Veritas Volume Manager Troubleshooting Guide

Linux

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Veritas Volume Manager 5.0

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Chapter 1

Recovery from hardware failure

Symantec's 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 35.

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
```

Displaying volume and plex states

To display detailed information about the configuration of a volume including its state and the states of its plexes, use the following form of the `vxprint` command:

```
# vxprint [-g diskgroup] -hvt [volume ...]
```

The following example shows a disabled volume, `vol`, which has two clean plexes, `vol-01` and `vol-02`, each with a single subdisk:

```
# vxprint -g mydg -hvt vol
Disk group: mydg

V   NAME    RVG/VSET/CO  KSTATE     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
SC  NAME    PLEX         CACHE      DISKOFFSLENGTH      [COL/]OFF  DEVICE    MODE
DC  NAME    PARENTVOL    LOGVOL
SP  NAME    SNAPVOL      DCO

v   vol         -         DISABLED   ACTIVE    212880    SELECT     -         fsgen
pl  vol-01      vol       DISABLED   CLEAN     212880    CONCAT     -         RW
sd  mydg11-01   vol-01    mydg11     0         212880    0          sdg       ENA
pl  vol-02      vol       DISABLED   CLEAN     212880    CONCAT     -         RW
sd  mydg12-01   vol-02    mydg12     0         212880    0          sdh       ENA
```

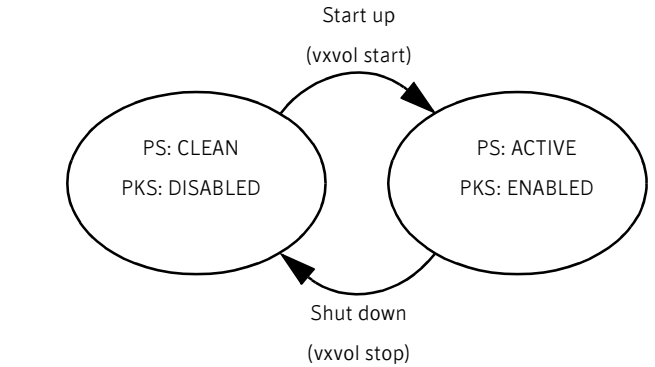
See the “Creating and Administering Plexes” and “Administering Volumes” chapters in the *Veritas Volume Manager Administrator’s Guide* for a description of the possible plex and volume states.

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 procedures described in this chapter.

Figure 1-1 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*.)

Figure 1-1 Main plex state cycle

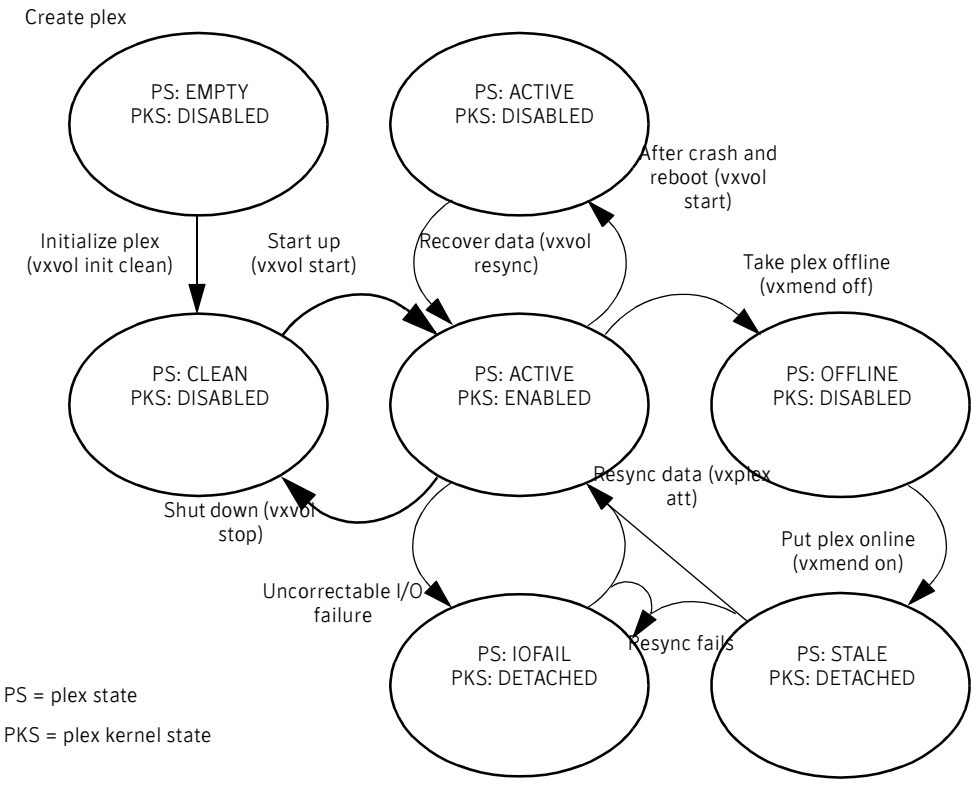


At system startup, volumes are started automatically and the `vxvol start` task makes all CLEAN plexes ACTIVE. At shutdown, the `vxvol stop` task marks all ACTIVE plexes CLEAN. If all plexes are initially CLEAN at startup, this indicates that a controlled shutdown occurred and optimizes the time taken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

Figure 1-2 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.

Figure 1-2 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.

"Recovering an unstartable mirrored volume" on page 11, and subsequent sections describe 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 15 and subsequent sections.

Recovering an unstartable 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 [-g diskgroup] fix clean plex
   ```

   For example, to place the plex vol01-02 in the CLEAN state:

   ```
   # vxmend -g mydg fix clean vol01-02
   ```

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 [-g diskgroup] fix stale plex
   ```

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

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

   For example, to recover volume vol01:

   ```
   # vxvol -g mydg start vol01
   ```

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.

Recovering an unstartable volume with a disabled plex in the RECOVER state

A plex is shown in the RECOVER state if its contents are out-of-date with respect to the volume. This can happen if a disk containing one or more of the plex's subdisks has been replaced or reattached. If a plex is shown as being in this state, it can be recovered as follows:

1. Use the following command to force the plex into the OFFLINE state:

   ```
   # vxmend [-g diskgroup] -o force off plex
   ```

2. Place the plex into the STALE state using this command:

   ```
   # vxmend [-g diskgroup] on plex
   ```

3. If there are other ACTIVE or CLEAN plexes in the volume, use the following command to reattach the plex to the volume:

   ```
   # vxplex [-g diskgroup] att plex volume
   ```

   If the volume is already enabled, resynchronization of the plex is started immediately.

   If there are no other clean plexes in the volume, use this command to make the plex DISABLED and CLEAN:

   ```
   # vxmend [-g diskgroup] fix clean plex
   ```

4. If the volume is not already enabled, use the following command to start it, and preform any resynchronization of the plexes in the background:

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

Note: If the data in the plex was corrupted, and the volume has no ACTIVE or CLEAN redundant plexes from which its contents can be resynchronized, it must be restored from a backup or from a snapshot image.

Forcibly restarting a disabled volume

If a disk failure caused a volume to be disabled, and the volume does not contain any valid redundant plexes, 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:

```
# vxvol [-g diskgroup] -o bg -f start volume
```

The `-f` option forcibly restarts the volume, and the `-o bg` option resynchronizes its plexes as a background task. For example, to restart the volume `myvol` so that it can be restored from backup, use the following command:

```
# vxvol -g mydg -o bg -f start myvol
```

Clearing the failing flag for a disk

If I/O errors are intermittent rather than persistent, Veritas Volume Manager sets the `failing` flag on a disk, rather than detaching the disk. Such errors can occur due to the temporary removal of a cable, controller faults, a partially faulty LUN in a disk array, or a disk with a few bad sectors or tracks.

If the hardware fault is not with the disk itself (for example, it is caused by problems with the controller or the cable path to the disk), you can use the `vxedit` command to unset the `failing` flag after correcting the source of the I/O error.

Caution: Do not unset the `failing` flag if the reason for the I/O errors is unknown. If the disk hardware truly is failing, and the flag is cleared, there is a risk of data loss.

To clear the `failing` flag on a disk:

1. Use the `vxdisk list` command to find out which disks are failing:

```
# vxdisk list
DEVICE       TYPE            DISK         GROUP      STATUS
sdp          auto:sliced     mydg01       mydg       online
sdq          auto:sliced     mydg02       mydg       online failing
sdr          auto:sliced     mydg03       mydg       online
. . .
```

2. Use the `vxedit set` command to clear the flag for each disk that is marked as `failing` (in this example, `mydg02`):

```
# vxedit set failing=off mydg02
```

3 Use the `vxdisk list` command to verify that the `failing` flag has been cleared:

```
# vxdisk list
DEVICE          TYPE            DISK        GROUP     STATUS
sdp             auto:sliced     mydg01      mydg      online
sdq             auto:sliced     mydg02      mydg      online
sdr             auto:sliced     mydg03      mydg      online
. . .
```

Reattaching failed disks

You can perform a reattach operation if a disk could not be found at system startup, 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 (such as a cable or controller fault), 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.

To reattach a failed disk:

1 Use the `vxdisk list` command to see which disks have failed, as shown in the following example:

```
# vxdisk list
DEVICE          TYPE            DISK        GROUP     STATUS
sdp             auto:sliced     mydg01      mydg      online
sdq             auto:sliced     mydg02      mydg      online
-               -               mydg03      mydg      failed was:
sdr
-               -               mydg04      mydg      failed was:
sds
```

2 Once the fault has been corrected, the disks can be reattached by using the following command to rescan the device list:

```
# /usr/sbin/vxdctl enable
```

3 Use the `vxreattach` command with no options to reattach the disks:

```
# /etc/vx/bin/vxreattach
```

After reattachment takes place, recovery may not be necessary unless a disk was faulty and had to be replaced. 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     DISKOFFS  LENGTH    [COL/]OFF   DEVICE      MODE
SV  NAME        PLEX      VOLNAME  NVOLLAYR  LENGTH    [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         sda         ENA
sd  disk02-01   r5vol-01disk02     0         102400    1/0         sdb         dS
sd  disk03-01   r5vol-01disk03     0         102400    2/0         sdc         ENA
pl  r5vol-02    r5vol     ENABLED  LOG       1440      CONCAT      -           RW
sd  disk04-01   r5vol-02disk04     0         1440      0           sdd         ENA
pl  r5vol-03    r5vol     ENABLED  LOG       1440      CONCAT      -           RW
sd  disk05-01   r5vol-03disk05     0         1440      0           sde         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.

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-02` has failed:

```
V   NAME        RVG/VSET/COKSTATE  STATE     LENGTH    READPOL     PREFPLEX    UTYPE
PL  NAME        VOLUME    KSTATE   STATE     LENGTH    LAYOUT      NCOL/WID    MODE
SD  NAME        PLEX      DISK     DISKOFFS  LENGTH    [COL/]OFF   DEVICE      MODE
SV  NAME        PLEX      VOLNAME  NVOLLAYR  LENGTH    [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         sda         ENA
sd  disk02-01   r5vol-01disk02     0         102400    1/0         sdb         ENA
sd  disk03-01   r5vol-01disk03     0         102400    2/0         sdc         ENA
pl  r5vol-02    r5vol     DISABLED BADLOG    1440      CONCAT      -           RW
sd  disk04-01   r5vol-02disk04     0         1440      0           sdd         ENA
pl  r5vol-03    r5vol     ENABLED  LOG       1440      CONCAT      -           RW
sd  disk05-01   r5vol-12disk05     0         1440      0           sde         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, go 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 21.

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.

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/COKSTATE  STATE     LENGTH    READPOL     PREFPLEX    UTYPE
PL  NAME        VOLUME    KSTATE   STATE     LENGTH    LAYOUT      NCOL/WID    MODE
SD  NAME        PLEX      DISK     DISKOFFS  LENGTH    [COL/]OFF   DEVICE      MODE
SV  NAME        PLEX      VOLNAME  NVOLLAYR  LENGTH    [COL/]OFF   AM/NM       MODE
...
v   r5vol       -         ENABLED  NEEDSYNC  204800    RAID        -           raid5
pl  r5vol-01    r5vol     ENABLED  ACTIVE    204800    RAID        3/16        RW
sd  disk01-01   r5vol-01disk01     0         102400    0/0         sda         ENA
sd  disk02-01   r5vol-01disk02     0         102400    1/0         sdb         dS
sd  disk03-01   r5vol-01disk03     0         102400    2/0         sdc         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 22, use the following command:

```
# vxvol -g mydg resync r5vol
```

Parity is regenerated by issuing `VOL_R5_RESYNC ioctls` 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 checkpt=`*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 -g mydg att r5vol r5vol-l1
```

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 22, use the following command:

```
# vxvol -g mydg recover r5vol disk05-00
```

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 -g mydg 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

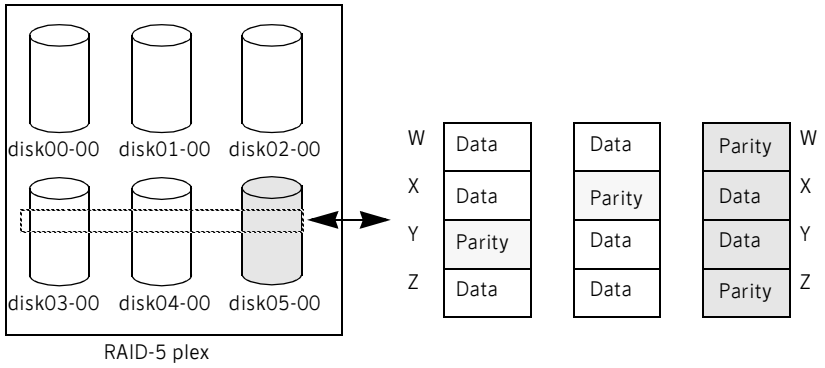
When this occurs, the `vxvol start` command returns the following error message:

```
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. Figure 1-3 illustrates a RAID-5 volume that has become invalid due to stale parity and a failed subdisk.

Figure 1-3 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 15 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 [-g diskgroup] 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           sdf            -           35521408   -         -
dm mydg02           sdg            -           35521408   -         -
dm mydg03           sdh            -           35521408   -         FAILING
dm mydg04           sdi            -           35521408   -         FAILING
dm mydg05           sdj            -           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, vol1_dcl, of the volume, vol1, has been detached and the state of vol1_dco has been set to BADLOG. For future reference, note the entries for the snap objects, vol1_snp and SNAP-vol1_snp, that point to vol1 and SNAP-vol1 respectively.

You can use such output to deduce the name of a volume's DCO (in this example, vol1_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 vol1_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 vol1_dco
```

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

- "Recovering a version 0 DCO" on page 27
- "Recovering a version 20 DCO" on page 28

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 vol1_dco
   ```

   The entry for `vol1_dco` in the output from `vxprint` now looks like this:

   ```
   dc vol1_dco    vol1      -       -     -   -
   ```

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 vol1_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 vol1 SNAP-vol1_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 `vxdg 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
```

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=yes|no|sequential] \
  [storage_attribute ...]
```

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

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

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.

Chapter 2

Recovery from failure of instant snapshot operations

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 `tutil0` field:

   ```
   # vxmend [-g diskgroup] clear tutil0 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, 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 tutil0 field:
   ```
   # vxmend [-g diskgroup] clear tutil0 volume
   ```
2. Use the vxsnap command to dissociate the volume from the snapshot hierarchy:
   ```
   # vxsnap [-g diskgroup] dis volume
   ```
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=yes|no|sequential] \
     [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 28.

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

Chapter 3

Recovery from boot disk failure

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.

For information about recovering volumes and their data on disks other than boot disks, see "Recovery from hardware failure" on page 7.

Note: Rootability, which brings the root disk under Veritas Volume Manager control, is supported in this release of VxVM.

Possible root disk configurations

It is possible to set up a variety of configurations for the `root` (`/`) file system and other critical file systems that are used by the operating system (such as `/usr`), and for the swap area. Using the `/usr` file system as an example, the following three 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 when the root disk is encapsulated.
- `/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.

Note: For maximum availability of the system, it is recommended that you encapsulate both the `root` disk and any other disks that contain other critical file systems, and create mirrors for these volumes and for the swap area.

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 other 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. 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.

The boot process

On a system with an encapsulated root disk, VxVM uses `initrd` to load VxVM modules and to start the system volumes on the root disk. For more information about `initrd`, refer to the `initrd`(4) manual page.

VxVM boot disk recovery

If there is a failure to boot from the VxVM boot disk on Linux, use one of the following methods to recover. The method you choose depends on the type of failure:

- Failed boot disk
- Failed boot disk mirror
- Accidental use of the -R, fallback or lock option with LILO
- Missing or corrupted master boot record
- Missing or corrupted /etc/fstab file
- Missing or corrupted /etc/vx/volboot file

If these methods fail, use the procedures described in "Recovery by reinstallation" on page 49.

Failed boot disk

Caution: Only use the procedures in the following sections if your root disk has gone bad. VxVM automatically tries to synchronize the contents of the root disk and its mirrors. If the procedures are used when the root disk is still good, this can cause data corruption when VxVM is restarted as it does not know which disk contains valid data.

- *Description:* If the boot disk fails at boot time, the system BIOS displays vendor-specific warning messages.
  The system can automatically boot from a mirror of the root disk under the following conditions:
  - The geometry of the mirror disk must be the same as that of the root disk.
  - The mirror disk must have a suitable GRUB or LILO master boot record (MBR) configured on track 0. See "Missing or corrupted master boot record" on page 46 for details of how to set up an MBR.

  If no root disk mirror is available, follow the procedure given in "Recovery by reinstallation" on page 49.
- *Action:* Use the `vxprint -d` command to confirm that the root disk has failed:

```
# vxprint -d
TY NAME         ASSOC   KSTATE    LENGTH      PLOFFS    STATE       TUTIL0    PUTIL0
dm rootdisk     -       -         -           -         NODEVICE    -         -
dm rootmir      sdb     -         164504997   -         -           -         -
```

  In this example, the boot disk, `rootdisk`, is shown with the state `NODEVICE`.
  The methods to recover the root disk depend on the circumstances of the failure, and are described in the following sections:
  - "Disconnected root disk" on page 37
  - "Failed root disk" on page 38

Disconnected root disk

If the disk media has not failed, but the root disk has become disconnected:

1. Shut down the system, and then power it down.
2. Reconnect the disk.
3. Power up the system, but do not allow it to reboot. Instead, enter the system's BIOS settings mode (this is usually achieved by pressing a key such as `Esc`, `F2` or `F12` on the console keyboard). Verify in the BIOS settings that

the system is set to boot from the root disk (in this example, `sda`). Otherwise the system may not be bootable.

4. Reboot the system, selecting `vxvm_root` at the GRUB or LILO boot prompt as appropriate.

5. Use the `vxprint -d` command to confirm that the disk is now active:

```
# vxprint -d
TY NAME         ASSOC   KSTATE    LENGTH      PLOFFS    STATE   TUTIL0  PUTIL0
dm rootdisk     sda     -         16450497    -         -       -       -
dm rootmir      sdb     -         16450497    -         -       -       -
```

6. Use the `vxprint -p` command to view the state of the plexes. One or more of the plexes on the mirror disk are shown with the state STALE until their contents are recovered. You can use the `vxtask` command to monitor how the recovery and reattachment of the stale plexes is progressing, as shown in this example:

```
# vxtask list
TASKID    PTID    TYPE/STATE      PCT       PROGRESS
160               PARENT/R          0.00%     2/0(1) VXRECOVER
161       161     ATCOPY/R      41.78%    0/12337857/5155232 PLXATT mirrootvol rootvol
```

Failed root disk

If the disk media has failed, there are two methods for replacing the failed disk:

- Replace the failed disk with the root mirror disk, replace the root mirror disk with a new disk, and restore the contents of the root mirror disk from the new root disk. This is the simplest method, but it requires that you are able to reconfigure the root mirror disk to appear to the operating system as the original root disk (for example, by physically moving the disk to a different slot). This method is described in “Substituting a root mirror disk for a failed root disk” on page 38.
- Replace the failed root disk, and recreate its contents from the root mirror disk. This method is more complicated, but it does not require you to alter the configuration of the root mirror disk. This method is described in “Replacing a failed root disk” on page 41.

Substituting a root mirror disk for a failed root disk

To replace a failed root disk with a root disk mirror:

1. Use the `vxplex` command to remove the plex records that were on the failed disk:

```
# vxplex -g bootdg -o rm dis rootvol-01 swapvol-01
```

Note: This example removes the plexes `rootvol-01`, and `swapvol-01` that are configured on the mirror disk. You may need to modify the list of plexes according to your system configuration.

2 Shut down the system, and then power it down.

3 Remove the failed root disk (in this example, `sda`).

4 Reconfigure the root disk mirror (in this example, (`sdb`) to appear to the system as the original root disk (`sda`). This may require you to change settings on the drive itself, and to relocate the root disk mirror in the same physical slot as was occupied by the original root disk. Consult your system documentation for more information.

5 Configure a disk of the same or larger capacity as the failed root disk as a replacement for the root mirror disk (`sdb`). It should occupy the same slot that was vacated in step 4 if this is necessary for the system to see it as the same disk.

6 Power up the system, and boot it from Linux installation CD number 1.

7 On a Red Hat system, run the following command at the boot prompt to put the system in rescue mode:

```
boot: linux rescue
```

On a SUSE system, choose the **Rescue** option from the menu.

Log in as `root`, select your language and keyboard, and choose to skip finding your installation.

8 Use the `fdisk` command to ensure that the new root disk (`sda`) and the replacement disk (`sdb`) have the same geometry:

```
# fdisk -l /dev/sda
# fdisk -l /dev/sdb
```

See the `fdisk`(8) manual page for details.

9 If the replacement disk already contains a VxVM private region, use the `fdisk` command to change the partition type for the private region partition to a value other than `7f`.

```
# fdisk /dev/sdb
```

10 Make a temporary mount point, `/vxvm`, and mount the `root` partition on it:

```
# mkdir /vxvm
# mount -t ext3 /dev/sda1 /vxvm
```

Note: In this example, the `root` partition is `/dev/sda1`, and the `root` file system type is `ext3`. You may need to modify this command according to your system configuration. For example, the `root` file system may be configured as a `reiserfs` file system.

11 If the disk has a separate boot partition, mount this on /vxvm/boot:

```
# mount -t ext3 /dev/sda2 /vxvm/boot
```

Note: In this example, the boot partition is /dev/sda2, and the boot file system type is ext3. You may need to modify this command according to your system configuration.

12 Ensure that the device for the new root disk (in this example, sda) is defined correctly in the boot loader configuration file.

- For the GRUB boot loader:
  Check that the contents of the GRUB configuration file (/vxvm/boot/grub/menu.lst or /vxvm/etc/grub.conf as appropriate) are correct, and use the grub command to install the master boot record (MBR) in case it has been corrupted:

```
# /vxvm/sbin/grub
grub> root (hd0,1)
grub> setup (hd0)
grub> quit
```

  Here /boot is assumed to be on partition 2.
- For the LILO boot loader:
  Check that the contents of the /vxvm/etc/lilo.conf file are correct, and use the lilo command to recreate the master boot record (MBR) in case it has been corrupted:

```
# /vxvm/sbin/lilo -r /vxvm
```

Note: In these examples, the MBR is written to /dev/sda. You may need to modify the command according to your system configuration.

13 Unmount the partitions, run sync, and then exit the rescue shell:

```
# cd /
# umount /vxvm/boot
# umount /vxvm
# sync
# exit
```

14 Shut down and power cycle the system. Enter the system's BIOS settings mode (this is usually achieved by pressing a key such as Esc, F2 or F12 on the console keyboard). Verify in the BIOS settings that the system is set to boot from the new root disk (in this example, sda). Otherwise the system may not be bootable.

15 Reboot the system, selecting vxvm_root at the GRUB or LILO boot prompt as appropriate.

16 Run the following command to mirror the volumes from the new root disk onto the replacement disk:

```
# /etc/vx/bin/vxrootmir sdb rootdisk
```

Note: This example assumes that the disk media name of the replacement disk is `sdb`. You may need to modify this name according to your system configuration.

Replacing a failed root disk

1 Use the `vxplex` command to remove the plex records that were on the failed disk:

```
# vxplex -g bootdg -o rm dis rootvol-01 swapvol-01
```

Note: This example removes the plexes `rootvol-01`, and `swapvol-01` that are configured on the mirror disk. You may need to modify the list of plexes according to your system configuration.

2 Shut down the system, and then power it down.

3 Replace the failed disk with a disk of the same or larger capacity.

4 Power up the system, and boot it from Linux installation CD number 1.

5 On a Red Hat system, run the following command at the boot prompt to put the system in rescue mode:

```
boot: linux rescue
```

On a SUSE system, choose the **Rescue** option from the menu.

Log in as `root`, select your language and keyboard, and choose to skip finding your installation.

6 Use the `fdisk` command to ensure that the root mirror disk (`sdb`) and the replacement root disk (`sda`) have the same geometry:

```
# fdisk -l /dev/sdb
# fdisk -l /dev/sda
```

See the `fdisk`(8) manual page for details.

7 If the replacement disk already contains a VxVM private region, use the `fdisk` command to change the partition type for the private region partition to a value other than `7f`.

```
# fdisk /dev/sda
```

8 Make a temporary mount point, `/vxvm`, and mount the `root` partition on it:

```
# mkdir /vxvm
# mount -t ext3 /dev/sdb1 /vxvm
```

Note: In this example, the mirror of the `root` partition is `/dev/sdb1`, and the `root` file system type is `ext3`. You may need to modify this command according to your system configuration. For example, the `root` file system may be configured as a `reiserfs` file system.

9 If the disk has a separate `boot` partition, mount this on `/vxvm/boot`:

```
# mount -t ext3 /dev/sdb2 /vxvm/boot
```

Note: In this example, the mirror of the `boot` partition is `/dev/sdb2`, and the `boot` file system type is `ext3`. You may need to modify this command according to your system configuration.

10 Install the master boot record (MBR) on the replacement disk (in this example, `sda`).

- For the GRUB boot loader:
  Create a backup copy of the GRUB configuration file (`/vxvm/boot/grub/menu.lst` or `/vxvm/etc/grub.conf` as appropriate), for example:

  ```
  # cp /vxvm/etc/grub.conf /vxvm/etc/grub.conf.b4repldisk
  ```

  Run the `sync` command:

  ```
  # sync
  ```

  In the configuration file, change all occurrences of `sda` to `sdb`, *except* for the `boot=` statement.
  In the configuration file, change all occurrences of `hd0` to `hd1`.
  After saving your changes to the configuration file, run the following commands to install the boot loader:

  ```
  # /vxvm/sbin/grub
  grub> root (hd1,1)
  grub> setup (hd0)
  grub> quit
  ```

- For the LILO boot loader:
  Create a backup copy of the LILO configuration file, for example:

  ```
  # cp /vxvm/etc/lilo.conf /vxvm/etc/lilo.conf.b4repldisk
  ```

  Run the `sync` command:

  ```
  # sync
  ```

  In the configuration file, change all occurrences of `sda` to `sdb`, except for the `boot=` statement.
  In the configuration file, add a `root=` statement to the boot entries where this is missing. This statement specifies the device that is to be mounted as root, for example, `/dev/sdb1`. The following example is for the `vxvm_root` entry:

  ```
  image=/boot/vmlinuz-2.4.21-4.ELsmp
  ```

```
label=vxvm_root
initrd=/boot/VxVM_initrd.img
root=/dev/sdb1
```

After saving your changes to the configuration file, run the following command to install the boot loader:

```
# /vxvm/sbin/lilo -r /vxvm
```

11 Unmount the partitions, run `sync`, and then exit the rescue shell:

```
# cd /
# umount /vxvm/boot
# umount /vxvm
# sync
# exit
```

12 Shut down and power cycle the system. Enter the system's BIOS settings mode (this is usually achieved by pressing a key such as `Esc`, `F2` or `F12` on the console keyboard). Verify in the BIOS settings that the system is set to boot from the new root disk (in this example, `sdb`). Otherwise the system may not be bootable.

13 Reboot the system, selecting `vxvm_root` at the GRUB or LILO boot prompt as appropriate.

14 Run the following command to mirror the volumes from the root mirror disk onto the replacement disk:

```
# /etc/vx/bin/vxrootmir sda rootdisk
```

Note: This example assumes that the disk media name of the replacement root disk is `sda`. You may need to modify this name according to your system configuration.

---

15 Restore the contents of the boot loader configuration file, and recreate the original MBR on the root disk (in this example, `sda`).

- For the GRUB boot loader:

  Restore the original boot loader configuration file:

  ```
  # mv /etc/grub.conf.b4repldisk /etc/grub.conf
  ```

  Run the `sync` command:

  ```
  # sync
  ```

  Run the following commands to recreate the boot loader:

  ```
  # /sbin/grub
  grub> root (hd0,1)
  grub> setup --stage2=/boot/grub/stage2 (hd0)
  grub> quit
  ```

- For the LILO boot loader:

  Restore the original boot loader configuration file:

  ```
  # mv /etc/lilo.conf.b4repldisk /etc/lilo.conf
  ```

Run the `sync` command:

```
# sync
```

Run the following command to recreate the boot loader:

```
# /sbin/lilo
```

Failed boot disk mirror

Messages such as the following may be displayed while booting from the primary boot disk if a mirror of the boot disk fails:

```
Starting rootvol, swapvol...
VxVM vxconfigd WARNING V-5-1-122 Detaching plex mirrootvol-01 from
volume rootvol
VxVM vxconfigd WARNING V-5-1-122 Detaching plex mirswapvol-01 from
volume swapvol
VxVM vxconfigd WARNING V-5-1-546 Disk rootmir in group bootdg: Disk
device not found
```

- *Description:* Failure of a mirror of the root disk is discovered at boot time when the volumes on the root disk are started. To maintain the integrity of your system, replace the failed disk at the earliest possible opportunity.
- *Action:* Use the `vxprint -d` command to confirm that the root disk mirror has failed:

```
# vxprint -d
TY NAME         ASSOC     KSTATE    LENGTH      PLOFFS    STATE       TUTIL0  PUTIL0
dm rootdisk     sda       -         16450497    -         -           -       -
dm rootmir      -         -         -           -         NODEVICE    -       -
```

In this example, the boot disk mirror, `rootmir`, is shown with the state `NODEVICE`.

- If the disk media has not failed, but the mirror has become disconnected:

  1. Shut down the system, and then power it down.
  2. Reconnect the disk.
  3. Power up the system, and select `vxvm_root` at the GRUB or LILO boot prompt.
  4. Use the `vxprint -d` command to confirm that the disk is now active:

```
# vxprint -d
TY NAME         ASSOC    KSTATE    LENGTH      PLOFFS    STATE    TUTIL0  PUTIL0
dm rootdisk     sda      -         16450497    -         -        -       -
dm rootmir      sdb      -         16450497    -         -        -       -
```

  e. Use the `vxprint -p` command to view the state of the plexes. One or more of the plexes on the mirror disk are shown with the state STALE until their contents are recovered. You can use the `vxtask` command to

monitor how the recovery and reattachment of the stale plexes is progressing, as shown in this example:

```
# vxtask list
TASKID    PTID    TYPE/STATE      PCT       PROGRESS
160               PARENT/R        0.00%     2/0(1) VXRECOVER
161       161     ATCOPY/R        41.78%    0/12337857/5155232 PLXATT rootvol mirrootvol
```

6 Use the `vxplex` command to remove the plex records that were on the failed disk:

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

Note: This example removes the plexes `mirrootvol-01`, and `mirswapvol-01` that are configured on the mirror disk. You may need to modify the list of plexes according to your system configuration.

7 Shut down the system, and then power it down.

8 Replace the failed disk with a disk of the same or larger capacity.

9 Power up the system, and select `vxvm_root` at the GRUB or LILO boot prompt.

10 Use the `fdisk` command to ensure that the root disk and the replacement mirror disk have the same geometry. See the `fdisk`(8) manual page for details.

11 Run the following command to mirror the volumes on root disk onto the replacement disk:

```
# /etc/vx/bin/vxrootmir sdb rootmir
```

Note: This example assumes that the disk media name of the replacement mirror disk is `sdb`. You may need to modify this name according to your system configuration.

Accidental use of the -R, fallback or lock option with LILO

- *Description:* If you use the `-R`, `fallback` or `lock` options with the `lilo` command, this can corrupt the master boot record (MBR) on the root disk. Corruption of the MBR causes the system to fail to boot, and usually to stop at the LILO prompt. (The portion of the LILO prompt that is displayed can be used in diagnosing the problem, as described in the LILO reference manual.)
- *Action:* Use the recovery procedure described in the section, "Missing or corrupted master boot record" on page 46.

Missing or corrupted master boot record

- *Description:* The system may fail to boot if the master boot record (MBR) on track 0 of the root disk is missing or corrupted. Corruption of the MBR causes the system to fail to boot, and usually to stop at the GRUB or LILO prompt.
  - GRUB outputs an error message in the form `Error` *`number`* and then halts. See the GRUB reference manual for help in interpreting this error.
  - The portion of the LILO prompt that is displayed can be used in diagnosing the problem, as described in the LILO reference manual.
- *Action:* Follow these steps to recreate the MBR on the root disk:

  1 Power up the system and boot it from Linux installation CD number 1.

  2 On a Red Hat system, run the following command at the boot prompt to put the system in rescue mode:

  ```
  boot: linux rescue
  ```

  On a SUSE system, choose the **Rescue** option from the menu.

  Log in as `root`, select your language and keyboard, and choose to skip finding your installation.

  3 Make a temporary mount point, `/vxvm`, and mount the `root` partition on it:

  ```
  # mkdir /vxvm
  # mount -t ext3 /dev/sda1 /vxvm
  ```

  Note: In this example, the `root` partition is `/dev/sda1`, and the `root` file system type is `ext3`. You may need to modify this command according to your system configuration. For example, the `root` file system may be configured as a `reiserfs` file system.

  4 If the disk has a separate `boot` partition, mount this on `/vxvm/boot`:

  ```
  # mount -t ext3 /dev/sda2 /vxvm/boot
  ```

  Note: In this example, the `boot` partition is `/dev/sda2`, and the `boot` file system type is `ext3`. You may need to modify this command according to your system configuration.

  5 Recreate the master boot record (MBR) on the root disk.

  - For the GRUB boot loader:
    Check that the contents of the GRUB configuration file (`/vxvm/boot/grub/menu.lst` or `/vxvm/etc/grub.conf` as

appropriate) are correct, and use the `grub` command to recreate the MBR on the disk (here `/boot` is assumed to be on partition 2):

```
# /vxvm/sbin/grub
grub> root (hd0,1)
grub> setup (hd0)
grub> quit
```

- For the LILO boot loader:
  Check that the contents of the `/vxvm/etc/lilo.conf` file are correct, and use the `lilo` command to recreate the MBR on the replacement disk:

```
# /vxvm/sbin/lilo -r /vxvm
```

Note: In these examples, the `MBR` is written to `/dev/sda`. You may need to modify the commands according to your system configuration.

6. Unmount the partitions, run `sync`, and then exit the rescue shell:

```
# cd /
# umount /vxvm/boot
# umount /vxvm
# sync
# exit
```

7. Reboot the system from the disk with the reconstructed MBR, and select `vxvm_root` at the GRUB or LILO boot prompt.

Missing or corrupted /etc/fstab file

The following messages may be displayed at boot time if the `/etc/fstab` file is missing or corrupted:

```
WARNING: Couldn't open /etc/fstab: No such file or direcctory
WARNING: bad format on line # of /etc/fstab
```

- *Description:* The `/etc/fstab` file is missing or its contents have become corrupted. This prevents some or all file systems from being mounted successfully.
- *Action:* If maintenance mode is available, perform these steps:

1. Log in under maintenance mode.
2. Remount the `root` file system in read-write mode (an `ext3` type root file system is assumed in this example; modify as appropriate):

```
# mount -t ext3 -o remount,rw /dev/vx/dsk/rootvol /
```

3. Restore the `/etc/fstab` file from a recent backup, or correct its contents by editing the file.
4. Reboot the system.

Missing or corrupted /etc/vx/volboot file

The following message may be displayed at boot time if the `/etc/vx/volboot` file is missing or corrupted:

VxVM vxconfigd ERROR V-5-1-1589 enable failed: Volboot file not loaded transactions are disabled.

```
VxVM vxconfigd ERROR V-5-2-573 Vold is not enabled for transactions
no volumes started
```

- *Description:* During system bootup, the VxVM configuration daemon reads the file `/etc/vx/volboot`. If that file is missing or corrupted, the configuration daemon fails and aborts the boot sequence.
- *Action:* If a recent backup of the /etc/vx/volboot file is available, use that copy to restore the file, and then reboot. If a backup is not available, the following example procedure shows the sequence of commands that you can use to recreate the `/etc/vx/volboot` file. Replace the disk access name (`sda`) for the VxVM root disk, host ID (`diego`) and private region offset (`2144`) in the example with the values that are appropriate to your system.

  1. Put the system into maintenance mode.
  2. Run vxconfigd in disabled mode:

     ```
     # vxconfigd -m disable
     ```

  3. Reinitialize the `volboot` file:

     ```
     # vxdctl init diego
     # vxdctl add disk sda privoffset=2144
     ```

  4. Reset `vxconfigd` in boot mode:

     ```
     # vxconfigd -kr reset -m boot
     ```

  5. Use the following command to confirm that VxVM is running:

     ```
     # vxdisk list
     DEVICE       TYPE         DISK          GROUP     STATUS
     sda          sliced       rootdisk      bootdg    online
     sdb          sliced       rootmir       bootdg    online
     sdc          sliced       -             -         error
     ```

  6. Reboot the system.

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. On a Linux system, first use the recovery methods described in "VxVM boot disk recovery" on page 36. Follow the procedures below only if those methods fail.

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, 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 50.
   Replace any failed disks or other hardware, and detach any disks not involved in the reinstallation.
2. "Reinstall the operating system" on page 50.
   Reinstall the base system and any other packages that are not related to Veritas software.
3. "Reinstall the Veritas software" on page 51.
   Load the Veritas packages, but do *not* execute the `vxinstall` command. You are required to re-enter the software license keys.
4. "Recover the Veritas Volume Manager configuration" on page 51.
5. "Clean up the system configuration" on page 52.
   Restore any information in volumes affected by the failure or reinstallation, and recreate system volumes (`rootvol`, `swapvol`, `usr`, and other system volumes).

Prepare the system for reinstallation

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

Note: 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 from the system prior to reinstalling the operating system.

Disconnecting the other disks ensures that they are unaffected by the reinstallation. For example, if the operating system was originally installed with a `home` file system on the second disk, it can still be recoverable. Removing the second disk ensures 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 any Veritas software.

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 the Veritas software

To reinstall the Veritas software, follow the instructions in the *Installation Guide*. During the installation, you are prompted to enter the Veritas software license keys.

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.

Recover the Veritas Volume Manager configuration

Once the Veritas Volume Manager packages have been loaded, and you have installed the software licenses, recover the Veritas Volume Manager configuration using the following procedure:

1. Shut down the system.
2. Reattach the disks that were removed from the system.
3. Reboot the system.

The configuration preserved on the disks not involved with the reinstallation will now be recovered. As 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 (and other disks containing critical file systems) was previously under VxVM control, any volumes or mirrors on that disk (or on 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. In addition, the system `root` file system, `swap` area, and other related critical file systems are no longer located on volumes. To correct these problems, follow the instructions in "Clean up the system configuration" on page 52.

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 volumes
- Clean up Disk Configuration
- Final Volume Reconfiguration

Clean up volumes

After recovering the VxVM configuration, you must determine which volumes need to be restored from backup because a complete copy of their data is not present on the recovered disks. Such volumes are invalid and must be removed, recreated, and restored from backup. If a complete copy of a volume's data is available, it can be repaired by the hot-relocation feature provided that this is enabled and there is sufficient spare disk space in the disk group.

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
sdb       simple      -           -            error
sdc       simple      disk02      bootdg       online
sdd       simple      disk03      bootdg       online
-         -           disk01      bootdg       failed was:sdb
```

Note: Your system may use device names that differ from the examples. For more information on device names, see the chapter "Administering Disks" in the *Veritas Volume Manager Administrator's Guide*.

The display shows that the reinstalled root device, `sdb`, 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 (`sdc` and `sdd`). The former `disk01`,

which was the VM disk associated with the replaced disk device, is no longer associated with the device (sdb).

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 -sF "%vname" -e'sd_disk = "disk"'
```

where *disk* is the 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.

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        USETYPE   KSTATE    STATE     LENGTH    READPOL     PREFPLEX
PL    NAME        VOLUME    KSTATE    STATE     LENGTH    LAYOUT      NCOL/WID  MODE
SD    NAME        PLEX      DISK      DISKOFFS  LENGTH    [COL/]OFF   DEVICE    MODE

v     v01         fsgen     DISABLED  ACTIVE    24000     SELECT      -
pl    v01-01      v01       DISABLED  NODEVICE  24000     CONCAT      -         RW
sd    disk01-06   v0101     disk01    245759    24000     0           sdg       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:

```
V    NAME      USETYPE   KSTATE    STATE     LENGTH    READPOL     PREFPLEX
PL   NAME      VOLUME    KSTATE    STATE     LENGTH    LAYOUT      NCOL/WID  MODE
SD   NAME      PLEX      DISK      DISKOFFS  LENGTH    [COL/]OFF   DEVICE    MODE

v    v02       fsgen     DISABLED  ACTIVE    30720     SELECT      v02-01
pl   v02-01    v02       DISABLED  NODEVICE  30720     STRIPE      3/128     RW
sd   disk02-02v02-01     disk01    424144    10240     0/0         sdi       ENA
sd   disk01-05v02-01     disk01    620544    10240     1/0         sdj       DIS
sd   disk03-01v02-01     disk03    620544    10240     2/0         sdk       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 may also have other mirrors on disks that are still valid. In this case, the volume does not need to be restored from backup, since all the data is still available, and recovery can usually be handled by the hot-relocation feature provided that this is enabled.
If hot-relocation is disabled, you can recover the mirror manually. In this example, the vxprint -th command for a volume with one plex on a failed disk (disk01) and another plex on a valid disk (disk02) produces the following output:

```
V    NAME        USETYPE   KSTATE    STATE     LENGTH    READPOL     PREFPLEX
PL   NAME        VOLUME    KSTATE    STATE     LENGTH    LAYOUT      NCOL/WID  MODE
SD   NAME        PLEX      DISK      DISKOFFS  LENGTH    [COL/]OFF   DEVICE    MODE

v    v03         fsgen     DISABLED  ACTIVE    0720      SELECT      -
pl   v03-01      v03       DISABLED  ACTIVE    30720     CONCAT      -         RW
sd   disk02-01 v03-01      disk01    620544    30720     0           sdl       ENA
pl   v03-02      v03       DISABLED  NODEVICE  30720     CONCAT      -         RW
sd   disk01-04 v03-02      disk03    262144    30720     0           sdm       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 55.

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 52 until all invalid volumes and mirrors are removed.

Final Volume Reconfiguration

Once the root disk is under VxVM control, any other disks that were replaced should be added using the vxdiskadm command.

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.

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

```
# 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.

Chapter 4

Logging commands and transactions

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 69.

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`:

Table 4-1 Examples of vxcmdlog usage

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

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_4
# 26924, 3001, Thu Feb 13 19:30:57 2003
    /usr/sbin/vxdisk list Disk_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 60 and "Associating command and transaction logs" on page 62 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`:

Table 4-2 Examples of vxtranslog usage

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

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:

```
Fri Oct 17 13:23:30 2003
Clid = 23460, PID = 21240, Part = 0, Status = 0, Abort Reason = 0
        DA_GET   Disk_0
        DISK_GET_ATTRS  Disk_0
        DISK_DISK_OP  Disk_0 8
        DEVNO_GET   Disk_0
        DANAME_GET   0x160045 0x160072
        GET_ARRAYNAME  Disk DISKS
        CTLR_PTOLNAME  11-08-01
        GET_ARRAYNAME  Disk DISKS
        CTLR_PTOLNAME  21-08-01
        DROPPED  <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 57 and "Associating command and transaction logs" on page 62 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 `vxdg 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.

Chapter 5

Backing up and restoring disk group configurations

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
```

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:

Table 5-1 Files that record disk group configuration

Backup files	Description
`/etc/vx/cbr/bk/`*diskgroup.dgid*`/`*dgid*`.dginfo`	Disk group information.
`/etc/vx/cbr/bk/`*diskgroup.dgid*`/`*dgid* `.diskinfo`	Disk attributes.
`/etc/vx/cbr/bk/`*diskgroup.dgid*`/`*dgid* `.binconfig`	Binary configuration copy.
`/etc/vx/cbr/bk/`*diskgroup.dgid*`/`*dgid*`.cfgrec`	Configuration records in `vxprint -m` 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 64 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}
```

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.

Chapter 6

Error messages

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 57 for more information.

Logging error messages

VxVM provides the option of logging debug messages 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). If enabled, the default debug log file is /etc/vx/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. Debug message logging is disabled by default.

If syslog output is enabled, messages with a priority higher than Debug are written to /var/log/messages.

To enable logging of debug output to the default debug log file, /etc/vx/vxconfigd.log, edit the startup script for vxconfigd as described in "Configuring logging in the startup script" on page 70, or use the following command:

```
# vxdctl debug level [pathname]
```

There are 10 possible levels of debug logging with the values 0 through 9. Level 1 provides the least detail, and 9 the most. Level 0 turns off logging. If a path name is specified, this file is used to record the debug output instead of the default debug log file. If the vxdctl debug command is used, the new debug logging level and debug log file remain in effect until the VxVM configuration daemon, vxconfigd, is next restarted.

Configuring logging in the startup script

To enable log file or syslog logging on a permanent basis, you can edit the following portion of the /etc/vx/vxvm-startup 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 `vxdmp`, 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
```

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 specifiedVeritas 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.

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-5-0-106

`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.

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 vxdmp 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 `vxdctl`(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 `vxdctl 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.

  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 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.

V-5-0-244

`VxVM vxdmp 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-5-0-386

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.

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.

V-5-1-91

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 /bin/rm to remove directory: *reason*

- *Description:* The given directory could not be removed because the `/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 `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 `rm` utility is missing, or is not in the `/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 69.

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.

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. 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 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 65, and the contents of any volumes restored from a backup.

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.
- *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.
- *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.

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 *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/fstab:` *reason*

- *Description:* `vxconfigd` could not open the `/etc/fstab` file, for the reason given. The `/etc/fstab` 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 35.

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.

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 `vxdg -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 `vxdg -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 `vxdg -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 `vxdg -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.

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 `vxdctl 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 `vxdctl hostid` again. If it still results in an error, contact Veritas Technical Support.

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 `vxdctl 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 `vxdg 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 65, 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 `vxdg`(1M) manual page for information on how to use the `import` operation to rename a disk group.

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 65

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 65.

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
```

Caution: Be careful when using the `vxdisk clearimport` or `vxdg -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:

```
# vxdg -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. This can cause the disk group configuration to become inconsistent.

As using the `-f` option to force the import of an incomplete disk group counts as a successful import, an incomplete disk group may be imported subsequently without this option being specified. This may not be what you expect.

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 `vxdg reminor` command to renumber all volumes in the offending disk group permanently. See the `vxdg`(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/fstab` 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/fstab` file. Change the file to use a direct partition for the file system. There should be a comment in the `/etc/fstab` 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-5-1-809

`VxVM vxplex ERROR V-5-1-809 Plex` *plex* `in volume` *volume* `is locked by another utility.`

- *Description:* The `vxplex` command fails because a previous operation to attach a plex did not complete. The `vxprint` command should show that one or both of the temporary and persistent utility fields (`TUTIL0` and `PUTIL0`) of the volume and one of its plexes are set.
- *Action:* If the `vxtask list` command does not show a task running for the volume, use the `vxmend` command to clear the `TUTIL0` and `PUTIL0` fields for the volume and all its components for which these fields are set:

  ```
  # vxmend -g diskgroup clear all volume plex ...
  ```

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.

V-5-1-1063

`VxVM vxconfigd ERROR V-5-1-1063 There is no volume configured for the root device`

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.

A possible cause of this error is that 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 (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: Either boot with all drives in the offending version of `the` boot disk group turned off, or import and rename (see `vxdg`(1M)) the offending boot disk group from another host. In you turn off drives, run the following command after booting:

```
# vxdg 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/fstab` 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 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/fstab` 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 `vxdg`(1M)) the offending boot disk group from another host. If you turn off drives, run the following command after booting:

  ```
  # vxdg 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 `vxdctl 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 `vxdctl enable`.

  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.
- *Action:* If the `root` file system is full, increase its size or remove files to make space for the `tempdb` file.

  If `/var` is a separate file system, make sure that it has an entry in `/etc/fstab`. 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 `vxdctl 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 65.

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.

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 vxdctl disable and vxdctl 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:

  1. 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.
  2. 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`.

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-5-1-2860

`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 24. 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.

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 `vxdg -n` *`newname`* `import` *`diskgroup`* operation to rename either the shared disk group on the master, or the private disk group on the slave.

V-5-1-2928

`VxVM vxdg 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 vxdg 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-5-1-2935

`VxVM vxassist ERROR V-5-1-2935 No more space in disk group configuration.`

- *Description:* There is no more space in the disk group's configuration database for VxVM object records.
- *Action:* Copy the contents of several volumes to another disk group and then delete the volumes from this disk group, or use the disk group split/join feature to move the volumes to another disk group. To avoid the problem in the future, do not create more than a few hundred volumes in a disk group, or specify a larger size for the private region when adding disks to a new disk group.

V-5-1-3009

`VxVM vxdg 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.

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 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 `vxdg reminor` (see the `vxdg`(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 an internal VxVM error.
- *Action:* Contact Veritas Technical Support.

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 `vxdctl 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 vxdmpadm 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 `vxdmpadm 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 as shown in the `vxdmpadm`(1M) manual page.

V-5-1-3362

```
VxVM vxdmpadm 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 `vxdctl 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 the `vxdctl protocolversion` command. The `volboot` file should contain a supported protocol version before trying to bring the node into the cluster. Run `vxdctl 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 24 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 "Adding a Version 0 DCO and DCO Volume" in the chapter "Administering Volume Snapshots" of the *Veritas Volume Manager Administrator's Guide*.

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 `vxdg recover` command may be required to clean the disk group to be imported. See "Recovering from incomplete disk group moves" on page 24 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.

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:* VxVM has detected disks with duplicate disk identifiers. Arrays with mirroring capability in hardware are particularly susceptible to such data corruption, but other causes are possible as explained below.

  In releases prior to 3.5, VxVM selected the first disk that it found if the selection process failed. From release 3.5, the default behavior of VxVM was to avoid the selection of the wrong disk as this could lead to data corruption. If VxVM could not determine which disk was the original, it would not import the disks until they were reinitialized with a new disk ID.

  From release 5.0, VxVM checks the unique disk identifier (UDID) value that is known to the Device Discovery Layer (DDL) against the UDID value that is set in the disk's private region. The `udid_mismatch` flag is set on the disk if the values differ. If set, this flag is displayed in the output from the `vxdisk list` command.

  A new set of `vxdisk` and `vxdg` operations are provided to handle such disks; either by either writing the DDL value of the UDID to a disk's private region, or by tagging a disk and specifying that it is a cloned disk to the `vxdg import` operation.
- *Action:* User intervention is required in the following cases:
  - Case 1: 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 can result in two disks that have the same disk identifier and UDID value. See ''Handling Disks with Duplicated Identifiers'' in the ''Creating and Administering Disk Groups'' chapter of the *Veritas Volume Manager Administrator's Guide* for full details of how to deal with this condition.
  - Case 2: If disks have been duplicated by using the `dd` command or any similar copying utility, you can use the following command to update the UDID for one or more disks:

    ```
    # vxdisk [-f] updateudid disk ...
    ```

    This command uses the current value of the UDID that is stored in the Device Discovery Layer (DDL) database to correct the value in the

private region. The `-f` option must be specified if VxVM has not set the `udid_mismatch` flag on a disk.
For example, the following command updates the UDIDs for the disks `sdg` and `sdh`:

```
# vxdisk updateudid sdg sdh
```

- Case 3: If DMP has been 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 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`).

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