Oracle® Solaris Cluster 3.3 With Sun StorEdge 3310 or 3320 SCSI RAID Array Manual

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Contents

Preface

The *Oracle Solaris Cluster 3.3 With Sun StorEdge 3310 or 3320 SCSI RAID Array Manual* provides procedures specific to Oracle's Sun StorEdge 3310 and 3320 SCSI RAID storage devices that are placed in a Oracle Solaris Cluster environment. Use this manual with any version of Oracle Solaris Cluster 3.3 software on SPARC based or x86 based systems.

Note – This Oracle Solaris Cluster release supports systems that use the SPARC and x86 families of processor architectures: UltraSPARC, SPARC64, and AMD64. In this document, the label x86 refers to systems that use the AMD64 family of processor architectures.

Unless otherwise noted, procedures are the same for all Oracle Solaris Cluster 3.3 SPARC based or x86 based systems.

Who Should Use This Book

This book is for Oracle representatives who are performing the initial installation of an Oracle Solaris Cluster configuration and for system administrators who are responsible for maintaining the system.

This document is intended for experienced system administrators with extensive knowledge of Oracle software and hardware. Do not use this document as a planning or a pre-sales guide. You should have already determined your system requirements and purchased the appropriate equipment and software before reading this document.

How This Book Is Organized

The following chapters contain information about hardware used in an Oracle Solaris Cluster environment.

Chapter 1, "Installing and Configuring a Sun StorEdge 3310 or 3320 SCSI RAID Array," discusses how to install and configure the StorEdge 3310 RAID storage array.

Chapter 2, "Maintaining Sun StorEdge 3310 or 3320 SCSI RAID Array," discusses how to maintain the StorEdge 3310 RAID storage array.

Revision History

The following table lists the information that has been revised or added since the initial release of this documentation. The table also lists the revision date for these changes.

TABLE P–1 Oracle Solaris Cluster 3.3 With Sun StorEdge 3310 or 3320 SCSI RAID Array Manual

Revision Date	New Information
January 2009	Updated links to different versions of Sun Cluster documentation in Preface.
September 2010	Updated product name, removed references to old CLI, and removed instructions specific to Solaris 9 for the Oracle Solaris Cluster 3.3 release.

Related Documentation

The following books provide conceptual information or procedures to administer hardware and applications. If you plan to use this documentation in a hardcopy format, ensure that you have these books available for your reference.

The following books support the Oracle Solaris Cluster 3.3 release. You can also access the documentation for the Sun Cluster 3.1 and 3.2 releases. All Sun Cluster and Oracle Solaris Cluster documentation is available at http://docs.sun.com. Documentation that is not available at `http://docs.sun.com` is listed with the appropriate URL.

TABLE P–2 Sun StorEdge 3310 and 3320 RAID Storage Array Documentation

Title	Part Number
OpenBoot 2.x Command Reference Manual	806-2906
Sun StorEdge PCI Dual Ultra3 SCSI Host Adapter Release Notes	816-2157
Sun StorEdge 3310 SCSI Array Release Notes	816-7292
Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3310 SCSI Array	816–7290
Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3320 SCSI Array	819–1274
Sun StorEdge 3000 Family CLI 2.0 User's Guide	817–4951
Sun StorEdge 3000 Family FRU Installation Guide	816–7326
Sun StorEdge 3000 Family RAID Firmware 4.1x User's Guide	817–3711
Sun StorEdge 3320 SCSI Array Release Notes Available at http://docs.sun.com/db/doc/817–7660–10	817–7660

TABLE P–3 Oracle Solaris Cluster and Sun Cluster Documentation

Documentation
Oracle Solaris Cluster 3.3
Sun Cluster 3.2
Sun Cluster 3.1

Using UNIX Commands

This document contains information about commands that are used to install, configure, or upgrade an Oracle Solaris Cluster configuration. This document might not contain complete information about basic UNIX commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following sources for this information:

- Online documentation for the Oracle Solaris Operating System (Oracle Solaris OS)
- Other software documentation that you received with your system
- Oracle Solaris Operating System man pages

Getting Help

If you have problems installing or using Oracle Solaris Cluster, contact your service provider and provide the following information.

- Your name and email address (if available)
- Your company name, address, and phone number
- The model number and serial number of your systems
- The release number of the operating environment (for example, Oracle Solaris 10)
- The release number of Oracle Solaris Cluster (for example, Oracle Solaris Cluster 3.3)

Use the following commands to gather information about your system for your service provider.

Command	Function
`prtconf -v`	Displays the size of the system memory and reports information about peripheral devices
`psrinfo -v`	Displays information about processors

Command	Function
`showrev -p`	Reports which patches are installed
`prtdiag -v`	Displays system diagnostic information
`/usr/cluster/bin/clnode show-rev`	Displays Oracle Solaris Cluster release and package version information for each node

Also have available the contents of the `/var/adm/messages` file.

Documentation, Support, and Training

See the following web sites for additional resources:

- Documentation (`http://docs.sun.com`)
- Support (`http://www.oracle.com/us/support/systems/index.html`)
- Training (`http://education.oracle.com`) – Click the Sun link in the left navigation bar.

Oracle Welcomes Your Comments

Oracle welcomes your comments and suggestions on the quality and usefulness of its documentation. If you find any errors or have any other suggestions for improvement, go to `http://docs.sun.com` and click Feedback. Indicate the title and part number of the documentation along with the chapter, section, and page number, if available. Please let us know if you want a reply.

Oracle Technology Network (`http://www.oracle.com/technetwork/index.html`) offers a range of resources related to Oracle software:

- Discuss technical problems and solutions on the Discussion Forums (`http://forums.oracle.com`).
- Get hands-on step-by-step tutorials with Oracle By Example (`http://www.oracle.com/technology/obe/start/index.html`).
- Download Sample Code (`http://www.oracle.com/technology/sample_code/index.html`).

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–4 Typographic Conventions

Typeface	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P–5 Shell Prompts

Shell	Prompt
C shell	`machine_name%`
C shell for superuser	`machine_name#`
Bourne shell and Korn shell	`$`
Bourne shell and Korn shell for superuser	`#`

◆ ◆ ◆ CHAPTER 1

Installing and Configuring a Sun StorEdge 3310 or 3320 SCSI RAID Array

This chapter describes the procedures about how to install and configure Oracle's Sun StorEdge 3310 and 3320 SCSI RAID arrays in an Oracle Solaris Cluster environment.

Read the entire procedure before you perform any steps within a procedure in this chapter. If you are not reading an online version of this document, ensure that you have the books listed in available.

This chapter contains the following major topics:

Installing RAID Storage Arrays

This section contains instructions on installing storage arrays both in new clusters and in existing clusters.

TABLE 1–1 Task Map: Installing Storage Arrays

Task	Information
Install a storage array in a new cluster, before the OS and Oracle Solaris Cluster software are installed.	"How to Install a RAID Storage Array in a New Cluster" on page 12
Add a storage array to an operational cluster.	"How to Add a RAID Storage Array to an Existing Cluster" on page 13

How to Install a RAID Storage Array in a New Cluster

Use this procedure to install and configure RAID storage arrays *before* installing the Oracle Solaris operating environment and Oracle Solaris Cluster software on your nodes. To add storage arrays to an operating cluster, use the procedure, "How to Add a RAID Storage Array to an Existing Cluster" on page 13.

Note – The storage array must be mirrored with another storage array to ensure high availability.

Before You Begin This procedure assumes that the hardware is not connected.

SPARC only – To attach a JBOD storage array to a RAID storage array as an expansion unit, attach the JBOD storage array before connecting the RAID storage array to the nodes. For more information, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

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1. **Install the host adapters in the nodes that connect to the RAID storage array.**

   For the procedure about how to install host adapters, see the documentation that shipped with your host adapters and nodes.

2. **Cable the RAID storage array to the nodes.**

   Ensure the cable does not exceed bus length limitations. For more information on bus length limitations, see the documentation that shipped with your hardware.

   For the procedure about how to cable the storage arrays, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

3. **RAID storage arrays have redundant power inputs. Connect each power cord from the RAID storage array to a different power source.**

   Different RAID storage arrays can share power sources.

4. **Install the Oracle Solaris operating environment, then apply any required Oracle Solaris patches.**

   For software installation procedures, see your Oracle Solaris Cluster software installation documentation.

Note – For the current list of patches that are required for the Oracle Solaris operating environment, refer to SunSolve. SunSolve is available online to Oracle service providers and to customers with SunSolve service contracts at the SunSolve site: `http://sunsolve.sun.com`.

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5 **If necessary, install the `qus` driver and appropriate driver patches.**

For driver installation procedures, see the *Sun StorEdge PCI Dual Ultra 3 SCSI Host Adapter Release Notes*.

6 **If necessary, upgrade the controller firmware.**

7 **Set up and configure the RAID storage arrays with logical units (LUNs).**

For the procedure about how to set up the storage array with LUNs, see "How to Create and Map a LUN" on page 19.

Note – If you want to use the Configuration Service Console, perform this step after Step 8.

8 **(Optional) Install the Configuration Service.**

For the procedure about how to install the Configuration Service, see the *Sun StorEdge 3000 Family Configuration Service 1.5 User's Guide for the Sun StorEdge 3310 SCSI Array and the Sun StorEdge 3510 FC Array*.

9 **Install the Oracle Solaris Cluster software and volume management software.**

For software installation procedures, see the your Oracle Solaris Cluster software installation documentation.

See Also To continue with Oracle Solaris Cluster software and data services installation tasks, see your Oracle Solaris Cluster software installation documentation and your Oracle Solaris Cluster data services collection.

▼ How to Add a RAID Storage Array to an Existing Cluster

Use this procedure to add RAID storage arrays to a running cluster. If you need to install a storage array in a new cluster, use the procedure in "How to Install a RAID Storage Array in a New Cluster" on page 12.

Before You Begin This procedure assumes that your nodes are not configured with dynamic reconfiguration functionality.

If your nodes are configured for dynamic reconfiguration, see your *Oracle Solaris Cluster Hardware Administration Manual*.

This procedure provides the long forms of the Oracle Solaris Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical.

To perform this procedure, become superuser or assume a role that provides `solaris.cluster.read` RBAC (role-based access control) authorization.

1 **Install any RAID storage array packages and patches on nodes.**

Note – For the most current list of software, firmware, and patches that are required for the RAID storage array, refer to SunSolve. SunSolve is available online to Oracle service providers and to customers with SunSolve service contracts at the SunSolve site: http://sunsolve.sun.com.

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2 **Power on the RAID storage array.**

For procedures about how to power on the storage array, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

3 **Configure the RAID storage array.**

For the procedure about how to create LUNs, see "How to Create and Map a LUN" on page 19.

4 **On each node that is connected to the RAID storage array, ensure that each LUN has an associated entry in the `/kernel/drv/sd.conf` file.**

For more information, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

5 **Shut down the first node.**

For the procedure about how to shut down and power off a node, see your Oracle Solaris Cluster system administration documentation.

6 **If you are installing new host adapters, power off the first node.**

For the procedure about how to power off a node, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

7 **Install the host adapters in the first node.**

For the procedure about how to install host adapters, see the documentation that shipped with your host adapters and nodes.

8 **Cable the RAID storage array to the first node.**

Ensure the cable does not exceed bus length limitations. For more information on bus length limitations, see the documentation that shipped with your hardware.

For the procedure about how to cable the storage arrays, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

9 **Boot the first node.**

For the procedure about how to boot cluster nodes, see Chapter 3, "Shutting Down and Booting a Cluster," in *Oracle Solaris Cluster System Administration Guide*.

10 Verify that the first node recognizes the new host adapters and disk drives.

If the node does not recognize the new hardware, check all hardware connections and repeat installation steps you performed in Step 7.

- SPARC:

```
{0} ok show-disks
a) /pci@1f,4000/pci@2/scsi@5/sd
b) /pci@1f,4000/pci@2/scsi@4/sd
...
```

- x86:

```
Adaptec AIC-7899 SCSI BIOS v2.57S4
(c) 2000 Adaptec, Inc. All Rights Reserved.
    Press <Ctrl><A> for SCSISelect(TM) Utility!

Ch B,  SCSI ID: 0 SEAGATE  ST336605LC        160
       SCSI ID: 1 SEAGATE  ST336605LC        160
       SCSI ID: 6 ESG-SHV  SCA HSBP M18      ASYN
Ch A,  SCSI ID: 2 SUN      StorEdge 3310     160
       SCSI ID: 3 SUN      StorEdge 3310     160

AMIBIOS (C)1985-2002 American Megatrends Inc.,
Copyright 1996-2002 Intel Corporation
SCB20.86B.1064.P18.0208191106
SCB2 Production BIOS Version 2.08
BIOS Build 1064

2 X Intel(R) Pentium(R) III CPU family      1400MHz
Testing system memory, memory size=2048MB
2048MB Extended Memory Passed
512K L2 Cache SRAM Passed
ATAPI CD-ROM SAMSUNG CD-ROM SN-124

SunOS - Intel Platform Edition     Primary Boot Subsystem, vsn 2.0

                        Current Disk Partition Information

                  Part#   Status    Type      Start       Length
                 ================================================
                    1     Active   X86 BOOT     2428       21852
                    2              SOLARIS     24280     71662420
                    3              <unused>
                    4              <unused>
               Please select the partition you wish to boot: *   *

Solaris DCB

                    loading /solaris/boot.bin

SunOS Secondary Boot version 3.00

                  Solaris Intel Platform Edition Booting System

Autobooting from bootpath: /pci@1,0/pci8086,340f@7,1/sd@0,0:a

If the system hardware has changed, or to boot from a different
```

```
device, interrupt the autoboot process by pressing ESC.
Press ESCape to interrupt autoboot in 2 seconds.
Initializing system
Please wait...
Warning: Resource Conflict - both devices are added

NON-ACPI device: ISY0050
     Port: 3F0-3F5, 3F7; IRQ: 6; DMA: 2
ACPI device: ISY0050
     Port: 3F2-3F3, 3F4-3F5, 3F7; IRQ: 6; DMA: 2

                    <<< Current Boot Parameters >>>
Boot path: /pci@1,0/pci8086,340f@7,1/sd@0,0:a
Boot args:

Type    b [file-name] [boot-flags] <ENTER>  to boot with options
or      i <ENTER>                           to enter boot interpreter
or      <ENTER>                             to boot with defaults

                <<< timeout in 5 seconds >>>

Select (b)oot or (i)nterpreter:
```

11 If necessary, perform a reconfiguration boot on the first node to create the new Oracle Solaris device files and links.

12 Shut down the second node.

For the procedure about how to shut down a node, see your Oracle Solaris Cluster system administration documentation.

13 If you are installing new host adapters, power off the second node.

For the procedure about how to shut down and power off a node, see your Oracle Solaris Cluster system administration documentation.

14 Install the host adapters in the second node.

For the procedure about how to install host adapters, see the documentation that shipped with your nodes.

15 Cable the RAID storage array to the second node.

Ensure the cable does not exceed bus length limitations. For more information on bus length limitations, see the documentation that shipped with your hardware.

For the procedure about how to cable the storage arrays, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

16 Boot the second node.

For the procedure about how to boot cluster nodes, see Chapter 3, "Shutting Down and Booting a Cluster," in *Oracle Solaris Cluster System Administration Guide*.

17 Verify that the second node recognizes the new host adapters and disk drives.

If the node does not recognize the new hardware, check all hardware connections and repeat installation steps you performed in Step 14.

- SPARC:

```
{0} ok show-disks
a) /pci@1f,4000/pci@2/scsi@5/sd
b) /pci@1f,4000/pci@2/scsi@4/sd
...
```

- x86:

```
Adaptec AIC-7899 SCSI BIOS v2.57S4
(c) 2000 Adaptec, Inc. All Rights Reserved.
    Press <Ctrl><A> for SCSISelect(TM) Utility!

Ch B,  SCSI ID: 0 SEAGATE  ST336605LC        160
       SCSI ID: 1 SEAGATE  ST336605LC        160
       SCSI ID: 6 ESG-SHV  SCA HSBP M18      ASYN
Ch A,  SCSI ID: 2 SUN      StorEdge 3310     160
       SCSI ID: 3 SUN      StorEdge 3310     160

AMIBIOS (C)1985-2002 American Megatrends Inc.,
Copyright 1996-2002 Intel Corporation
SCB20.86B.1064.P18.0208191106
SCB2 Production BIOS Version 2.08
BIOS Build 1064

2 X Intel(R) Pentium(R) III CPU family      1400MHz
Testing system memory, memory size=2048MB
2048MB Extended Memory Passed
512K L2 Cache SRAM Passed
ATAPI CD-ROM SAMSUNG CD-ROM SN-124

SunOS - Intel Platform Edition     Primary Boot Subsystem, vsn 2.0

                        Current Disk Partition Information

                  Part#   Status    Type      Start       Length
                 ================================================
                    1     Active   X86 BOOT     2428       21852
                    2              SOLARIS     24280     71662420
                    3              <unused>
                    4              <unused>
               Please select the partition you wish to boot: *   *

Solaris DCB

                    loading /solaris/boot.bin

SunOS Secondary Boot version 3.00

                  Solaris Intel Platform Edition Booting System

Autobooting from bootpath: /pci@1,0/pci8086,340f@7,1/sd@0,0:a

If the system hardware has changed, or to boot from a different
```

```
device, interrupt the autoboot process by pressing ESC.
Press ESCape to interrupt autoboot in 2 seconds.
Initializing system
Please wait...
Warning: Resource Conflict - both devices are added

NON-ACPI device: ISY0050
     Port: 3F0-3F5, 3F7; IRQ: 6; DMA: 2
ACPI device: ISY0050
     Port: 3F2-3F3, 3F4-3F5, 3F7; IRQ: 6; DMA: 2

                    <<< Current Boot Parameters >>>
Boot path: /pci@1,0/pci8086,340f@7,1/sd@0,0:a
Boot args:

Type    b [file-name] [boot-flags] <ENTER>  to boot with options
or      i <ENTER>                           to enter boot interpreter
or      <ENTER>                             to boot with defaults

                  <<< timeout in 5 seconds >>>

Select (b)oot or (i)nterpreter:
```

18 If necessary, perform a reconfiguration boot on the second node to create the new Oracle Solaris device files and links.

19 For all nodes that are attached to the RAID storage array, verify that the DIDs have been assigned to the LUNs.

```
# cldevice list -v
```

Configuring RAID Storage Arrays

This product supports the use of hardware RAID and host-based software RAID. For host-based software RAID, this product supports RAID levels 0+1 and 1+0.

Note – When you use host-based software RAID with hardware RAID, the hardware RAID levels you use affect the hardware maintenance procedures due to volume management administration.

If you use hardware RAID level 1, 3, or 5, you can perform most maintenance procedures in "Maintaining RAID Storage Arrays" on page 23 without volume management disruptions. If you use hardware RAID level 0, some maintenance procedures in "Maintaining RAID Storage Arrays" on page 23 require additional volume management administration because the availability of the LUNs is impacted.

Note – When you upgrade firmware on a storage device or on an enclosure, redefine the stripe size of a LUN, or perform other LUN operations, a device ID might change unexpectedly. When you perform a check of the device ID configuration by running the `cldevice check` command, the following error message appears on your console if the device ID changed unexpectedly.

```
device id for nodename:/dev/rdsk/cXtYdZsN does not match physical
device's id for ddecimalnumber, device may have been replaced.
```

To fix device IDs that report this error, run the `cldevice repair` command for each affected device.

This section describes the procedures about how to configure a RAID storage array *after* installing Oracle Solaris Cluster software. Table 1–2 lists these procedures.

To configure a RAID storage array *before* you install Oracle Solaris Cluster software, follow the same procedure that you use in a noncluster environment. For procedures about how to configure RAID storage arrays before you install Oracle Solaris Cluster, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual*.

TABLE 1–2 Task Map: Configuring Disk Drives

Task	Information
Create a logical unit (LUN).	"How to Create and Map a LUN" on page 19
Remove a LUN.	"How to Unmap and Delete a LUN" on page 20

▼ How to Create and Map a LUN

Use this procedure to create a logical unit (LUN) from unassigned disk drives or remaining capacity. See the *Sun StorEdge 3310 SCSI RAID Firmware Version 3.25 Guide* for the latest information about LUN administration.

This procedure provides the long forms of the Oracle Solaris Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical.

Before You Begin To perform this procedure, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.

1 Create and partition the logical device(s).

For more information on creating a LUN, see the *Sun StorEdge 3000 Family RAID Firmware 4.1x User's Guide*.

2 **Map the LUNs to the host channels that are cabled to the nodes.**

For more information on mapping LUNs to host channels, see the *Sun StorEdge 3000 Family RAID Firmware 4.1x User's Guide*.

Note – You can have a maximum of 64 shared LUNs.

---

3 **Ensure that each LUN has an associated entry in the `/kernel/drv/sd.conf` file.**

For more information, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3310 SCSI Array*.

4 **To make the changes to the `/kernel/drv/sd.conf` file active, perform the following commands.**

Run the `update_drv -f sd` command and then the `devfsadm` command.

5 **If necessary, label the LUNs.**

6 **If the cluster is online and active, update the global device namespace.**

```
# cldevice populate
```

7 **If you want a volume manager to manage the new LUN, run the appropriate Solaris Volume Manager commands or Veritas Volume Manager commands. Use these commands to incorporate the new LUN into a diskset or disk group.**

For information on administering LUNs, see your Oracle Solaris Cluster system administration documentation.

For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

8 **If you want the new LUN to be a quorum device, add the quorum device.**

For the procedure about how to add a quorum device, see your Oracle Solaris Cluster system administration documentation.

▼ How to Unmap and Delete a LUN

Use this procedure to delete a LUN(s). See the *Sun StorEdge 3000 Family RAID Firmware 4.1x User's Guide* for the latest information about LUN administration.

Caution – When you delete the LUN, you remove all data on that LUN.

This procedure provides the long forms of the Oracle Solaris Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical.

Before You Begin This procedure assumes that the cluster is online. A cluster is online if the RAID storage array is connected to the nodes and all nodes are powered on. This procedure also assumes that you plan to telnet to the RAID storage array perform this procedure.

To perform this procedure, become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC authorization.

1 Identify the LUNs that you need to remove.

```
# cfgadm -al
```

2 If the LUN is configured as a quorum device, relocate that quorum device to another suitable RAID storage array.

To determine whether the LUN is configured as a quorum device, use one of the following commands.

```
# clquorum show +
```

For procedures about how to add and remove quorum devices, see your Oracle Solaris Cluster system administration documentation.

3 Remove the LUN from disksets or disk groups.

Run the appropriate Solaris Volume Manager commands or Veritas Volume Manager commands to remove the LUN from any diskset or disk group. For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation. See the following paragraph for additional Veritas Volume Manager commands that are required.

Note – LUNs that were managed by Veritas Volume Manager must be completely removed from Veritas Volume Manager control before you can delete the LUNs from the Oracle Solaris Cluster environment. After you delete the LUN from any disk group, use the following commands **on both nodes** to remove the LUN from Veritas Volume Manager control.

```
# vxdisk offline cNtXdY
# vxdisk rm cNtXdY
```

4 On both nodes, unconfigure the device that is associated with the LUN.

```
# cfgadm -c unconfigure cx::dsk/cxtydz
```

5 Unmap the LUN from both host channels.

For the procedure about how to unmap a LUN, see the *Sun StorEdge 3310 SCSI RAID Firmware Version 3.25 Guide*.

6 **Delete the logical drive.**

For more information, see the *Sun StorEdge 3310 SCSI RAID Firmware Version 3.25 Guide*.

7 **On both nodes, remove the paths to the LUN that you are deleting.**

```
# devfsadm -C
```

8 **On both nodes, remove all obsolete device IDs (DIDs).**

```
# cldevice clear
```

9 **If no other LUN is assigned to the target and LUN ID, remove the LUN entries from `/kernel/drv/sd.conf` file.**

Perform this step on both nodes to prevent extended boot time caused by unassigned LUN entries.

Note – Do not remove default `t0d0` entries.

◆ ◆ ◆ CHAPTER 2

Maintaining Sun StorEdge 3310 or 3320 SCSI RAID Array

This chapter describes the procedures about how to maintain Sun StorEdge 3310 and 3320 RAID arrays in an Oracle Solaris Cluster environment.

Read the entire procedure before you perform any steps within a procedure in this chapter. If you are not reading an online version of this document, ensure that you have the books listed in available.

This chapter contains the following procedures.

Maintaining RAID Storage Arrays

This section contains the procedures about how to maintain a RAID storage array in an Oracle Solaris Cluster environment. Maintenance tasks in Table 2–1 contain cluster-specific tasks. Tasks that are not cluster-specific are referenced in a list following the table.

Note – When you upgrade firmware on a storage device or on an enclosure, redefine the stripe size of a LUN, or perform other LUN operations, a device ID might change unexpectedly. When you perform a check of the device ID configuration by running the `cldevice check` command, the following error message appears on your console if the device ID changed unexpectedly.

```
device id for nodename:/dev/rdsk/cXtYdZsN does not match physical
device's id for ddecimalnumber, device may have been replaced.
```

To fix device IDs that report this error, run the `cldevice repair` command for each affected device.

TABLE 2–1 Tasks: Maintaining a RAID Storage Array

Task	Information
Remove a RAID storage array.	"How to Remove a RAID Storage Array" on page 25
Replace a RAID storage array. To replace a RAID storage array, remove the RAID storage array. Add a new RAID storage array to the configuration.	"How to Remove a RAID Storage Array" on page 25 "How to Add a RAID Storage Array to an Existing Cluster" on page 13
Add a JBOD as an expansion unit. Follow the same procedure that you use in a noncluster environment. If you plan to use the disk drives in the expansion unit to create a new LUN, see "How to Create and Map a LUN" on page 19	*Sun StorEdge 3000 Family Installation, Operation, and Service Manual* "How to Create and Map a LUN" on page 19
Remove a JBOD expansion unit. Follow the same procedure that you use in a noncluster environment. If you plan to remove a LUN in conjunction with the disk drive, see "How to Unmap and Delete a LUN" on page 20.	*Sun StorEdge 3000 Family Installation, Operation, and Service Manual* "How to Unmap and Delete a LUN" on page 20
Add a disk drive. Follow the same procedure that you use in a noncluster environment. If you plan to create a new LUN with the disk drive, see "How to Create and Map a LUN" on page 19.	*Sun StorEdge Family FRU Installation Guide for the Sun StorEdge 3310 SCSI Array and the Sun StorEdge 3510 FC Array* "How to Create and Map a LUN" on page 19

TABLE 2–1 Tasks: Maintaining a RAID Storage Array *(Continued)*

Task	Information
Remove a disk drive. Follow the same procedure that you use in a noncluster environment.	*Sun StorEdge Family FRU Installation Guide for the Sun StorEdge 3310 SCSI Array and the Sun StorEdge 3510 FC Array*
If you plan to remove a LUN in conjunction with the disk drive, see "How to Unmap and Delete a LUN" on page 20.	"How to Unmap and Delete a LUN" on page 20
If your configuration is running in RAID level 0, take appropriate action to prepare the volume manager for the impacted disk to be inaccessible.	
Replace a failed controller or restore an offline controller.	"How to Replace a Controller" on page 27
Replace a host-to-storage array SCSI cable. Switch the device group over to the other node before performing this procedure. Then follow the same procedure that you use in a noncluster environment.	*Sun StorEdge 3000 Family Installation, Operation, and Service Manual*
Replace the I/O module.	"How to Replace an I/O Module" on page 28
Replace the terminator module.	"How to Replace a Terminator Module" on page 29

Sun StorEdge 3310 and 3320 SCSI RAID FRUs

The following is a list of administrative tasks that require no cluster-specific procedures. See the*Sun StorEdge 3000 Family FRU Installation Guide* for instructions on replacing the following FRUs.

- Replace a disk drive
- Replace the battery unit
- Replace a JBOD-to-RAID unit SCSI cable
- Replace a power and fan module
- Replace a power cord to a RAID storage array
- Replace an EMU module

▼ How to Remove a RAID Storage Array

Use this procedure to remove a RAID storage array from a running cluster.

Caution – This procedure removes all data that is on the RAID storage array that you remove.

This procedure provides the long forms of the Oracle Solaris Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical.

Before You Begin This procedure assumes that your nodes are not configured with dynamic reconfiguration functionality. If your nodes are configured for dynamic reconfiguration, see your *Oracle Solaris Cluster Hardware Administration Manual*.

To perform this procedure, become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC (role-based access control) authorization.

1 If one of the disks in the RAID storage array is configured as a quorum device, relocate that quorum device to another suitable RAID storage array.

To determine whether any of the disks is configured as a quorum device, use the following command.

```
# clquorum show +
```

For procedures about how to add and remove quorum devices, see your Oracle Solaris Cluster system administration documentation.

2 If necessary, back up the metadevice or volume.

For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

3 Perform volume management administration to remove the RAID storage array from the configuration.

If a volume manager does manage the LUN, run the appropriate Solaris Volume Manager commands or Veritas Volume Manager commands to remove the LUN from any diskset or disk group. For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation. See the following paragraph for additional Veritas Volume Manager commands that are required.

Note – LUNs that were managed by Veritas Volume Manager must be completely removed from Veritas Volume Manager control before you can delete the LUNs from the Oracle Solaris Cluster environment. After you delete the LUN from any disk group, use the following commands *on both nodes* to remove the LUN from Veritas Volume Manager control.

```
# vxdisk offline cNtXdY
# vxdisk rm cNtXdY
```

4. **Identify the LUNs that you need to remove.**

   ```
   # cfgadm -al
   ```

5. **On all nodes, remove references to the LUNs in the RAID storage array that you removed.**

   ```
   # cfgadm -c unconfigure cN::dsk/cNtXdY
   ```

6. **Disconnect the SCSI cables from the RAID storage array.**

7. **On both nodes, remove the paths to the LUN that you are deleting.**

   ```
   # devfsadm -C
   ```

8. **On both nodes, remove all obsolete device IDs (DIDs).**

   ```
   # cldevice clear
   ```

9. **If no other LUN is assigned to the target and LUN ID, remove the LUN entries from `/kernel/drv/sd.conf` file.**

   Perform this step on both nodes to prevent extended boot time caused by unassigned LUN entries.

   Note – Do not remove default `t0d0` entries.

10. **Power off the RAID storage array. Disconnect the RAID storage array from the AC power source.**

    For the procedure about how to power off a storage array, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3310 SCSI Array*.

11. **Remove the RAID storage array.**

    For the procedure about how to remove a storage array, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3310 SCSI Array*.

12. **If necessary, remove any unused host adapters from the nodes.**

    For the procedure about how to remove a host adapter, see your Oracle Solaris Cluster system administration documentation and the documentation that shipped with your host adapter and node.

13. **From any node, verify that the configuration is correct.**

    ```
    # cldevice list -v
    ```

▼ How to Replace a Controller

If the RAID storage array is configured with dual controllers, see the*Sun StorEdge 3000 Family FRU Installation Guide* for controller replacement procedures. If the RAID storage array is configured with a single controller, perform the procedure below to ensure high availability.

1. **Detach the submirrors on the RAID storage array that are connected to the controller. This controller is the controller that you are replacing. Detach the submirrors to stop all I/O activity to the RAID storage array.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

2. **Replace the controller.**

   For the procedure about how to replace a controller, see the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual, 3310 SCSI Array*.

3. **Reattach the submirrors to resynchronize the submirrors.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

How to Replace an I/O Module

Use this procedure to replace a RAID storage array I/O module.

Note – If your configuration is running in RAID level 0, take appropriate action to prepare the volume manager for the impacted disk to be inaccessible.

---

1. **Detach the submirrors on the RAID storage array that are connected to the I/O module that you are replacing. Detach the submirrors to stop all I/O activity to the RAID storage array.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

2. **Disconnect the SCSI cables from the hosts.**

3. **Disconnect the SCSI cables from the I/O module.**

4. **Replace the I/O module.**

   For the procedure about how to replace the I/O module, see the *Sun StorEdge 3000 Family FRU Installation Guide*.

5. **Reconnect the SCSI cables to the I/O module.**

6. **Reconnect the SCSI cables to the host.**

7. **Reattach the submirrors to resynchronize submirrors.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

How to Replace a Terminator Module

Use this procedure to replace a RAID storage array terminator module.

Note – If your configuration is running in RAID level 0, take appropriate action to prepare the volume manager for the impacted disk to be inaccessible.

---

1. **Detach the submirrors on the RAID storage array that are connected to the terminator module that you are replacing. Detach the submirrors to stop all I/O activity to the RAID storage array.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

2. **Replace the terminator module.**

   For the procedure about how to replace the terminator module, see the *Sun StorEdge 3000 Family FRU Installation Guide*.

3. **Reattach the submirrors to resynchronize submirrors.**

   For more information, see your Solaris Volume Manager or Veritas Volume Manager documentation.

How to Replace a Host Adapter

Use this procedure to replace a failed host adapter in a running cluster. This procedure defines `Node A` as the node with the failed host adapter that you are replacing.

This procedure provides the long forms of the Oracle Solaris Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical.

Before You Begin This procedure relies on the following prerequisites and assumptions.

- Except for the failed host adapter, your cluster is operational and all nodes are powered on.
- Your nodes are not configured with dynamic reconfiguration functionality.

  If your nodes are configured for dynamic reconfiguration **and** you are using two entirely separate hardware paths to your shared data, see the *Oracle Solaris Cluster 3.3 Hardware Administration Manual* and skip steps that instruct you to shut down the cluster.

  If you are using a single, dual-port HBA to provide the connections to your shared data, you cannot use dynamic reconfiguration for this procedure. Follow all steps in the procedure. For the details on the risks and limitations of this configuration, see "Configuring Cluster Nodes With a Single, Dual-Port HBA" in *Oracle Solaris Cluster 3.3 Hardware Administration Manual*.

To perform this procedure, become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC (role-based access control) authorization.

1 **Determine the resource groups and device groups that are running on `Node A`.**

Record this information because you use this information in Step 12 and Step 13 of this procedure to return resource groups and device groups to `Node A`.

```
# clresourcegroup status -n nodename
# cldevicegroup status -n nodename
```

2 **Record the details of any metadevices that are affected by the failed host adapter.**

Record this information because you use it in Step 11 of this procedure to repair any affected metadevices.

3 **Move all resource groups and device groups off `Node A`.**

```
# clnode evacuate NodeA
```

4 **Shut down `Node A`.**

For the full procedure about how to shut down and power off a node, see your Oracle Solaris Cluster system administration documentation.

5 **Power off `Node A`.**

6 **Replace the failed host adapter.**

For the procedure about how to remove and add host adapters, see the documentation that shipped with your nodes.

7 **If you need to upgrade the node's host adapter firmware, boot `Node A` into noncluster mode by adding `-x` to your boot instruction. Proceed to Step 9.**

For more information about how to boot nodes, see your Oracle Solaris Cluster system administration documentation.

8 **If you do not need to upgrade the node's host adapter firmware, proceed to Step 10.**

9 **Upgrade the host adapter firmware on `Node A`.**

The Oracle Enterprise Manager Ops Center 2.5 software helps you patch and monitor your data center assets. Oracle Enterprise Manager Ops Center 2.5 helps improve operational efficiency and ensures that you have the latest software patches for your software. Contact your Oracle representative to purchase Oracle Enterprise Manager Ops Center 2.5.

Additional information for using the Oracle patch management tools is provided in *Oracle Solaris Administration Guide: Basic Administration* at http://docs.sun.com (`http://docs.sun.com`). Refer to the version of this manual for the Oracle Solaris OS release that you have installed.

If you must apply a patch when a node is in noncluster mode, you can apply it in a rolling fashion, one node at a time, unless instructions for a patch require that you shut down the entire cluster. Follow the procedures in "How to Apply a Rebooting Patch (Node)" in *Oracle Solaris Cluster System Administration Guide* to prepare the node and to boot it in noncluster mode. For ease of installation, consider applying all patches at the same time. That is, apply all patches to the node that you place in noncluster mode.

For required firmware, see the *Sun System Handbook*.

10 Boot `Node A` into cluster mode.

For more information about how to boot nodes, see Chapter 3, "Shutting Down and Booting a Cluster," in *Oracle Solaris Cluster System Administration Guide*.

11 Perform any volume management procedures that are necessary to fix any metadevices affected by this procedure, as you identified in Step 2.

For more information, see your volume manager software documentation.

12 (Optional) Restore the device groups to `Node A`.

Perform the following step for each device group you want to return to the original node.

`#` `cldevicegroup switch -n` *NodeA devicegroup1*`[` *devicegroup2* `...]`

`-n` *NodeA*	The node to which you are restoring device groups.
devicegroup1[*devicegroup2* …]	The device group or groups that you are restoring to the node.

13 (Optional) Restore the resource groups to `Node A`.

Perform the following step for each resource group you want to return to the original node.

`#` `clresourcegroup switch -n` *NodeA resourcegroup1*`[` *resourcegroup2* `...]`

NodeA	For failover resource groups, the node to which the groups are returned. For scalable resource groups, the node list to which the groups are returned.
resourcegroup1[*resourcegroup2* …]	The resource group or groups that you are returning to the node or nodes.

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