

Oracle® Solaris Cluster 3.3 With Fibre Channel JBOD Storage Device Manual

SPARC Platform Edition

Copyright © 2000, 2010, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related software documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT RIGHTS Programs, software, databases, and related documentation and technical data delivered to U.S. Government customers are "commercial computer software" or "commercial technical data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, duplication, disclosure, modification, and adaptation shall be subject to the restrictions and license terms set forth in the applicable Government contract, and, to the extent applicable by the terms of the Government contract, the additional rights set forth in FAR 52.227-19, Commercial Computer Software License (December 2007). Oracle America, Inc., 500 Oracle Parkway, Redwood City, CA 94065.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications which may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. UNIX is a registered trademark licensed through X/Open Company, Ltd.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

Contents

- Preface5**

- 1 Installing and Maintaining a Fibre Channel JBOD Storage Device11**
 - Installing Storage Arrays 11
 - ▼ How to Install a Storage Array in a New Cluster 12
 - ▼ How to Add the *First* Storage Array to an Existing Cluster 12
 - ▼ How to Add a *Subsequent* Storage Array to an Existing Cluster 14
 - Maintaining Storage Arrays 15
 - FRUs That *Do Not* Require Oracle Solaris Cluster Maintenance Procedures 16
 - ▼ How to Replace a Storage Array 17
 - ▼ How to Remove a Storage Array 19
 - ▼ How to Add a Disk Drive 20
 - ▼ How to Remove a Disk Drive 21
 - ▼ How to Replace a Disk Drive 23

- A Cabling Diagrams27**
 - Sun StorEdge A5x00 Cabling Diagrams 27
 - Installing a Storage Array 27
 - Adding a Storage System 28

- Index29**

Preface

The *Oracle Solaris Cluster 3.3 With Fibre Channel JBOD Storage Device Manual* provides procedures specific to FC JBOD storage devices that are placed in an Oracle Solaris Cluster environment.

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

This book contains one chapter and one appendix.

- Chapter 1, “Installing and Maintaining a Fibre Channel JBOD Storage Device,” contains:
 - “Installing Storage Arrays” on page 11 discusses how to install FC JBOD storage devices.
 - “Maintaining Storage Arrays” on page 15 describes how to maintain FC JBOD storage devices in a running cluster.
- Appendix A, “Cabling Diagrams,” illustrates installation and maintenance configurations.

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 Fibre Channel JBOD Storage Device Manual

Revision Date	New Information
January 2009	Updated Preface with links to different versions of Sun Cluster documentation.
September 2010	Updated the product name throughout the book; removed old CLI commands for the 3.3 release; and removed examples for previous software versions.

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.

The related books are organized by the following products and subjects:

- [Sun StorEdge A5x00 Storage Array](#)
- [Oracle Solaris Cluster and Sun Cluster Documentation](#)

TABLE P-2 Sun StorEdge A5x00 Storage Array

Title	Part Number
<i>Sun StorEdge A5000 Configuration Guide</i>	805-0264
<i>Sun StorEdge A5000 Installation and Service Manual</i>	802-7573
Available at http://www.sun.com/products-n-solutions/hardware/docs/pdf/805-0070-11.pdf	
<i>Sun StorEdge A5000 Product Note</i>	805-1018

TABLE P-3 Oracle Solaris Cluster and Sun Cluster Documentation

Documentation
Oracle Solaris Cluster 3.3

TABLE P-3 Oracle Solaris Cluster and Sun Cluster Documentation (Continued)

Documentation

[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
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices
<code>psrinfo -v</code>	Displays information about processors
<code>showrev -p</code>	Reports which patches are installed
<code>prtdiag -v</code>	Displays system diagnostic information

Command	Function
<code>/usr/cluster/bin/clnode show-rev</code>	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 \(http://docs.sun.com\)](http://docs.sun.com)
- [Support \(http://www.oracle.com/us/support/systems/index.html\)](http://www.oracle.com/us/support/systems/index.html)
- [Training \(http://education.oracle.com\)](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 \(http://www.oracle.com/technetwork/index.html\)](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 \(http://forums.oracle.com\)](http://forums.oracle.com).
- Get hands-on step-by-step tutorials with [Oracle By Example \(http://www.oracle.com/technology/obe/start/index.html\)](http://www.oracle.com/technology/obe/start/index.html).
- Download [Sample Code \(http://www.oracle.com/technology/sample_code/index.html\)](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 <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name%</code> you have mail.
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name%</code> su Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . A <i>cache</i> is a copy that is stored locally. Do <i>not</i> 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 shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P-5 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	\$
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	<code>machine_name%</code>
C shell for superuser	<code>machine_name#</code>

Installing and Maintaining a Fibre Channel JBOD Storage Device

This chapter describes the procedures about how to install, configure, and maintain fibre channel (FC) JBOD storage devices in an Oracle Solaris Cluster environment.

The procedures in this chapter apply to the Sun StorEdge A5x00.

This chapter contains the following main sections:

- “Installing Storage Arrays” on page 11
- “Maintaining Storage Arrays” on page 15

For information about how to use storage arrays in a storage area network (SAN), see “[SAN Solutions in an Oracle Solaris Cluster Environment](#)” in *Oracle Solaris Cluster 3.3 Hardware Administration Manual*.

Installing Storage Arrays

This section contains instructions on installing arrays both to new clusters and operational 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 Storage Array in a New Cluster” on page 12
Add a storage array to an operational cluster.	“How to Add the <i>First</i> Storage Array to an Existing Cluster” on page 12 “How to Add a <i>Subsequent</i> Storage Array to an Existing Cluster” on page 14

▼ How to Install a Storage Array in a New Cluster

This procedure assumes you are installing one or more storage arrays at initial installation of a cluster.

1 Install host adapters in the nodes that are to be connected to the storage array.

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

Note – To ensure maximum redundancy, put each host adapter on a separate I/O board, if possible.

2 Cable the storage arrays to the nodes.

For cabling diagrams, see [Appendix A, “Cabling Diagrams.”](#)

3 Check the revision number for the storage array's controller firmware. If necessary, install the most recent firmware.

For more information, see your storage documentation. For a list of storage documentation, see [“Related Documentation” on page 6.](#)

▼ How to Add the *First* Storage Array to an Existing Cluster

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

- Your cluster is operational.
- You do *not* have an existing storage array that is installed and configured.

If you are installing a storage array in a running cluster that already has storage arrays installed and configured, use the procedure in [“How to Add a *Subsequent* Storage Array to an Existing Cluster” on page 14.](#)

1 Determine if the storage array packages need to be installed on the nodes. These nodes are the nodes to which you are connecting the storage array. This product requires the following packages.

```
# pkginfo | egrep Wlux
system SUNWld Sun Enterprise Network Array sf Device Driver
system SUNWluxdx Sun Enterprise Network Array sf Device Driver
                    (64-bit)
system SUNWluxl Sun Enterprise Network Array social Device Driver
system SUNWluxlx Sun Enterprise Network Array social Device Driver
                    (64-bit)
system SUNWluxop Sun Enterprise Network Array firmware and utilities
system SUNWluxox Sun Enterprise Network array libraries (64 bit)
```

2 On each node, install any necessary packages for the Oracle Solaris Operating System.

The storage array packages are located in the `Product` directory of the CD-ROM. Use the `pkgadd` command to add any necessary packages.

```
# pkgadd -G -d path_to_Solaris/Product Pkg1 Pkg2 Pkg3 ... PkgN
```

`-G` Add package(s) in the current zone only. When used in the global zone, the package is added to the global zone only and is not propagated to any existing or yet-to-be-created non-global zone. When used in non-global zone, the package(s) are added to the non-global zone only.

`path_to_Solaris` Path to the Oracle Solaris Operating System

`Pkg1 Pkg2` The packages to be added

3 Shut down and power off any node that is connected to the storage array.

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

4 Install host adapters in the node that is to be connected to the storage array.

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

5 Cable, configure, and power on the storage array.

For cabling diagrams, see [Appendix A, “Cabling Diagrams.”](#)

6 To create the new Oracle Solaris device files and links, perform a reconfiguration boot by adding `-r` to your boot instruction.

For more information about how to boot nodes, see [Chapter 3, “Shutting Down and Booting a Cluster,”](#) in *Oracle Solaris Cluster System Administration Guide*.

7 Determine if any patches need to be installed on nodes that are to be connected to the storage array.

For a list of patches specific to Oracle Solaris Cluster, see your Oracle Solaris Cluster release notes documentation.

8 Obtain and install any necessary patches on the nodes that are to be connected to the storage array.

For procedures about how to apply patches, see your Oracle Solaris Cluster system administration documentation.

Note – Read any README files that accompany the patches before you begin this installation. Some patches must be installed in a specific order.

9 If required by the patch README instructions, shut down and reboot the node.

For the procedure about how to shut down and power off a node, see [Chapter 3, “Shutting Down and Booting a Cluster,”](#) in *Oracle Solaris Cluster System Administration Guide*.

10 Perform [Step 3](#) through [Step 9](#) for each node that is attached to the storage array.

11 Perform volume management administration to add the disk drives in the storage array to the volume management configuration.

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

▼ **How to Add a *Subsequent* Storage Array to an Existing Cluster**

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

- Your cluster is operational.
- You have an existing storage array that is installed and configured.

If you are installing a storage array in a running cluster that does not yet have a storage array that is installed, use the procedure in “[How to Add the *First* Storage Array to an Existing Cluster](#)” on page 12.

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.modify` RBAC (role-based access control) authorization.

1 Configure the new storage array.

Note – Each storage array in the loop must have a unique box ID. If necessary, use the front-panel module (FPM) to change the box ID for the new storage array that you are adding. For more information about loops and general configuration, see the [Sun StorEdge A5000 Configuration Guide](#) and the *Sun StorEdge A5000 Installation and Service Manual*.

2 On both nodes, insert the new storage array into the cluster. Add paths to the disk drives.

```
# luxadm insert_device
```

Please hit <RETURN> when you have finished adding Fibre Channel Enclosure(s)/Device(s):

Note – Do not press the Return key until you complete [Step 3](#).

- 3 Cable the new storage array to a spare port in the existing hub, switch, or host adapter in your cluster.**

For cabling diagrams, see [Appendix A, “Cabling Diagrams.”](#)

Note – You must use FC switches when installing storage arrays in a partner-group configuration. If you want to create a storage area network (SAN) by using two FC switches and Sun SAN software, see “[SAN Solutions in an Oracle Solaris Cluster Environment](#)” in *Oracle Solaris Cluster 3.3 Hardware Administration Manual*.

- 4 After you cable the new storage array, press the Return key to complete the `luxadm insert_device` operation.**

```
Waiting for Loop Initialization to complete...
New Logical Nodes under /dev/dsk and /dev/rdisk :
c4t98d0s0
c4t98d0s1
c4t98d0s2
c4t98d0s3
c4t98d0s4
c4t98d0s5
c4t98d0s6
...
New Logical Nodes under /dev/es:
ses12
ses13
```

- 5 On both nodes, verify that the new storage array is visible to both nodes.**
`luxadm probe`
- 6 On one node, update the DID database.**
`cldevice populate`

Maintaining Storage Arrays

The maintenance procedures in “[FRUs That Do Not Require Oracle Solaris Cluster Maintenance Procedures](#)” on page 16 are performed the same as in a noncluster environment. [Table 1–2](#) lists the procedures that require cluster-specific steps.

TABLE 1-2 Task Map: Maintaining a Storage Array

Task	Information
Remove a storage array	“How to Remove a Storage Array” on page 19
Replace a storage array	“How to Replace a Storage Array” on page 17
Add a disk drive	“How to Add a Disk Drive” on page 20
Remove a disk drive	“How to Remove a Disk Drive” on page 21
Replace a disk drive	“How to Replace a Disk Drive” on page 23

FRUs That *Do Not* Require Oracle Solaris Cluster Maintenance Procedures

Each storage device has a different set of FRUs that do not require cluster-specific procedures.

Choose among the following storage devices:

- [Sun StorEdge A5x00](#)

Sun StorEdge A5x00 FRUs

The following is a list of administrative tasks that require no cluster-specific procedures. See the *Sun StorEdge A5000 Installation and Service Manual* for the following procedures.

- Replace an AC power filter
- Replace a backplane
- Replace a chassis
- Replace a door panel assembly
- Replace a fan tray
- Remove a fiber-optic cable
- Replace an FPM
- Remove a GBIC
- Replace an interconnect assembly
- Replace an interface board
- Replace a power supply

▼ How to Replace a Storage Array

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

- Your cluster is operational.
- You want to retain the existing disk drives in the storage array.

If you want to replace your disk drives, see [“How to Replace a Disk Drive” on page 23](#).

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.modify` RBAC authorization.

[Example 1–1](#) shows you how to apply this procedure.

1 If possible, back up the metadevices or volumes that reside in the storage array.

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

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

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

3 On all nodes that are connected to the storage array, run the `luxadm remove_device` command.

```
# luxadm remove_device -F boxname
```

See [Example 1–1](#) for an example of this command and its use.

4 Disconnect the fiber-optic cables from the storage array.

5 Power off and disconnect the storage array from the AC power source.

For more information, see your storage documentation. For a list of storage documentation, see [“Related Documentation” on page 6](#).

6 Connect the fiber optic cables to the new storage array.

7 Connect the new storage array to an AC power source.

8 One disk drive at a time, remove the disk drives from the old storage array. Insert the disk drives into the same slots in the new storage array.

9 Power on the storage array.

10 Use the `luxadm insert_device` command to find the new storage array.

Repeat this step for each node that is connected to the storage array.

```
# luxadm insert_device
```

See [Example 1–1](#) for an example of this command and its use.

11 On all nodes that are connected to the new storage array, upload the new information to the DID driver.

If a volume management daemon such as `vold` is running on your node, and you have a CD-ROM drive that is connected to the node, a device busy error might be returned even if no disk is in the drive. This error is an expected behavior.

Use the following command:

```
# cldevice populate
```

12 Perform volume management administration to add the new storage array to the configuration.

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

Example 1–1 Replacing a Sun StorEdge A5x00 Storage Array When Using Oracle Solaris Cluster 3.3 Software

The following example shows how to replace a Sun StorEdge A5x00 storage array when using Oracle Solaris Cluster 3.3 software. The storage array to be replaced is `venus1`.

```
# luxadm remove_device -F venus1
```

WARNING!!! Please ensure that no filesystems are mounted on these device(s).
All data on these devices should have been backed up.

The list of devices that will be removed is:

```
1: Box name:      venus1
   Node WWN:      123456789abcdeff
   Device Type:   SENA (SES device)
   SES Paths:
       /devices/nodes@1/sbus@1f,0/SUNW,socal@1,0/sf@0,0/ \
       ses@w123456789abcdf03,0:0
       /devices/nodes@1/sbus@1f,0/SUNW,socal@1,0/sf@1,0/ \
       ses@w123456789abcdf00,0:0
```

Please verify the above list of devices and then enter 'c' or <CR> to Continue or 'q' to Quit. [Default: c]:

<Return>

Hit <Return> after removing the device(s). <Return>

```
# luxadm insert_device
```

Please hit <RETURN> when you have finished adding Fibre Channel Enclosure(s)/Device(s): <Return>

```
# cldevice populate
```

▼ How to Remove a Storage Array

Use this procedure to remove a storage array from a cluster. [Example 1–2](#) shows you how to apply this procedure. Use the procedures in your server hardware manual to identify the storage array.

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.modify` RBAC authorization.

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

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

2 On all nodes that are connected to the storage array, run the `luxadm remove_device` command.

```
# luxadm remove_device -F boxname
```

3 Remove the storage array and the fiber-optic cables that are connected to the storage array.

For more information, see your storage documentation. For a list of storage documentation, see [“Related Documentation”](#) on page 6.

Note – If you are using your storage arrays in a SAN-configured cluster, you must keep two FC switches configured in parallel. This configuration maintains cluster availability. See [“SAN Solutions in an Oracle Solaris Cluster Environment”](#) in *Oracle Solaris Cluster 3.3 Hardware Administration Manual* for more information.

4 On all nodes, remove references to the storage array.

```
# devfsadm -C
# cldevice populate
```

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

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

Example 1–2 Removing a Sun StorEdge A5x00 Storage Array When Using Oracle Solaris Cluster 3.3 Software

The following example shows how to remove a Sun StorEdge A5x00 storage array from a cluster running Oracle Solaris Cluster version 3.3 software. The storage array to be removed is `venus1`.

```
# luxadm remove_device -F venus1
WARNING!!! Please ensure that no file systems are mounted on these device(s).
All data on these devices should have been backed up.
```

The list of devices that will be removed is:

```
1: Storage Array:   venus1
   Node WWN:       123456789abcdeff
   Device Type:    SENA (SES device)
   SES Paths:
     /devices/nodes@1/sbus@1f,0/SUNW,socal@1,0/sf@0,0/   \
       ses@w123456789abcdf03,0:0
     /devices/nodes@1/sbus@1f,0/SUNW,socal@1,0/sf@1,0/   \
       ses@w123456789abcdf00,0:0
```

Please verify the above list of devices and then enter 'c' or <CR> to Continue or 'q' to Quit. [Default: c]: **<Return>**

Hit <Return> after removing the device(s). <Return>

```
# devfsadm -C
# cldevice populate
```

▼ How to Add a Disk Drive

For conceptual information about quorums, quorum devices, global devices, and device IDs, see your Oracle Solaris Cluster concepts documentation. For a list of Oracle Solaris Cluster documentation, see [“Related Documentation” on page 6](#).

Before You Begin This procedure assumes that your cluster is operational.

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` and `solaris.cluster.modify` RBAC authorization.

1 On one node that is connected to the storage array, install the new disk.

Install the new disk drive. Press the Return key when prompted. You can insert multiple disk drives at the same time.

```
# luxadm insert_device enclosure,slot
```

2 On all other nodes that are attached to the storage array, probe all devices. Write the new disk drive to the `/dev/rdisk` directory.

The amount of time that the `devfsadm` command requires to complete its processing depends on the number of devices that are connected to the node. Expect at least five minutes.

```
# devfsadm -C
```

3 Ensure that entries for the disk drive have been added to the /dev/rdisk directory.

```
# ls -l /dev/rdisk
```

4 If necessary, partition the disk drive.

You can use either the `format(1M)` command or copy the partitioning from another disk drive in the storage array.

5 From any node in the cluster, update the global device namespace.

If a volume management daemon such as `vold` is running on your node, and you have a CD-ROM drive connected to the node, a device busy error might be returned even if no disk is in the drive. This error is an expected behavior.

Run the following command:

```
# cldevice populate
```

6 Verify that a device ID (DID) has been assigned to the disk drive.

Note – The DID that was assigned to the new disk drive might not be in sequential order in the storage array.

```
# cldevice list -v
```

7 Perform necessary volume management administration actions on the new disk drive.

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

▼ How to Remove a Disk Drive

For conceptual information about quorum, quorum devices, global devices, and device IDs, see your Oracle Solaris Cluster concepts documentation. For a list of Oracle Solaris Cluster documentation, see [“Related Documentation” on page 6](#).

[Example 1–3](#) shows you how to apply this procedure.

Before You Begin This procedure assumes that your cluster is operational.

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` and `solaris.cluster.modify` RBAC authorization.

- 1 **Determine whether the disk drive that you want to remove is configured as a quorum device.**

```
# clquorum show
```

- 2 **If the disk drive you want to remove is configured as a quorum device, choose and configure another device to be the new quorum device. Then remove the old quorum device.**

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

- 3 **If possible, back up the metadvice or volume.**

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

- 4 **Perform volume management administration to remove the disk drive from the configuration.**

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

- 5 **Identify the disk drive that needs to be removed.**

If the disk error message reports the drive problem by DID, determine the Oracle Solaris device name.

```
# cldevice list -v
```

- 6 **On any node that is connected to the storage array, run the `luxadm remove_device` command.**

Remove the disk drive. Press the Return key when prompted.

```
# luxadm remove_device -F /dev/rdisk/cNtXdYsZ
```

- 7 **On all connected nodes, remove references to the disk drive.**

```
# devfsadm -C  
# cldevice clear
```

Example 1–3 Removing a Disk Drive in a Sun StorEdge A5x00 Storage Array When Using Oracle Solaris Cluster 3.3 Software

The following example shows how to remove a disk drive from a Sun StorEdge A5x00 storage array in a cluster running Oracle Solaris Cluster version 3.3 software. The disk drive to be removed is d4 and is a virtual table of contents (VTOC) labelled device.

```
# cldevice list -v
```

```
=== DID Device Instances ===
```

DID Device Name:	/dev/did/rdisk/d4
Full Device Path:	phys0-schost1:/dev/rdisk/clt1d0
Full Device Path:	phys-schost2:/dev/rdisk/clt1d0
Replication:	none
default_fencing:	global

```
# luxadm remove_device -F /dev/rdisk/clt32d0s2

WARNING!!! Please ensure that no file systems are mounted on these device(s).
All data on these devices should have been backed up.

The list of devices that will be removed is:
    1: Box Name "venus1" front slot 0

Please enter 'q' to Quit or <Return> to Continue: <Return>

stopping: Drive in "venus1" front slot 0....Done
offlining: Drive in "venus1" front slot 0....Done

Hit <Return> after removing the device(s). <Return>

Drive in Box Name "venus1" front slot 0
Logical Nodes being removed under /dev/dsk/ and /dev/rdisk:
    clt32d0s0
    clt32d0s1
    clt32d0s2
    clt32d0s3
    clt32d0s4
    clt32d0s5
    clt32d0s6
    clt32d0s7
# devfsadm -C
# cldevice clear
```

▼ How to Replace a Disk Drive

For conceptual information about quorum, quorum devices, global devices, and device IDs, see your Oracle Solaris Cluster concepts documentation.

Before You Begin This procedure assumes that your cluster is operational.

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` and `solaris.cluster.modify` RBAC authorization.

1 Identify the disk drive that needs replacement.

If the disk error message reports the drive problem by device ID (DID), determine the Oracle Solaris logical device name. If the disk error message reports the drive problem by the Oracle Solaris physical device name, use your Oracle Solaris documentation to map the Oracle Solaris physical device name to the Oracle Solaris logical device name. Use this Oracle Solaris *logical* device name and DID throughout this procedure.

Run the following command:

```
# cldevice list -v
```

- 2 Determine whether the disk drive that you want to replace is configured as a quorum device.**

```
# clquorum show
```

- 3 If the disk drive that you want to replace is configured as a quorum device, add a new quorum device on a different storage array. Remove the old quorum device.**

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

- 4 If possible, back up the metadevice or volume.**

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

- 5 Identify the failed disk drive's physical DID.**

Use this physical DID in [Step 14](#) to verify that the failed disk drive has been replaced with a new disk drive. The DID and the world wide name (WWN) for the disk drive are the same.

Use the following command:

```
# cldevice list -v
```

- 6 If you are using Veritas Volume Manager, proceed to [Step 8](#).**

- 7 If you are using Solaris Volume Manager, save the disk partitioning information to partition the new disk drive.**

```
# prtvtoc /dev/rdisk/cNtXdYs2 > filename
```

Note – You can also use the `format` utility to save the disk's partition information.

- 8 On any node that is connected to the storage array, remove the disk drive when prompted.**

```
# luxadm remove_device -F /dev/rdisk/cNtXdYs2
```

After running the command, warning messages might display. These messages can be ignored.

- 9 On any node that is connected to the storage array, run the `luxadm insert_device` command. Add the new disk drive when prompted.**

```
# luxadm insert_device boxname,fslotnumber
```

or

```
# luxadm insert_device boxname,fslotnumber
```

If you are inserting a front disk drive, use the `fslotnumber` parameter. If you are inserting a rear disk drive, use the `rslotnumber` parameter.

- 10 On all other nodes that are attached to the storage array, probe all devices. Write the new disk drive to the `/dev/rdisk` directory.**

The amount of time that the `devfsadm` command requires to complete depends on the number of devices that are connected to the node. Expect at least five minutes.

```
# devfsadm -C
```

- 11 If you are using IfVeritas Volume Manager, proceed to [Step 13](#).**
- 12 If you are using Solaris Volume Manager, on one node that is connected to the storage array, partition the new disk drive. Use the partitioning information you saved in [Step 6](#).**

```
# fmthard -s filename /dev/rdisk/cNtXdYs2
```

Note – You can also use the `format` utility to partition the new disk drive.

- 13 From all nodes that are connected to the storage array, update the DID database and driver.**

```
# cldevice repair
```

- 14 On any node, confirm that the failed disk drive has been replaced. Compare the following physical DID to the physical DID in [Step 5](#).**

If the following physical DID is different from the physical DID in [Step 5](#), you successfully replaced the failed disk drive with a new disk drive.

Use the following command:

```
# cldevice list -v
```

- 15 Perform volume management administration to add the disk drive back to its diskset or disk group.**

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

- 16 If you want this new disk drive to be a quorum device, add the quorum device.**

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

Cabling Diagrams

This appendix provides cabling diagrams for installation and maintenance of Fibre Channel JBOD storage devices. It contains the following sections:

- [Sun StorEdge A5x00](#)

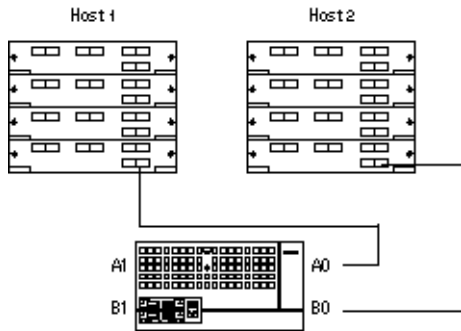
Sun StorEdge A5x00 Cabling Diagrams

Installing a Storage Array

[Figure A-1](#) shows a sample storage array configuration.

Note – You must use FC switches when you install storage arrays in a partner-group configuration. If you want to create a storage area network (SAN) by using two FC switches and Sun SAN software, see “[SAN Solutions in an Oracle Solaris Cluster Environment](#)” in *Oracle Solaris Cluster 3.3 Hardware Administration Manual* for more information.

FIGURE A-1 Installing a Sun StorEdge A5x00 Storage Array in a Full-Loop Configuration



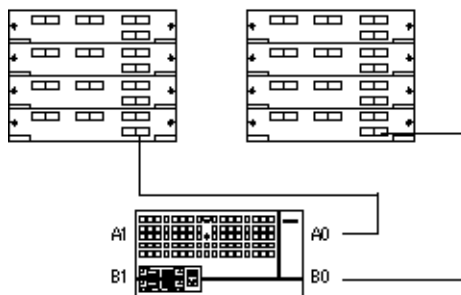
For more information about how to cable and configure storage arrays, see the *Sun StorEdge A5000 Installation and Service Manual*.

Adding a Storage System

Figure A-2 shows a sample storage array configuration.

Note – You must use FC switches when installing storage arrays in a partner-group configuration. If you want to create a storage area network (SAN) by using two FC switches and Sun SAN software, see “SAN Solutions in an Oracle Solaris Cluster Environment” in *Oracle Solaris Cluster 3.3 Hardware Administration Manual* for more information.

FIGURE A-2 Adding a Sun StorEdge A5x00 Storage Array in a Full-Loop Configuration



For more information about how to cable and configure storage arrays, see the *Sun StorEdge A5000 Configuration Guide* and the *Sun StorEdge A5000 Configuration Guide*.

Index

A

AC power filter, replacing, 16
adding
 See also installing
 disk drives, 20–21
 first storage array, 12–14
 subsequent storage arrays, 14–15

B

backplane, replacing, 16

C

cabling, storage arrays, 27–28
chassis, replacing, 16

D

disk drives
 adding, 20–21
 removing, 21–23
 replacing, 23–25
door panel assembly, replacing, 16

F

fan tray, replacing, 16
fiber optic cable, replacing, 16

FPM, replacing, 16

FRUs, 16

G

GBIC, replacing, 16

H

help, 7–8

I

installing
 See also adding
 storage arrays, 12
interconnect assembly, replacing, 16
interface board, replacing, 16

M

maintaining storage arrays, 15–25

P

power supply, replacing, 16

R

removing

- disk drives, 21–23
- storage arrays, 19–20

replacing

- AC power filter, 16
- backplane, 16
- chassis, 16
- disk drives, 23–25
- door panel assembly, 16
- fan tray, 16
- fiber optic cable, 16
- FPM, 16
- GBIC, 16
- interconnect assembly, 16
- interface board, 16
- power supply, 16
- storage arrays, 17–18

S

storage arrays

- adding subsequent, 14–15
- adding the first, 12–14
- cabling, 27–28
- installing, 12
- maintaining, 15–25
- removing, 19–20
- replacing, 17–18

T

technical support, 7–8