure, such as a disk cabling error, then you may be able to repair the situation by rebooting. Otherwise, the disk group configuration may have to be recreated by using the procedures given in “Restoring a Disk Group Configuration” on page 63, and the contents of any volumes restored from a backup. Failure of the boot disk group may require reinstallation of the system if your system uses a `root` or `/usr` file system that is defined on a volume.

V-5-1-124

VxVM vxconfigd ERROR V-5-1-124 Disk group *group*: update failed: *reason*

- ◆ *Description:* I/O failures have prevented vxconfigd from updating any active copies of the disk group configuration. This usually implies a large number of disk failures. This error will usually be followed by the error:

VxVM vxconfigd ERROR V-5-1-123 Disk group *group*: Disabled by errors

- ◆ *Action:* If the underlying error resulted from a transient failure, such as a disk cabling error, then you may be able to repair the situation by rebooting. Otherwise, the disk group may have to be recreated and restored from a backup.

V-5-1-134

VxVM vxconfigd ERROR V-5-1-134 Memory allocation failure

- ◆ *Description:* This implies that there is insufficient memory to start VxVM and to get the volumes for the `root` and `/usr` file systems running.
- ◆ *Action:* This error should not normally occur, unless your system has very small amounts of memory. Adding swap space will probably not help because this error is most likely to occur early in the boot sequence, before swap areas have been added.

V-5-1-135

VxVM vxconfigd FATAL ERROR V-5-1-135 Memory allocation failure during startup

- ◆ *Description:* This implies that there is insufficient memory to start up VxVM and to get the volumes for the `root` and `/usr` file systems running.
- ◆ *Action:* This error should not normally occur, unless your system has very small amounts of memory. Adding swap space probably will not help, because this error is most likely to occur early in the boot sequence, before swap areas have been added.

Understanding Messages

V-5-1-148

VxVM vxconfigd ERROR V-5-1-148 System startup failed

- ◆ *Description:* Either the `root` or the `/usr` file system volume could not be started, rendering the system unusable. The error that resulted in this condition should appear prior to this error message.
- ◆ *Action:* Look up other error messages appearing on the console and take the actions suggested in the descriptions of those messages.

V-5-1-169

VxVM vxconfigd ERROR V-5-1-169 cannot open `/dev/vx/config`: *reason*

- ◆ *Description:* The `/dev/vx/config` device could not be opened. `vxconfigd` uses this device to communicate with the VERITAS Volume Manager kernel drivers. The most likely reason is “Device is already open.” This indicates that some process (most likely `vxconfigd`) already has `/dev/vx/config` open. Less likely reasons are “No such file or directory” or “No such device or address.” For either of these reasons, likely causes are:
 - ◆ The VERITAS Volume Manager package installation did not complete correctly.
 - ◆ The device node was removed by the administrator or by an errant shell script.
- ◆ *Action:* If the reason is “Device is already open,” stop or kill the old `vxconfigd` by running the command:

```
# vxdctl -k stop
```

For other failure reasons, consider re-adding the base VERITAS Volume Manager package. This will reconfigure the device node and re-install the VERITAS Volume Manager kernel device drivers. See the *VERITAS Volume Manager Installation Guide* for information on how to add the package. If you cannot re-add the package, contact VERITAS Technical Support for more information.

VxVM vxconfigd ERROR V-5-1-169 Cannot open `/etc/vfstab`: *reason*

- ◆ *Description:* `vxconfigd` could not open the `/etc/vfstab` file, for the reason given. The `/etc/vfstab` file is used to determine which volume (if any) to use for the `/usr` file system.
- ◆ *Action:* This error implies that your `root` file system is currently unusable. You may be able to repair the `root` file system by mounting it after booting from a network or CD-ROM `root` file system. If the `root` file system is defined on a volume, then see the procedures defined for recovering from a failed `root` file system in “Recovery from Boot Disk Failure” on page 27.

V-5-1-249

VxVM vxconfigd NOTICE V-5-1-249 Volume *volume* entering degraded mode

- ◆ *Description:* Detaching a subdisk in the named RAID-5 volume has caused the volume to enter “degraded” mode. While in degraded mode, performance of the RAID-5 volume is substantially reduced. More importantly, failure of another subdisk may leave the RAID-5 volume unusable. Also, if the RAID-5 volume does not have an active log, then failure of the system may leave the volume unusable.
- ◆ *Action:* If hot-relocation is enabled, VERITAS Volume Manager objects affected by the disk failure are taken care of automatically. Mail is sent to `root` indicating what actions were taken by VxVM and what further actions the administrator should take.

V-5-1-480

VxVM vxconfigd ERROR V-5-1-480 Cannot reset VxVM kernel: *reason*

- ◆ *Description:* The `-r` reset option was specified to `vxconfigd`, but the VxVM kernel drivers could not be reset. The most common reason is “A virtual disk device is open.” This implies that a VxVM tracing or volume device is open.
- ◆ *Action:* If you want to reset the kernel devices, track down and kill all processes that have a volume or VERITAS Volume Manager tracing device open. Also, if any volumes are mounted as file systems, unmount those file systems.

Any reason other than “A virtual disk device is open” does not normally occur unless there is a bug in the operating system or in VxVM.

V-5-1-484

VxVM vxconfigd ERROR V-5-1-484 Cannot start *volume* volume, no valid complete plexes

- ◆ *Description:* These errors indicate that the volume cannot be started because the volume contains no valid complete plexes. This can happen, for example, if disk failures have caused all plexes to be unusable. It can also happen as a result of actions that caused all plexes to become unusable (for example, forcing the dissociation of subdisks or detaching, dissociation, or offlining of plexes).
- ◆ *Action:* It is possible that this error results from a drive that failed to spin up. If so, rebooting may fix the problem. If that does not fix the problem, then the only recourse is to repair the disks involved with the plexes and restore the file system from a backup. Restoring the `root` or `/usr` file system requires that you have a valid backup. See “Repairing Root or /usr File Systems on Mirrored Volumes” on page 38 for information on how to fix problems with `root` or `/usr` file system volumes.

Understanding Messages

V-5-1-485

VxVM vxconfigd ERROR V-5-1-485 Cannot start *volume* volume, volume state is invalid

- ◆ *Description:* The volume for the `root` or `/usr` file system is in an unexpected state (not `ACTIVE`, `CLEAN`, `SYNC` or `NEEDSYNC`). This should not happen unless the system administrator circumvents the mechanisms used by VxVM to create these volumes.
- ◆ *Action:* The only recourse is to bring up VxVM on a CD-ROM or NFS-mounted `root` file system and to fix the state of the volume. See "Repairing Root or /usr File Systems on Mirrored Volumes" on page 38 for further information.

V-5-1-525

VxVM vxconfigd NOTICE V-5-1-525 Detached log for volume *volume*

- ◆ *Description:* The DRL or RAID-5 log for the named volume was detached as a result of a disk failure, or as a result of the administrator removing a disk with `vxchg -k rmdisk`. A failing disk is indicated by a "Detached disk" message.
- ◆ *Action:* If the log is mirrored, hot-relocation tries to relocate the failed log automatically. Use either `vxplex dis` or `vxsd dis` to remove the failing logs. Then, use `vxassist addlog` (see the `vxassist(1M)` manual page) to add a new log to the volume.

V-5-1-526

VxVM vxconfigd NOTICE V-5-1-526 Detached plex *plex* in volume *volume*

- ◆ *Description:* The specified plex was disabled as a result of a disk failure, or as a result of the administrator removing a disk with `vxchg -k rmdisk`. A failing disk is indicated by a "Detached disk" message.
- ◆ *Action:* If hot-relocation is enabled, VERITAS Volume Manager objects affected by the disk failure are taken care of automatically. Mail is sent to `root` indicating what actions were taken by VxVM and what further actions the administrator should take.

V-5-1-527

VxVM vxconfigd NOTICE V-5-1-527 Detached subdisk *subdisk* in volume *volume*

- ◆ *Description:* The specified subdisk was disabled as a result of a disk failure, or as a result of the administrator removing a disk with `vxchg -k rmdisk`. A failing disk is indicated by a “Detached disk” message.
- ◆ *Action:* If hot-relocation is enabled, VERITAS Volume Manager objects affected by the disk failure are taken care of automatically. Mail is sent to `root` indicating what actions were taken by VxVM and what further actions the administrator should take.

V-5-1-528

VxVM vxconfigd NOTICE V-5-1-528 Detached volume *volume*

- ◆ *Description:* The specified volume was detached as a result of a disk failure, or as a result of the administrator removing a disk with `vxchg -k rmdisk`. A failing disk is indicated by a “Detached disk” message. Unless the disk error is transient and can be fixed with a reboot, the contents of the volume should be considered lost.
- ◆ *Action:* Contact VERITAS Technical Support.

V-5-1-543

VxVM vxconfigd ERROR V-5-1-543 Differing version of vxconfigd installed

- ◆ *Description:* A `vxconfigd` daemon was started after stopping an earlier `vxconfigd` with a non-matching version number. This can happen, for example, if you upgrade VxVM and then run `vxconfigd` without first rebooting.
- ◆ *Action:* Reboot the system.

V-5-1-544

VxVM vxconfigd WARNING V-5-1-544 Disk *disk* in group *group* flagged as shared; Disk skipped

- ◆ *Description:* The given disk is listed as shared, but the running version of VxVM does not support shared disk groups.
- ◆ *Action:* This message can usually be ignored. If you want to use the disk on this system, use `vxdiskadd` to add the disk. Do not do this if the disk really is shared with other systems.

Understanding Messages

V-5-1-545

VxVM vxconfigd WARNING V-5-1-545 Disk *disk* in group *group* locked by host *hostid* Disk skipped

- ◆ *Description:* The given disk is listed as locked by the host with the VERITAS Volume Manager host ID (usually the same as the system host name).
- ◆ *Action:* This message can usually be ignored. If you want to use the disk on this system, use `vxdiskadd` to add the disk. Do not do this if the disk really is shared with other systems.

V-5-1-546

VxVM vxconfigd WARNING V-5-1-546 Disk *disk* in group *group*: Disk device not found

- ◆ *Description:* No physical disk can be found that matches the named disk in the given disk group. This is equivalent to failure of that disk. (Physical disks are located by matching the disk IDs in the disk group configuration records against the disk IDs stored in the VERITAS Volume Manager header on the physical disks.) This error message is displayed for any disk IDs in the configuration that are not located in the disk header of any physical disk. This may result from a transient failure such as a poorly-attached cable, or from a disk that fails to spin up fast enough. Alternately, this may happen as a result of a disk being physically removed from the system, or from a disk that has become unusable due to a head crash or electronics failure.

Any RAID-5 plexes, DRL log plexes, RAID-5 subdisks or mirrored plexes containing subdisks on this disk are unusable. Such disk failures (particularly on multiple disks) may cause one or more volumes to become unusable.

- ◆ *Action:* If hot-relocation is enabled, VERITAS Volume Manager objects affected by the disk failure are taken care of automatically. Mail is sent to `root` indicating what actions were taken by VxVM and what further actions the administrator should take.

V-5-1-554

VxVM vxconfigd WARNING V-5-1-554 Disk *disk* names group *group*, but group ID differs

- ◆ *Description:* As part of a disk group import, a disk was discovered that had a mismatched disk group name and disk group ID. This disk is not imported. This can only happen if two disk groups have the same name but have different disk group ID values. In such a case, one group is imported along with all its disks and the other group is not. This message appears for disks in the un-selected group.
- ◆ *Action:* If the disks should be imported into the group, this must be done by adding the disk to the group at a later stage, during which all configuration information for the disk is lost.

V-5-1-557

VxVM vxconfigd ERROR V-5-1-557 Disk *disk*, group *group*, device *device*:
not updated with new host ID
Error: *reason*

- ◆ *Description:* This can result from using `vxctl hostid` to change the VERITAS Volume Manager host ID for the system. The error indicates that one of the disks in a disk group could not be updated with the new host ID. This usually indicates that the disk has become inaccessible or has failed in some other way.
- ◆ *Action:* Try running the following command to determine whether the disk is still operational:

```
# vxdisk check device
```

If the disk is no longer operational, `vxdisk` should print a message such as:

```
device: Error: Disk write failure
```

This will result in the disk being taken out of active use in its disk group, if it has not already been taken out of use. If the disk is still operational, which should not be the case, `vxdisk` prints:

```
device: Okay
```

If the disk is listed as "Okay," try running `vxctl hostid` again. If it still results in an error, contact VERITAS Technical Support.

Understanding Messages

V-5-1-568

VxVM vxconfigd WARNING V-5-1-568 Disk group *group* is disabled, disks not updated with new host ID

- ◆ *Description:* As a result of failures, the named disk group has become disabled. Earlier error messages should indicate the cause. This message indicates that disks in that disk group were not updated with a new VERITAS Volume Manager host ID. This warning message should result only from a `vxctl hostid` operation.
- ◆ *Action:* Typically, unless a disk group was disabled due to transient errors, there is no way to repair a disabled disk group. The disk group may have to be reconstructed from scratch. If the disk group was disabled due to a transient error such as a cabling problem, then a future reboot may not automatically import the named disk group, due to the change in the system's VERITAS Volume Manager host ID. In such a case, import the disk group directly using `vxvg import` with the `-C` option.

V-5-1-569

VxVM vxconfigd ERROR V-5-1-569 Disk group *group*, Disk *disk*: Cannot auto-import group: *reason*

- ◆ *Description:* On system startup, `vxconfigd` failed to import the disk group associated with the named disk. A message related to the specific failure is given in *reason*. Additional error messages may be displayed that give more information on the specific error. In particular, this is often followed by:

```
VxVM vxconfigd ERROR V-5-1-579 Disk group group: Errors in some
configuration copies:
Disk device, copy number: Block bno: error ...
```

The most common reason for auto-import failures is excessive numbers of disk failures, making it impossible for VxVM to find correct copies of the disk group configuration database and kernel update log. Disk groups usually have enough copies of this configuration information to make such import failures unlikely.

A more serious failure is indicated by errors such as:

```
Configuration records are inconsistent
Disk group has no valid configuration copies
Duplicate record in configuration
Format error in configuration copy
Invalid block number
Invalid magic number
```

These errors indicate that all configuration copies have become corrupt (due to disk failures, writing on the disk by an application or the administrator, or bugs in VxVM).

Some correctable errors may be indicated by other error messages that appear in conjunction with the auto-import failure message. Look up those other errors for more information on their cause.

Failure of an auto-import implies that the volumes in that disk group will not be available for use. If there are file systems on those volumes, then the system may yield further errors resulting from inability to access the volume when mounting the file system.

- ◆ *Action:* If the error is clearly caused by excessive disk failures, then you may have to recreate the disk group configuration by using the procedures given in “Restoring a Disk Group Configuration” on page 63, and restore contents of any volumes from a backup. There may be other error messages that appear which provide further information. See those other error messages for more information on how to proceed. If those errors do not make it clear how to proceed, contact VERITAS Technical Support.

V-5-1-571

```
VxVM vxconfigd ERROR V-5-1-571 Disk group group, Disk disk: Skip disk
group
with duplicate name
```

- ◆ *Description:* Two disk groups with the same name are tagged for auto-importing by the same host. Disk groups are identified both by a simple name and by a long unique identifier (disk group ID) assigned when the disk group is created. Thus, this error indicates that two disks indicate the same disk group name but a different disk group ID.

VxVM does not allow you to create a disk group or import a disk group from another machine, if that would cause a collision with a disk group that is already imported. Therefore, this error is unlikely to occur under normal use. However, this error can occur in the following two cases:

- ◆ A disk group cannot be auto-imported due to some temporary failure. If you create a new disk group with the same name as the failed disk group and reboot, the new disk group is imported first. The auto-import of the older disk group fails because more recently modified disk groups have precedence over older disk groups.
- ◆ A disk group is deported from one host using the `-h` option to cause the disk group to be auto-imported on reboot from another host. If the second host was already auto-importing a disk group with the same name, then reboot of that host will yield this error.
- ◆ *Action:* If you want to import both disk groups, then rename the second disk group on import. See the `vxchg(1M)` manual page for information on how to use the `import` operation to rename a disk group.

Understanding Messages

V-5-1-577

VxVM vxconfigd WARNING V-5-1-577 Disk group *group*: Disk group log may be too small

Log size should be at least *number* blocks

- ◆ *Description*: The log areas for the disk group have become too small for the size of configuration currently in the group. This message only occurs during disk group import; it can only occur if the disk was inaccessible while new database objects were added to the configuration, and the disk was then made accessible and the system restarted. This should not normally happen without first displaying a message about the database area size.
- ◆ *Action*: Reinitialize the disks in the group with larger log areas. Note that this requires that you restore data on the disks from backups. See the `vxdisk(1M)` manual page. To reinitialize all of the disks, detach them from the group with which they are associated, reinitialize and re-add them. Then deport and re-import the disk group to effect the changes to the log areas for the group.

V-5-1-579

VxVM vxconfigd ERROR V-5-1-579 Disk group *group*: Errors in some configuration copies: Disk *disk*, copy *number*: [Block number]: *reason* ...

- ◆ *Description*: During a failed disk group import, some of the configuration copies in the named disk group were found to have format or other types of errors which make those copies unusable. This message lists all configuration copies that have uncorrected errors, including any appropriate logical block number. If no other reasons are displayed, then this may be the cause of the disk group import failure.
- ◆ *Action*: If some of the copies failed due to transient errors (such as cable failures), then a reboot or re-import may succeed in importing the disk group. Otherwise, the disk group configuration may have to be restored. You can recreate a disk group configuration by using the procedures given in "Restoring a Disk Group Configuration" on page 63

V-5-1-583

VxVM vxconfigd ERROR V-5-1-583 Disk group *group*: Reimport of disk group failed: *reason*

- ◆ *Description:* After vxconfigd was stopped and restarted (or disabled and then enabled), VxVM failed to recreate the import of the indicated disk group. The reason for failure is specified. Additional error messages may be displayed that give further information describing the problem.
- ◆ *Action:* A major cause for this kind of failure is disk failures that were not addressed before vxconfigd was stopped or disabled. If the problem is a transient disk failure, then rebooting may take care of the condition. The error may be accompanied by messages such as "Disk group has no valid configuration copies." This indicates that the disk group configuration copies have become corrupt (due to disk failures, writing on the disk by an application or the administrator, or bugs in VxVM). You can recreate a disk group configuration by using the procedures given in "Restoring a Disk Group Configuration" on page 63.

V-5-1-587

VxVM vxdg ERROR V-5-1-587 disk group *groupname*: import failed: *reason*

- ◆ *Description:* The import of a disk group failed for the specified reason.
- ◆ *Action:* The action to be taken depends on the reason given in the error message:

```
Disk is in use by another host
No valid disk found containing disk group
```

The first message indicates that disks have been moved from a system that has crashed or that failed to detect the group before the disk was moved. The locks stored on the disks must be cleared.

The second message indicates that the disk group does not contain any valid disks (not that it does not contain any disks). The disks may be considered invalid due to a mismatch between the host ID in their configuration copies and that stored in the `/etc/vx/volboot` file.

To clear locks on a specific set of devices, use the following command:

```
# vxdisk clearimport devicename ...
```

To clear the locks during import, use the following command:

```
# vxdg -C import diskgroup
```

Understanding Messages

Caution Be careful when using the `vxdisk clearimport` or `vxvg -C import` command on systems that have dual-ported disks. Clearing the locks allows those disks to be accessed at the same time from multiple hosts and can result in corrupted data.

An `import` operation fails if some disks for the disk group cannot be found among the disk drives attached to the system.

```
Disk for disk group not found
Disk group has no valid configuration copies
```

The first message indicates a recoverable error.

The second message indicates a fatal error that requires hardware repair or the creation of a new disk group, and recovery of the disk group configuration and data:

If some of the disks in the disk group have failed, you can force the disk group to be imported with this command:

```
# vxvg -f import diskgroup
```

Caution Be careful when using the `-f` option. It can cause the same disk group to be imported twice from different sets of disks, causing the disk group to become inconsistent.

These operations can also be performed using the `vxdiskadm` utility. To deport a disk group using `vxdiskadm`, select menu item 9 (Remove access to (deport) a disk group). To import a disk group, select item 8 (Enable access to (import) a disk group). The `vxdiskadm import` operation checks for host import locks and prompts to see if you want to clear any that are found. It also starts volumes in the disk group.

V-5-1-663

```
VxVM vxconfigd WARNING V-5-1-663 Group group: Duplicate virtual device
number(s) :
```

```
Volume volume remapped from major, minor to major, minor ...
```

- ◆ *Description:* The configuration of the named disk group includes conflicting device numbers. A disk group configuration lists the recommended device number to use for each volume in the disk group. If two volumes in two disk groups happen to list the same device number, then one of the volumes must use an alternate device number. This is called device number remapping. Remapping is a temporary change to a volume. If the other disk group is deported and the system is rebooted, then the

volume that was remapped may no longer be remapped. Also, volumes that are remapped once are not guaranteed to be remapped to the same device number in further reboots.

- ◆ *Action:* Use the `vx dg remminor` command to renumber all volumes in the offending disk group permanently. See the `vx dg(1M)` manual page for more information.

V-5-1-737

VxVM vxconfigd ERROR V-5-1-737 Mount point *path*: volume not in *bootdg* disk group

- ◆ *Description:* The volume device listed in the `/etc/vfstab` file for the given mount-point directory (normally `/usr`) is listed as in a disk group other than the boot disk group. This error should not occur if the standard VERITAS Volume Manager procedures are used for encapsulating the disk containing the `/usr` file system.
- ◆ *Action:* Boot VxVM from a network or CD-ROM mounted root file system. Then, start up VxVM using `fixmountroot` on a valid mirror disk of the root file system. After starting VxVM, mount the root file system volume and edit the `/etc/vfstab` file. Change the file to use a direct partition for the file system. There should be a comment in the `/etc/vfstab` file that indicates which partition to use.

V-5-1-768

VxVM vxconfigd NOTICE V-5-1-768 Offlining config copy *number* on disk *disk*: Reason: *reason*

- ◆ *Description:* An I/O error caused the indicated configuration copy to be disabled. This is a notice only, and does not normally imply serious problems, unless this is the last active configuration copy in the disk group.
- ◆ *Action:* Consider replacing the indicated disk, since this error implies that the disk has deteriorated to the point where write errors cannot be repaired automatically. The error can also result from transient problems with cabling or power.

V-5-1-923

VxVM vxplex ERROR V-5-1-923 Record *volume* is in disk group *diskgroup1* *plex* is in group *diskgroup2*.

- ◆ *Description:* An attempt was made to snap back a plex from a different disk group.
- ◆ *Action:* Move the snapshot volume into the same disk group as the original volume.

Understanding Messages

V-5-1-946

VxVM vxconfigd FATAL ERROR V-5-1-946 bootdg cannot be imported during boot

- ◆ *Description:* Usually means that multipathing is misconfigured.
- ◆ *Action:* See “V-5-1-5929” on page 114 for possible causes and solutions.

V-5-1-1049

VxVM vxconfigd ERROR V-5-1-1049 System boot disk does not have a valid rootvol plex

Please boot from one of the following disks:

DISK	MEDIA	DEVICE	BOOT	COMMAND
<i>diskname</i>	<i>device</i>	<i>boot</i>	<i>vx-diskname...</i>	

- ◆ *Description:* The system is configured to use a volume for the root file system, but was not booted on a disk containing a valid mirror of the root volume. Disks containing valid root mirrors are listed as part of the error message. A disk is usable as a boot disk if there is a root mirror on that disk which is not stale or offline.
- ◆ *Action:* Try to boot from one of the named disks using the associated boot command that is listed in the message.

V-5-1-1063

VxVM vxconfigd ERROR V-5-1-1063 There is no volume configured for the root device

- ◆ *Description:* The system is configured to boot from a root file system defined on a volume, but there is no root volume listed in the configuration of the boot disk group.
- There are two possible causes of this error:
- ◆ *Case 1:* The `/etc/system` file was erroneously updated to indicate that the root device is `/pseudo/vxio@0:0`. This can happen only as a result of direct manipulation by the administrator.
 - ◆ *Case 2:* The system somehow has a duplicate boot disk group, one of which contains a root file system volume and one of which does not, and `vxconfigd` somehow chose the wrong one. Since `vxconfigd` chooses the more recently accessed version of the boot disk group, this error can happen if the system clock was updated incorrectly at some point (reversing the apparent access order of the two disk groups). This can also happen if some disk group was deported and assigned the same name as the boot disk group with locks given to this host.

- ◆ *Action:* In case 1, boot the system on a CD-ROM or networking-mounted root file system, directly mount the disk partition of the root file system, and remove the following lines from `/etc/system`:

```
rootdev:/pseudo/vxio@0:0
set vxio:vol_rootdev_is_volume=1
```

In case 2, either boot with all drives in the offending version of the boot disk group turned off, or import and rename (see `vxdbg(1M)`) the offending boot disk group from another host. If you turn off the drives, run the following command after booting:

```
# vxdbg flush bootdg
```

This updates time stamps on the imported version of the specified boot disk group, `bootdg`, which should make the correct version appear to be the more recently accessed. If this does not correct the problem, contact VERITAS Technical Support.

V-5-1-1171

VxVM vxconfigd ERROR V-5-1-1171 Version number of kernel does not match vxconfigd

- ◆ *Description:* The release of `vxconfigd` does not match the release of the VERITAS Volume Manager kernel drivers. This should happen only as a result of upgrading VxVM, and then running `vxconfigd` without a reboot.
- ◆ *Action:* Reboot the system. If that does not cure the problem, re-add the VxVM packages.

V-5-1-1186

VxVM vxconfigd ERROR V-5-1-1186 Volume *volume* for mount point `/usr` not found in `bootdg` disk group

- ◆ *Description:* The system is configured to boot with `/usr` mounted on a volume, but the volume associated with `/usr` is not listed in the configuration of the boot disk group. There are two possible causes of this error:
 - ◆ Case 1: The `/etc/vfstab` file was erroneously updated to indicate the device for the `/usr` file system is a volume, but the volume named is not in the boot disk group. This should happen only as a result of direct manipulation by the administrator.
 - ◆ Case 2: The system somehow has a duplicate boot disk group, one of which contains the `/usr` file system volume and one of which does not (or uses a different volume name), and `vxconfigd` somehow chose the wrong boot disk group. Since `vxconfigd` chooses the more recently accessed version of the boot disk group, this error can happen if the system clock was updated incorrectly at

Understanding Messages

some point (causing the apparent access order of the two disk groups to be reversed). This can also happen if some disk group was deported and assigned the same name as the boot disk group with locks given to this host.

- ◆ *Action:* In case 1, boot the system on a CD-ROM or networking-mounted `root` file system. If the `root` file system is defined on a volume, then start and mount the `root` volume. If the `root` file system is not defined on a volume, mount the `root` file system directly. Edit the `/etc/vfstab` file to correct the entry for the `/usr` file system.

In case 2, either boot with all drives in the offending version of the boot disk group turned off, or import and rename (see `vxchg(1M)`) the offending boot disk group from another host. If you turn off drives, run the following command after booting:

```
# vxchg flush bootdg
```

This updates time stamps on the imported version of the boot disk group, `bootdg`, which should make the correct version appear to be the more recently accessed. If this does not correct the problem, contact VERITAS Technical Support.

V-5-1-1589

VxVM vxconfigd ERROR V-5-1-1589 enable failed: aborting

- ◆ *Description:* Regular startup of `vxconfigd` failed. This error can also result from the command `vxctl enable`.
- ◆ *Action:* The failure was fatal and `vxconfigd` was forced to exit. The most likely cause is that the operating system is unable to create interprocess communication channels to other utilities.

VxVM vxconfigd ERROR V-5-1-1589 enable failed: Error check group configuration copies. Database file not found

- ◆ *Description:* Regular startup of `vxconfigd` failed. This error can also result from the command `vxctl enable`.
- ◆ *Action:* If the `root` file system is full, increase its size or remove files to make space for the `tempdb` file.

The directory `/var/vxvm/tempdb` is inaccessible. This may be because of `root` file system corruption, if the `root` file system is full, or if `/var` is a separate file system, because it has become corrupted or has not been mounted.

If `/var` is a separate file system, make sure that it has an entry in `/etc/vfstab`. Otherwise, look for I/O error messages during the boot process that indicate either a hardware problem or misconfiguration of any logical volume management software being used for the `/var` file system. Also verify that the encapsulation (if configured) of your boot disk is complete and correct.

VxVM vxconfigd ERROR V-5-1-1589 enable failed: transactions are disabled

- ◆ *Description:* Regular startup of vxconfigd failed. This error can also result from the command vxctl enable.

vxconfigd is continuing to run, but no configuration updates are possible until the error condition is repaired.

Additionally, this may be followed with:

```
VxVM vxconfigd ERROR V-5-1-579 Disk group group: Errors in some
configuration copies:
Disk device, copy number: Block bno: error ...
```

Other error messages may be displayed that further indicate the underlying problem.

- ◆ *Action:* Evaluate the error messages to determine the root cause of the problem. Make changes suggested by the errors and then try rerunning the command.

If the “Errors in some configuration copies” error occurs again, that may indicate the real problem lies with the configuration copies in the disk group. You can recreate a disk group configuration by using the procedures given in “Restoring a Disk Group Configuration” on page 63.

V-5-1-2020

VxVM vxconfigd ERROR V-5-1-2020 Cannot kill existing daemon,
pid=*process_ID*

- ◆ *Description:* The -k (kill existing vxconfigd process) option was specified, but a running configuration daemon process could not be killed. A configuration daemon process, for purposes of this discussion, is any process that opens the /dev/vx/config device (only one process can open that device at a time). If there is a configuration daemon process already running, then the -k option causes a SIGKILL signal to be sent to that process. If, within a certain period of time, there is still a running configuration daemon process, the above error message is displayed.
- ◆ *Action:* This error can result from a kernel error that has made the configuration daemon process unkillable, from some other kind of kernel error, or from some other user starting another configuration daemon process after the SIGKILL signal. This last condition can be tested for by running vxconfigd -k again. If the error message reappears, contact VERITAS Technical Support.

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V-5-1-2197

VxVM vxconfigd ERROR V-5-1-2197 node *N*: missing vxconfigd

- ◆ *Description:* The vxconfigd daemon is not running on the indicated cluster node.
- ◆ *Action:* Restart the vxconfigd daemon.

V-5-1-2198

VxVM vxconfigd ERROR V-5-1-2198 node *N*: vxconfigd not ready

- ◆ *Description:* The vxconfigd daemon is not responding properly in a cluster.
- ◆ *Action:* Stop and restart the vxconfigd daemon on the node indicated.

V-5-1-2274

VxVM vxconfigd ERROR V-5-1-2274 *volume*:vxconfigd cannot boot-start RAID-5 volumes

- ◆ *Description:* A volume that vxconfigd should start immediately upon booting the system (that is, the volume for the /usr file system) has a RAID-5 layout. The /usr file system should never be defined on a RAID-5 volume.
- ◆ *Action:* It is likely that the only recovery for this is to boot VxVM from a network-mounted root file system (or from a CD-ROM), and reconfigure the /usr file system to be defined on a regular non-RAID-5 volume.

V-5-1-2290

VxVM vxdmpadm ERROR V-5-1-2290 Attempt to enable a controller that is not available

- ◆ *Description:* This message is returned by the vxdmpadm utility when an attempt is made to enable a controller that is not working or is not physically present.
- ◆ *Action:* Check hardware and see if the controller is present and whether I/O can be performed through it.

V-5-1-2353

VxVM vxconfigd ERROR V-5-1-2353 Disk group *group*: Cannot recover temp database: *reason*
Consider use of "vxconfigd -x cleartempdir" [see vxconfigd(1M)].

- ◆ *Description*: This can happen if you kill and restart vxconfigd, or if you disable and enable it with vxctl disable and vxctl enable. This error indicates a failure related to reading the file /var/vxvm/tempdb/*group*. This is a temporary file used to store information that is used when recovering the state of an earlier vxconfigd. The file is recreated on a reboot, so this error should never survive a reboot.
- ◆ *Action*: If you can reboot, do so. If you do not want to reboot, then do the following:
 - a. Ensure that no vxvol, vxplex, or vxsd processes are running.

Use ps -e to search for such processes, and use kill to kill any that you find. You may have to run kill twice to make these processes go away. Killing utilities in this way may make it difficult to make administrative changes to some volumes until the system is rebooted.
 - b. Recreate the temporary database files for all imported disk groups using the following command:

```
# vxconfigd -x cleartempdir 2> /dev/console
```

The vxvol, vxplex, and vxsd commands make use of these tempdb files to communicate locking information. If the file is cleared, then locking information can be lost. Without this locking information, two utilities can end up making incompatible changes to the configuration of a volume.

V-5-1-2524

VxVM vxconfigd ERROR V-5-1:2524 VOL_IO_DAEMON_SET failed: daemon count must be above N while cluster

- ◆ *Description*: The number of VERITAS Volume Manager kernel daemons (vxiod) is less than the minimum number needed to join a cluster.
- ◆ *Action*: Increase the number of daemons using vxiod.

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V-5-1-2630

VxVM vxconfigd WARNING V-5-1-2630 library and vxconfigd disagree on existence of client *number*

- ◆ *Description:* This warning may safely be ignored.
- ◆ *Action:* None required.

V-5-1-2824

VxVM vxconfigd ERROR V-5-1-2824 Configuration daemon error 242

- ◆ *Description:* A node failed to join a cluster, or a cluster join is taking too long. If the join fails, the node retries the join automatically.
- ◆ *Action:* No action is necessary if the join is slow or a retry eventually succeeds.

V-5-1-2829

VxVM vxdg ERROR V-5-1-2829 *diskgroup*: Disk group version doesn't support feature; see the vxdg upgrade command

- ◆ *Description:* The version of the specified disk group does not support disk group move, split or join operations.
- ◆ *Action:* Use the vxdg upgrade *diskgroup* command to update the disk group version.

V-5-1-2830

VxVM vxconfigd ERROR V-5-1-2830 Disk reserved by other host

- ◆ *Description:* An attempt was made to online a disk whose controller has been reserved by another host in the cluster.
- ◆ *Action:* No action is necessary. The cluster manager frees the disk and VxVM puts it online when the node joins the cluster.

V-5-1-2841

VxVM vxconfigd ERROR V-5-1-2841 enable failed: Error in disk group configuration copies

Unexpected kernel error in configuration update; transactions are disabled.

- ◆ *Description:* Usually means that multipathing is misconfigured.
- ◆ *Action:* See "V-5-1-5929" on page 114 for possible causes and solutions.

V-5-1-2860

VxVM vxdg ERROR V-5-1-2860 Transaction already in progress

- ◆ *Description:* One of the disk groups specified in a disk group move, split or join operation is currently involved in another unrelated disk group move, split or join operation (possibly as the result of recovery from a system failure).
- ◆ *Action:* Use the `vxprint` command to display the status of the disk groups involved. If `vxprint` shows that the TUTIL0 field for a disk group is set to MOVE, and you are certain that no disk group move, split or join should be in progress, use the `vxdg` command to clear the field as described in “Recovering from Incomplete Disk Group Moves” on page 15. Otherwise, retry the operation.

V-5-1-2862

VxVM vxdg ERROR V-5-1-2862 *object:* Operation is not supported

- ◆ *Description:* DCO and snap objects dissociated by Persistent FastResync, and VVR objects cannot be moved between disk groups.
- ◆ *Action:* None. The operation is not supported.

V-5-1-2866

VxVM vxdg ERROR V-5-1-2866 *object:* Record already exists in disk group

- ◆ *Description:* A disk group join operation failed because the name of an object in one disk group is the same as the name of an object in the other disk group. Such name clashes are most likely to occur for snap objects and snapshot plexes.
- ◆ *Action:* Use the following command to change the object name in either one of the disk groups:

```
# vxedit -g diskgroup rename old_name new_name
```

For more information about using the `vxedit` command, see the `vxedit(1M)` manual page.

Understanding Messages

V-5-1-2870

VxVM vxdg ERROR V-5-1-2870 *volume*: Volume or plex device is open or mounted

- ◆ *Description*: An attempt was made to perform a disk group move, split or join on a disk group containing an open volume.
- ◆ *Action*: It is most likely that a file system configured on the volume is still mounted. Stop applications that access volumes configured in the disk group, and unmount any file systems configured in the volumes.

V-5-1-2879

VxVM vxdg ERROR V-5-1-2879 *subdisk*: Record is associated

- ◆ *Description*: The named subdisk is not a top-level object.
- ◆ *Action*: Objects specified for a disk group move, split or join must be either disks or top-level volumes.

V-5-1-2907

VxVM vxdg ERROR V-5-1-2907 *diskgroup*: Disk group does not exist

- ◆ *Description*: The disk group does not exist or is not imported
- ◆ *Action*: Use the correct name, or import the disk group and try again.

V-5-1-2908

VxVM vxdg ERROR V-5-1-2908 *diskdevice*: Request crosses disk group boundary

- ◆ *Description*: The specified disk device is not configured in the source disk group for a disk group move or split operation.
- ◆ *Action*: Correct the name of the disk object specified in the disk group move or split operation.

V-5-1-2911

VxVM vxdg ERROR V-5-1-2911 *diskname*: Disk is not usable

- ◆ *Description*: The specified disk has become unusable.
- ◆ *Action*: Do not include the disk in any disk group move, split or join operation until it has been replaced or repaired.

V-5-1-2922

VxVM vxconfigd ERROR V-5-1-2922 Disk group exists and is imported

- ◆ *Description:* A slave tried to join a cluster, but a shared disk group already exists in the cluster with the same name as one of its private disk groups.
- ◆ *Action:* Use the `vxchg newname` operation to rename either the shared disk group on the master, or the private disk group on the slave.

V-5-1-2928

VxVM vxchg ERROR V-5-1-2928 *diskgroup*: Configuration too large for configuration copies

- ◆ *Description:* The disk group's configuration database is too small to hold the expanded configuration after a disk group move or join operation.
- ◆ *Action:* None.

V-5-1-2933

VxVM vxchg ERROR V-5-1-2933 *diskgroup*: Cannot remove last disk group configuration copy

- ◆ *Description:* The requested disk group move, split or join operation would leave the disk group without any configuration copies.
- ◆ *Action:* None. The operation is not supported.

V-5-1-3009

VxVM vxchg ERROR V-5-1-3009 *object*: Name conflicts with imported diskgroup

- ◆ *Description:* The target disk group of a split operation already exists as an imported disk group.
- ◆ *Action:* Choose a different name for the target disk group.

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V-5-1-3020

VxVM vxconfigd ERROR V-5-1-3020 Error in cluster processing

- ◆ *Description:* This may be due to an operation inconsistent with the current state of a cluster (such as an attempt to import or deport a shared disk group to or from the slave). It may also be caused by an unexpected sequence of commands from vxclust.
- ◆ *Action:* Perform the operation can be performed from the master node.

V-5-1-3022

VxVM vxconfigd ERROR V-5-1-3022 Cannot find disk on slave node

- ◆ *Description:* A slave node in a cluster cannot find a shared disk. This is accompanied by the syslog message:

```
VxVM vxconfigd ERROR V-5-1-2173 cannot find disk disk
```
- ◆ *Action:* Make sure that the same set of shared disks is online on both nodes. Examine the disks on both the master and the slave with the command `vxdisk list` and make sure that the same set of disks with the `shared` flag is visible on both nodes. If not, check the connections to the disks.

V-5-1-3023

VxVM vxconfigd ERROR V-5-1-3023 Disk in use by another cluster

- ◆ *Description:* An attempt was made to import a disk group whose disks are stamped with the ID of another cluster.
- ◆ *Action:* If the disk group is not imported by another cluster, retry the import using the `-C` (clear import) flag.

V-5-1-3024

VxVM vxconfigd ERROR V-5-1-3024 vxclust not there

- ◆ *Description:* An error during an attempt to join a cluster caused `vxclust` to fail. This may be caused by the failure of another node during a join or by the failure of `vxclust`.
- ◆ *Action:* Retry the join. An error message on the other node may clarify the problem.

V-5-1-3025

VxVM vxconfigd ERROR V-5-1-3025 Unable to add portal for cluster

- ◆ *Description:* vxconfigd was not able to create a portal for communication with the vxconfigd on the other node. This may happen in a degraded system that is experiencing shortages of system resources such as memory or file descriptors.
- ◆ *Action:* If the system does not appear to be degraded, stop and restart vxconfigd, and try again.

V-5-1-3030

VxVM vxconfigd ERROR V-5-1-3030 Volume recovery in progress

- ◆ *Description:* A node that crashed attempted to rejoin the cluster before its DRL map was merged into the recovery map.
- ◆ *Action:* Retry the join when the merge operation has completed.

V-5-1-3031

VxVM vxconfigd ERROR V-5-1-3031 Cannot assign minor *minor*

- ◆ *Description:* A slave attempted to join a cluster, but an existing volume on the slave has the same minor number as a shared volume on the master.

This message is accompanied by the following console message:

```
VxVM vxconfigd ERROR V-5-1-2192 minor number minor disk group group
in use
```

- ◆ *Action:* Before retrying the join, use vxdbg reminor (see the vxdbg(1M) manual page) to choose a new minor number range either for the disk group on the master or for the conflicting disk group on the slave. If there are open volumes in the disk group, the reminor operation will not take effect until the disk group is deported and updated (either explicitly or by rebooting the system).

V-5-1-3032

VxVM vxconfigd ERROR V-5-1-3032 Master sent no data

- ◆ *Description:* During the slave join protocol, a message without data was received from the master. This message is only likely to be seen in the case of a programming error.
- ◆ *Action:* Contact VERITAS Technical Support.

Understanding Messages

V-5-1-3033

VxVM vxconfigd ERROR V-5-1-3033 Join in progress

- ◆ *Description:* An attempt was made to import or deport a shared disk group during a cluster reconfiguration.
- ◆ *Action:* Retry when the cluster reconfiguration has completed.

V-5-1-3034

VxVM vxconfigd ERROR V-5-1-3034 Join not currently allowed

- ◆ *Description:* A slave attempted to join a cluster when the master was not ready. The slave will retry automatically.
- ◆ *Action:* No action is necessary if the join eventually completes. Otherwise, investigate the cluster monitor on the master.

V-5-1-3042

VxVM vxconfigd ERROR V-5-1-3042 Clustering license restricts operation

- ◆ *Description:* An operation requiring a full clustering license was attempted, and such a license is not available.
- ◆ *Action:* If the error occurs when a disk group is being activated, dissociate all but one plex from mirrored volumes before activating the disk group. If the error occurs during a transaction, deactivate the disk group on all nodes except the master.

V-5-1-3046

VxVM vxconfigd ERROR V-5-1-3046 Node activation conflict

- ◆ *Description:* The disk group could not be activated because it is activated in a conflicting mode on another node in a cluster.
- ◆ *Action:* Retry later, or deactivate the disk group on conflicting nodes.

V-5-1-3049

VxVM vxconfigd ERROR V-5-1-3049 Retry rolling upgrade

- ◆ *Description:* An attempt was made to upgrade a cluster to a higher protocol version when a transaction was in progress.
- ◆ *Action:* Retry the upgrade at a later time.

V-5-1-3050

VxVM vxconfigd ERROR V-5-1-3050 Version out of range for at least one node

- ◆ *Description:* Before trying to upgrade a cluster by running `vxctl upgrade`, all nodes should be able to support the new protocol version. An upgrade can fail if at least one of them does not support the new protocol version.
- ◆ *Action:* Make sure that the VERITAS Volume Manager package that supports the new protocol version is installed on all nodes and retry the upgrade.

V-5-1-3091

VxVM vxdg ERROR V-5-1-3091 *diskname* : Disk not moving, but subdisks on it are

- ◆ *Description:* Some volumes have subdisks that are not on the disks implied by the supplied list of objects.
- ◆ *Action:* Use the `-o expand` option to `vxdg listmove` to produce a self-contained list of objects.

V-5-1-3212

VxVM vxconfigd ERROR V-5-1-3212 Insufficient DRL log size: logging is disabled.

- ◆ *Description:* A volume with an insufficient DRL log size was started successfully, but DRL logging is disabled and a full recovery is performed.
- ◆ *Action:* Create a new DRL of sufficient size.

V-5-1-3243

VxVM vxdumpadm ERROR V-5-1-3243 The VxVM restore daemon is already running. You can stop and restart the restore daemon with desired arguments for changing any of its parameters.

- ◆ *Description:* The `vxdumpadm start restore` command has been executed while the restore daemon is already running.
- ◆ *Action:* Stop the restore daemon and restart it with the required set of parameters.

Understanding Messages

V-5-1-3362

VxVM vxmpadm ERROR V-5-1-3362 Attempt to disable controller failed. One (or more) devices can be accessed only through this controller. Use the `-f` option if you still want to disable this controller.

- ◆ *Description:* Disabling the controller could lead to some devices becoming inaccessible.
- ◆ *Action:* To disable the only path connected to a disk, use the `-f` option.

V-5-1-3486

VxVM vxconfigd ERROR V-5-1-3486 Not in cluster

- ◆ *Description:* Checking for the current protocol version (using `vxctl protocol` version) does not work if the node is not in a cluster.
- ◆ *Action:* Bring the node into the cluster and retry.

V-5-1-3689

VxVM vxassist ERROR V-5-1-3689 Volume record id *rid* is not found in the configuration.

- ◆ *Description:* An error was detected while reattaching a snapshot volume using `snapback`. This happens if a volume's record identifier (*rid*) changes as a result of a disk group split that moved the original volume to a new disk group. The snapshot volume is unable to recognize the original volume because its record identifier has changed.
- ◆ *Action:* Use the following command to perform the `snapback`:

```
# vxplex [-g diskgroup] -f snapback volume plex
```

V-5-1-3828

VxVM vxconfigd ERROR V-5-1-3828 upgrade operation failed: Already at highest version

- ◆ *Description:* An upgrade operation has failed because a cluster is already running at the highest protocol version supported by the master.
- ◆ *Action:* No further action is possible as the master is already running at the highest protocol version it can support.

V-5-1-3848

VxVM vxconfigd ERROR V-5-1-3848 Incorrect protocol version (*number*) in volboot file

- ◆ *Description:* A node attempted to join a cluster where VxVM software was incorrectly upgraded or the volboot file is corrupted, possibly by being edited manually. The volboot file should contain a supported protocol version before trying to bring the node into the cluster.
- ◆ *Action:* Verify the supported cluster protocol versions using vxctl protocol version, possibly by being edited manually. The volboot file should contain a supported protocol version before trying to bring the node into the cluster. Run vxctl init to write a valid protocol version to the volboot file. Restart vxconfigd and retry the join.

V-5-1-4220

VxVM vxconfigd ERROR V-5-1-4220 DG move: can't import diskgroup, giving up

- ◆ *Description:* The specified disk group cannot be imported during a disk group move operation. (The disk group ID is obtained from the disk group that could be imported.)
- ◆ *Action:* The disk group may have been moved to another host. One option is to locate it and use the vxdg recover command on both the source and target disk groups. Specify the -o clean option with one disk group, and the -o remove option with the other disk group. See "Recovering from Incomplete Disk Group Moves" on page 15 for more information.

V-5-1-4267

VxVM vxassist WARNING V-5-1-4267 volume *volume* already has at least one snapshot plex
Snapshot volume created with these plexes will have a dco volume with no associated dco plex.

- ◆ *Description:* An error was detected while adding a DCO object and DCO volume to a mirrored volume. There is at least one snapshot plex already created on the volume. Because this snapshot plex was created when no DCO was associated with the volume, there is no DCO plex allocated for it.
- ◆ *Action:* See the section "Enabling Persistent FastResync on Existing Volumes with Associated Snapshots" in the chapter "Administering Volumes" of the *VERITAS Volume Manager Administrator's Guide*.

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V-5-1-4277

VxVM vxconfigd ERROR V-5-1-4277 cluster_establish: CVM protocol version out of range

- ◆ *Description:* When a node joins a cluster, it tries to join at the protocol version that is stored in its `volboot` file. If the cluster is running at a different protocol version, the master rejects the join and sends the current protocol version to the slave. The slave re-tries with the current version (if that version is supported on the joining node), or the join fails.
- ◆ *Action:* Make sure that the joining node has a VERITAS Volume Manager release installed that supports the current protocol version of the cluster.

V-5-1-4551

VxVM vxconfigd ERROR V-5-1-4551 dg_move_recover: can't locate disk(s), giving up

- ◆ *Description:* Disks involved in a disk group move operation cannot be found, and one of the specified disk groups cannot be imported.
- ◆ *Action:* Manual use of the `vxchg recover` command may be required to clean the disk group to be imported. See “Recovering from Incomplete Disk Group Moves” on page 15 for more information.

V-5-1-4620

VxVM vxassist WARNING V-5-1-4620 Error while retrieving information from SAL

- ◆ *Description:* The `vxassist` command does not recognize the version of the SAN Access Layer (SAL) that is being used, or detects an error in the output from SAL.
- ◆ *Action:* If a connection to SAL is desired, ensure that the correct version of SAL is installed and configured correctly. Otherwise, suppress communication between `vxassist` and SAL by adding the following line to the `vxassist` defaults file (usually `/etc/default/vxassist`):

```
salcontact=no
```

V-5-1-4625

VxVM vxassist WARNING V-5-1-4625 SAL authentication failed...

- ◆ *Description:* The SAN Access Layer (SAL) rejects the credentials that are supplied by the vxassist command.
- ◆ *Action:* If connection to SAL is desired, use the vxspcshow command to set a valid user name and password. Otherwise, suppress communication between vxassist and SAL by adding the following line to the vxassist defaults file (usually /etc/default/vxassist):

```
salcontact=no
```

V-5-1-5150

VxVM vxassist ERROR V-5-1-5150 Insufficient number of active snapshot mirrors in *snapshot_volume*.

- ◆ *Description:* An attempt to snap back a specified number of snapshot mirrors to their original volume failed.
- ◆ *Action:* Specify a number of snapshot mirrors less than or equal to the number in the snapshot volume.

V-5-1-5160

VxVM vxplex ERROR V-5-1-5160 Plex *plex* not associated to a snapshot volume.

- ◆ *Description:* An attempt was made to snap back a plex that is not from a snapshot volume.
- ◆ *Action:* Specify a plex from a snapshot volume.

V-5-1-5161

VxVM vxplex ERROR V-5-1-5161 Plex *plex* not attached.

- ◆ *Description:* An attempt was made to snap back a detached plex.
- ◆ *Action:* Reattach the snapshot plex to the snapshot volume.

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V-5-1-5162

VxVM vxplex ERROR V-5-1-5162 Plexes do not belong to the same snapshot volume.

- ◆ *Description:* An attempt was made to snap back plexes that belong to different snapshot volumes.
- ◆ *Action:* Specify the plexes in separate invocations of vxplex snapback.

V-5-1-5929

VxVM vxconfigd NOTICE V-5-1-5929 Unable to resolve duplicate diskid.

- ◆ *Description:* When VxVM detects disks with duplicate disk IDs (unique internal identifiers), VxVM attempts to select the appropriate disk (using logic that is specific to an array). If a disk can not be selected, VxVM does not import any of the duplicated disks into a disk group. In the rare case when VxVM cannot make the choice, you must choose which duplicate disk to use.

Note In releases prior to 3.5, VxVM selected the first disk that it found if the selection process failed. From VxVM 3.5 onward, the default behavior is to avoid the selection of the wrong disk as this could lead to data corruption. Arrays with mirroring capability in hardware are particularly susceptible to such data corruption.

- ◆ *Action:* User intervention is required in the following cases:
 - ◆ Case 1: When DMP is disabled to an array that has multiple paths, then each path to the array is claimed as a unique disk.

If DMP is suppressed, VxVM does not know which path to select as the true path. You must choose which path to use. Decide which path to exclude, and then either edit the file `/etc/vx/vxvm.exclude`, or, if `vxconfigd` is running, select item 1 (suppress all paths through a controller from VxVM's view) or item 2 (suppress a path from VxVM's view) from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view).

The following example shows a `vxvm.exclude` file with paths `c6t0d0s2`, `c6t0d1s2`, and `c6t0d2s2` excluded from VxVM:

```
exclude_all 0
paths
c6t0d0s2 /pci@1f,4000/SUNW,ifp@2/ssd@w50060e8003275705,0
c6t0d1s2 /pci@1f,4000/SUNW,ifp@2/ssd@w50060e8003275705,1
c6t0d2s2 /pci@1f,4000/SUNW,ifp@2/ssd@w50060e8003275705,2
#
```

```
controllers
#
product
#
pathgroups
```

- ◆ Case 2: Some arrays such as EMC and HDS provide mirroring in hardware. When a LUN pair is split, depending on how the process is performed, this may result in two disks with the same disk ID.

Check with your array vendor to make sure that you are using the correct split procedure. If you know which LUNs you want to use, choose which path to exclude, and then either edit the file `/etc/vx/vxvm.exclude`, or, if `vxconfigd` is running, select item 1 (Suppress all paths through a controller from VxVM's view) or item 2 (Suppress a path from VxVM's view) from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view).

- ◆ Case 3: If disks have become duplicated using the `dd` command or any other disk copying utility, choose which set of duplicate disks you want to exclude, and then either edit the file `/etc/vx/vxvm.exclude`, or, if `vxconfigd` is running, select item 1 (Suppress all paths through a controller from VxVM's view) or item 2 (Suppress a path from VxVM's view) from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view).
- ◆ Case 4: (Solaris 9 only) After suppressing one path to a multipathed array from DMP, you then have suppressed that path from VxVM using item 1 (suppress all paths through a controller from VxVM's view) from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view). If all bootdg disks are from that array, `vxconfigd` does not start. (You may also see errors V-5-0-64, V-5-1-946 and V-5-1-2841.)

If only one array is connected to the controller, suppress the path from DMP using item 5 (Prevent multipathing of all disks on a controller by VxVM), and then item 1 (Suppress all paths through a controller from VxVM's view), from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view).

If more than one array is connected to the controller, suppress the path from DMP using item 5 (Prevent multipathing of all disks on a controller by VxVM), and then item 2 (Suppress a path from VxVM's view), from `vxdiskadm` option 17 (Prevent multipathing/Suppress devices from VxVM's view).

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V-5-2-2400

VxVM vxdisksetup NOTICE V-5-2-2400 *daname*: Duplicate DA records encountered for this device.

- ◆ *Description*: This may occur if a disk has been replaced in a Sun StorEdge™ A5x00 (or similar) array without using the `luxadm` command to notify the operating system. Duplicated disk access record entries similar to the following appear in the output from the `vxdisk list` command:

```
c1t5d0s2    sliced    c1t5d0s2    -    error
c1t5d0s2    sliced    c1t5d0s2    -    online|error
```

Note The status of the second entry may be `online` or `error`.

- ◆ *Action*: Perform the following steps to correct the problem:
 - a. Use the following command for each of the duplicated disk access name to remove them all from VxVM control:


```
# vxdisk rm daname
```

 Run the `vxdisk list` command to ensure that you have remove all entries for the disk access name.
 - b. Use the Solaris `luxadm` command to obtain the A5K array name and slot number of the disk, and then use these with `luxadm` to remove the disk:


```
# luxadm disp /dev/rdisk/daname
# luxadm remove_device array_name,slot_number
```
 - c. Pull out the disk as instructed to by `luxadm`.
 - d. Run the following VxVM commands:


```
# devfsadm -C
# vxdctl enable
```

 This completes the removal of device entries corresponding to the physical disk.
 - e. As in step a, run the `vxdisk list` and `vxdisk rm` commands to list any remaining entries for the disk access name and remove these from VxVM control.
 - f. Use the following `luxadm` command to take the disk offline on all the paths to it. The following example shows how to take a disk offline that is connected to controllers `c1` and `c2`:


```
# luxadm -e offline /dev/dsk/c1t5d0s2
# luxadm -e offline /dev/dsk/c2t5d0s2
```


- g.** Repeat step e and step f until no entries remain for the disk in the output from `vxdisk list`. This completes the removal of stale device entries for the disk from VxVM.
- h.** Finally, follow the procedure to replace the failed or removed disk that is described in the “Administering Disks” chapter of the *VERITAS Volume Manager Administrator’s Guide*.

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