

# **Oracle® Solaris Cluster 3.3 With StorageTek 2540 RAID Arrays Manual**

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# Preface

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The *Oracle Solaris Cluster 3.3 With StorageTek 2540 RAID Arrays Manual* provides procedures that are specific to Oracle's StorageTek 2540 array that is placed in an Oracle Solaris Cluster environment.

Use this manual with any version of Oracle Solaris Cluster 3.3 software on SPARC based clusters or x86 based clusters.

This book assumes that you are performing one or more of the following tasks:

- You want to replace an array component to *prevent* a failure.
- You want to replace an array component because you have an *existing* failure.
- You want to add (to an *established* cluster) or install (to a *new* cluster) a storage array.

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**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.

The information in this document pertains to both platforms unless otherwise specified in a special chapter, section, note, bulleted item, figure, table, or example.

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## 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 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 the following chapters:

- [Chapter 1, “Requirements and Restrictions,”](#) lists limitations of your use of Oracle’s Sun StorageTek 2540 storage arrays in an Oracle Solaris Cluster environment.
- [Chapter 2, “Installing and Configuring a StorageTek Array,”](#) discusses how to install Sun StorageTek 2540 storage arrays and how to configure logical units on them.
- [Chapter 3, “Maintaining a StorageTek Array,”](#) describes how to maintain Sun StorageTek 2540 storage arrays in a running cluster.

## 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-1 Oracle Solaris Cluster and Sun Cluster Documentation

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**Documentation**

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[Oracle Solaris Cluster 3.3](#)

[Sun Cluster 3.2](#)

[Sun Cluster 3.1](#)

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## 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
<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>) 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](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-2 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% you have mail.</code>
<b>AaBbCc123</b>	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> 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> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. <b>Note:</b> Some emphasized items appear bold online.



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## 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-3 Shell Prompts

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



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CHAPTER 1

# Requirements and Restrictions

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This chapter includes only requirements and restrictions that have a direct impact on the procedures in this book. For general support information, contact your Oracle service provider.

## Requirements for This Array

Requirements do not exist for the StorageTek FC RAID array.

## Restrictions for This Array

When using storage-based replication, do not configure a replicated volume as a quorum device. Locate any quorum devices on an unreplicated volume. See [“Using Storage-Based Data Replication Within a Cluster”](#) in *Oracle Solaris Cluster System Administration Guide* for more information on storage-based replication.



# Installing and Configuring a StorageTek Array

---

This chapter contains the procedures about how to install and configure StorageTek FC RAID arrays. These procedures are specific to an Oracle Solaris Cluster environment.

This chapter contains the following main topics:

- “Installing Storage Arrays” on page 13
- “Configuring Storage Arrays” on page 17

For detailed information about storage array architecture, features, configuration utilities, and installation, see the StorageTek documentation listed in “Related Documentation” on page 6.

## Installing Storage Arrays

This section contains the procedures that are listed in [Table 2-1](#).

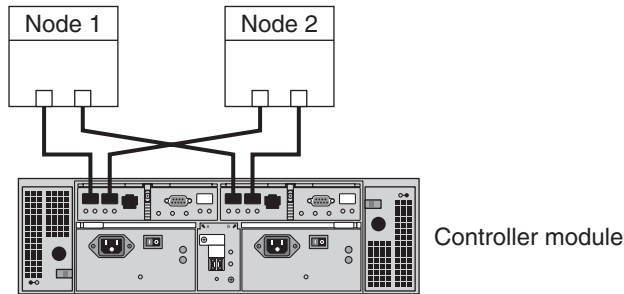
TABLE 2-1 Task Map: Installing Storage Arrays

Task	Information
Install a storage array in a new cluster, before the OS and Oracle Solaris Cluster software are installed.	<a href="#">“How to Install Storage Arrays in a New Cluster” on page 14</a>
Add a storage array to an existing cluster.	<a href="#">“How to Add Storage Arrays to an Existing Cluster” on page 16</a>

## Storage Array Cabling Configurations

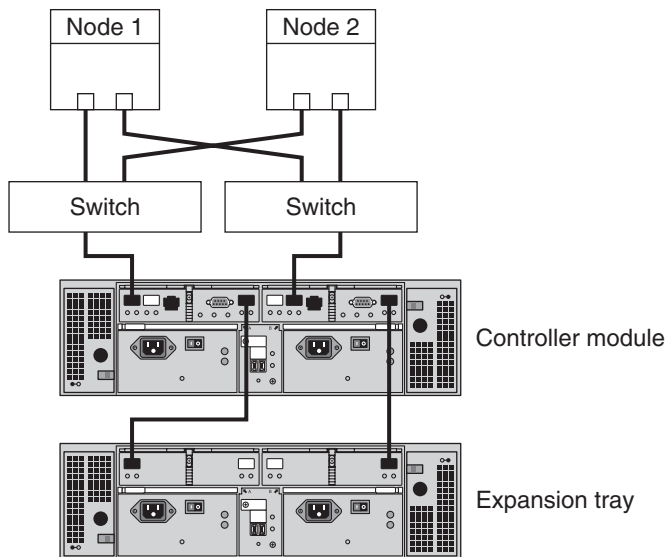
You can install your storage array in several different configurations: [Figure 2-1](#) and [Figure 2-2](#) are two examples.

FIGURE 2-1 StorageTek 2540 Array Direct-Connect Configuration



**Note** – The StorageTek 2540 array houses two controllers, each having two host ports. The cabling approach is the same as shown in [Figure 2-1](#).

FIGURE 2-2 StorageTek 2540 Array Switched Configuration



## How to Install Storage Arrays in a New Cluster

Use this procedure to install a storage array in a new cluster. To add a storage array to an existing cluster, use the procedure in [“How to Add Storage Arrays to an Existing Cluster”](#) on [page 16](#).

This procedure relies on the following assumptions:

- You have *not* installed the Oracle Solaris Operating System.
- You have *not* installed the Oracle Solaris Cluster software.
- Your cluster has *not* been established.
- You have enough host adapters to connect the nodes and the storage array to the service processor panel.

If you need to install host adapters, see “[How to Replace a Host Adapter](#)” on page 28. When this procedure asks you to replace the failed host adapter, simply install the new host adapter instead.

## ▼ Install and Cable the Hardware

### 1 **Unpack, place, and level your storage array.**

For the procedure about how to unpack, place, and level your storage array, see [Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0](#).

### 2 **(Optional) If you do not have a Fibre Channel (FC) switch installed, install it for the storage array.**

For the procedure about how to install an FC switch, see the documentation that shipped with your FC switch hardware.

### 3 **Connect the nodes.**

- *(Direct-Attached Configuration)* To see how to connect each node to the host ports on the array, see [Figure 2–1](#).
- *(SAN Configuration)* To see how to connect the nodes to the ports of the FC switches, see [Figure 2–2](#).

For instructions, see [Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0](#).

### 4 **Install the storage array.**

For instructions, see [Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0](#).

### 5 **Power on the storage array nodes, and if necessary, the FC switches.**

For instructions, see [Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0](#).

## ▼ Install the Solaris Operating System

- 1 **On all nodes, install the Oracle Solaris operating system and apply the required Solaris patches for Oracle Solaris Cluster software and storage array support.**

For the procedure about how to install the Solaris operating environment, see “[How to Install Solaris Software](#)” in *Oracle Solaris Cluster Software Installation Guide* “[How to Install Solaris Software](#)” in *Oracle Solaris Cluster Software Installation Guide*.

- 2 **Oracle Solaris 10 automatically installs Solaris I/O multipathing. Verify that the paths to the storage device are functioning.**

- See Also**
- To create a logical volume, see “[How to Create a Logical Volume](#)” on page 18.
  - To continue with Oracle Solaris Cluster software installation tasks, see your Oracle Solaris Cluster software installation documentation.

## ▼ How to Add Storage Arrays to an Existing Cluster

Use this procedure to add a new storage array to a *running* cluster. To install a new storage array in an Oracle Solaris Cluster configuration that is not running, use the procedure in “[How to Install Storage Arrays in a New Cluster](#)” on page 14.

**Before You Begin** This procedure relies on the following assumptions:

- (*Veritas Volume Manager Only*) You have a version of Veritas Volume Manager that includes Array Support Library (ASL). For more information on this requirement, see “[Requirements for This Array](#)” on page 11.
- You have enough host adapters to connect the nodes and the storage array to the service processor panel.  
If you need to install host adapters, see “[How to Replace a Host Adapter](#)” on page 28. When this procedure asks you to replace the failed host adapter, simply install the new host adapter instead.
- You do *not* need to install a new node in your cluster.  
If you need to add a node to your cluster, see your Oracle Solaris Cluster system administration documentation. Ensure that you install the required Solaris patches for storage array support.

- 1 **Unpack, place, and level your storage array.**

For the procedure about how to unpack, place, and level your storage array, see *Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0*.



**2 (Optional) If you do not have a Fibre Channel (FC) switch installed, install it for the storage array.**

For the procedure about how to install an FC switch, see the documentation that shipped with your FC switch hardware.

**3 Connect the nodes.**

- *(Direct-Attached Configuration)* To see how to connect each node to the host ports on the array, see [Figure 2–1](#).
- *(SAN Configuration)* To see how to connect the nodes to the ports of the FC switches, see [Figure 2–2](#).

For instructions, see *Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0*.

**4 Install the storage array.**

For instructions, see *Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0*.

**5 Power on the storage array nodes, and if necessary, the FC switches.**

For instructions, see *Sun StorageTek 2500 Series Array Hardware Installation Guide, v1.0*.

- See Also**
- To create a logical volume, see “[How to Create a Logical Volume](#)” on page 18.
  - If you added a new node, perform the steps in “[Install the Solaris Operating System](#)” on [page 16](#) as appropriate. Apply the correct patches for storage array support enable multipathing.

## Configuring Storage Arrays

This section contains the procedures about how to configure a storage array in a running cluster. [Table 2–2](#) lists these procedures.

TABLE 2–2 Task Map: Configuring a Storage Array

Task	Information
Create a logical volume.	“ <a href="#">How to Create a Logical Volume</a> ” on page 18
Remove a logical volume.	“ <a href="#">How to Remove a Logical Volume</a> ” on page 20

The following list outlines administrative tasks that require no cluster-specific procedures. See the storage array's online help for the following procedures.

- Creating a storage pool
- Removing a storage pool
- Creating a host group
- Removing a host group
- Adding a host to a host group
- Removing a host from a host group
- Adding initiators
- Removing initiators

## ▼ How to Create a Logical Volume

Use this procedure to create a logical volume from unassigned storage capacity.

---

**Note** – Oracle's Sun storage documentation uses the following terms:

- Logical volume
- Logical device
- Logical unit number (LUN)

This manual uses *logical volume* to refer to all such logical constructs.

---

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

- All nodes are booted in cluster mode and attached to the storage device.
- The storage device is installed and configured. If you are using multipathing, the storage device is configured as described in the installation procedure.
- If you are using Solaris I/O multipathing (MPxIO) for the Oracle Solaris 10 OS, previously called Sun StorEdge Traffic Manager in the Solaris 9 OS, verify that the paths to the storage device are functioning. To configure multipathing, see the *Solaris Fibre Channel Storage Configuration and Multipathing Support Guide*.

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.

- 1 **Become superuser or assume a role that provides `solaris.cluster.modify` role-based access control (RBAC) authorization.**
- 2 **Follow the instructions in your storage device's documentation to create and map the logical volume. For a URL to this storage documentation, see ["Related Documentation"](#) on page 6.**

- Completely set up the logical volume. When you are finished, the volume must be created, mapped, mounted, and initialized.
- If necessary, partition the volume.
- To allow multiple clusters and nonclustered nodes to access the storage device, create initiator groups by using LUN masking.

**3 If you are not using multipathing, skip to [Step 5](#).**

**4 If you are using multipathing, and if any devices that are associated with the volume you created are at an unconfigured state, configure the multipathing paths on each node that is connected to the storage device.**

To determine whether any devices that are associated with the volume you created are at an unconfigured state, use the following command.

```
# cfmadm -al | grep disk
```

---

**Note** – To configure the Oracle Solaris I/O multipathing paths on each node that is connected to the storage device, use the following command.

```
# cfmadm -o force_update -c configure controllerinstance
```

---

To configure multipathing, see the *Solaris Fibre Channel Storage Configuration and Multipathing Support Guide*.

**5 On one node that is connected to the storage device, use the `format` command to label the new logical volume.**

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

```
# cldevice populate
```

---

**Note** – You might have a volume management daemon such as `vold` running on your node, and have a DVD drive connected to the node. Under these conditions, a device busy error might be returned even if no disk is inserted in the drive. This error is expected behavior. You can safely ignore this error message.

**7 To manage this volume with volume management software, use Solaris Volume Manager or Veritas Volume Manager commands to update the list of devices on all nodes that are attached to the new volume that you created.**

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

- See Also**
- To configure a logical volume as a quorum device, see [Chapter 6, “Administering Quorum,”](#) in *Oracle Solaris Cluster System Administration Guide*.

- To create a new resource or configure a running resource to use the new logical volume, see [Chapter 2, “Administering Data Service Resources,”](#) in *Oracle Solaris Cluster Data Services Planning and Administration Guide*.

## ▼ How to Remove a Logical Volume

Use this procedure to remove a logical volume. This procedure defines Node A as the node with which you begin working.

---

**Note** – Sun storage documentation uses the following terms:

- Logical volume
- Logical device
- Logical unit number (LUN)

This manual uses *logical volume* to refer to all such logical constructs.

---

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

- All nodes are booted in cluster mode and attached to the storage device.
- The logical volume and the path between the nodes and the storage device are both 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.

**1 Become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC authorization.**

**2 Identify the logical volume that you are removing.**

Refer to your Solaris Volume Manager or Veritas Volume Manager documentation for more information.

**3 (Optional) Migrate all data off the logical volume that you are removing. Alternatively, back up that data.**

**4 If the LUN that you are removing is configured as a quorum device, choose and configure another device as the quorum device. Then remove the old quorum device.**

To determine whether the LUN is configured as a quorum device, use the following command.

```
# clquorum show
```

For procedures about how to add and remove quorum devices, see [Chapter 6, “Administering Quorum,”](#) in *Oracle Solaris Cluster System Administration Guide*.

- 5 If you are using volume management software, use that software to update the list of devices on all nodes that are attached to the logical volume that you are removing.**

For instructions about how to update the list of devices, see your Solaris Volume Manager or Veritas Volume Manager documentation.

- 6 If you are using volume management software, run the appropriate Solaris Volume Manager or Veritas Volume Manager commands to remove the logical volume from any diskset or disk group.**

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

---

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

```
# vxdisk offline Accessname
# vxdisk rm Accessname

Accessname    Disk access name
```

---

- 7 If you are using multipathing, unconfigure the volume in Solaris I/O multipathing.**

```
# cfgadm -o force_update -c unconfigure Logical_Volume
```

- 8 Access the storage device and remove the logical volume.**

To remove the volume, see your storage documentation. For a list of storage documentation, see [“Related Documentation”](#) on page 6.

- 9 Determine the resource groups and device groups that are running on all nodes.**

Record this information because you use it in [Step 14](#) and [Step 15](#) of this procedure to return resource groups and device groups to these nodes.

Use the following command:

```
# clresourcegroup status +
# cldevicegroup status +
```

- 10 Move all resource groups and device groups off Node A.**

```
# clnode evacuate nodename
```

- 11 Shut down and reboot Node A.**

To shut down and boot a node, see [Chapter 3, “Shutting Down and Booting a Cluster,”](#) in *Oracle Solaris Cluster System Administration Guide*.

- 12 On Node A, remove the paths to the logical volume that you removed. Remove obsolete device IDs.**
- ```
# devfsadm -C
# cldevice clear
```
- 13 For each additional node that is connected to the shared storage that hosted the logical volume, repeat [Step 9](#) to [Step 12](#).**
- 14 (Optional) Restore the device groups to the original node.**  
Do the following for each device group that you want to return to the original node.
- ```
# cldevicegroup switch -n nodename devicegroup1[ devicegroup2 ...]
-n nodename
```
- The node to which you are restoring device groups.
- ```
devicegroup1[ devicegroup2 ...]
```
- The device group or groups that you are restoring to the node.
- 15 (Optional) Restore the resource groups to the original node.**  
Do the following for each resource group that you want to return to the original node.
- ```
# clresourcegroup switch -n nodename resourcegroup1[ resourcegroup2 ...]
nodename
```
- 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.

## Maintaining a StorageTek Array

---

This chapter contains the procedures about how to maintain a Sun StorageTek 2540 Fibre Channel RAID array. These procedures are specific to an Oracle Solaris Cluster environment.

This chapter contains the following procedures:

- “How to Upgrade Storage Array Firmware” on page 24
- “How to Remove a Storage Array” on page 25
- “Replacing a Node-to-Switch Component” on page 26
- “How to Replace a Host Adapter” on page 28
- “How to Replace a Disk Drive” on page 30

For detailed information about storage array architecture, features, and configuration utilities, see the StorageTek documentation listed in [“Related Documentation” on page 6](#).

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

In general, the following is a list of administrative tasks that require no cluster-specific procedures. See the base-product documentation for these procedures.

---

**Note** – Depending on your configuration type and the state of your cluster, a few of the following FRUs might require cluster-specific steps. Such FRUs include the DSP and service processor panel.

---

- Adding a disk drive.
- Replacing a storage array's chassis.
- Replacing an Ethernet cable.
- Replacing an Ethernet hub in a cabinet.
- Replacing an expansion cabinet.
- Replacing a fan assembly.

- Replacing the power cable on the storage array.
- Replacing a power and cooling unit (PCU).
- Replacing a controller.
- Replacing a battery.

Before removing a disk drive, stop all I/O to the storage array. There are no other cluster-specific steps.

## Maintaining Storage Arrays

This section contains the procedures about how to maintain a storage system in a running cluster. [Table 3–1](#) lists these procedures.

TABLE 3–1 Task Map: Maintaining a Storage System

| Task                                  | Information                                                                                              |
|---------------------------------------|----------------------------------------------------------------------------------------------------------|
| Remove a storage array.               | <a href="#">“How to Remove a Storage Array” on page 25</a>                                               |
| Upgrade storage array firmware.       | <a href="#">“How to Upgrade Storage Array Firmware” on page 24</a>                                       |
| Replace a node-to-switch component.   | <a href="#">“How to Replace a Node-to-Switch Component in a Cluster Without Multipathing” on page 27</a> |
| Replace a node's host adapter.        | <a href="#">“How to Replace a Host Adapter” on page 28</a>                                               |
| Replace a disk drive.                 | <a href="#">“How to Replace a Disk Drive” on page 30</a>                                                 |
| Add a node to the storage array.      | Oracle Solaris Cluster system administration documentation                                               |
| Remove a node from the storage array. | Oracle Solaris Cluster system administration documentation                                               |

### ▼ How to Upgrade Storage Array Firmware

Use this procedure to upgrade storage array firmware in a running cluster. Storage array firmware includes controller firmware, unit interconnect card (UIC) firmware, EPROM firmware, and disk drive firmware.



---

**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/rdisk/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.

---

- 1 **Stop all I/O to the storage arrays you are upgrading.**
- 2 **Apply the controller, disk drive, and loop-card firmware patches by using the arrays' GUI tools.**  
For specific instructions, see your storage array's documentation.
- 3 **Confirm that all storage arrays that you upgraded are visible to all nodes.**  
`# luxadm probe`
- 4 **Restart all I/O to the storage arrays.**  
You stopped I/O to these storage arrays in [Step 1](#).

## ▼ How to Remove a Storage Array

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

This procedure defines Node N as the node that is connected to the storage array you are removing and the node with which you begin working.




---

**Caution** – During this procedure, you lose access to the data that resides on the storage array that you are removing.

---

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` role-based access control (RBAC) authorization.

- 1 **If necessary, back up all database tables, data services, and volumes.**

- 2 **Remove references to the volumes that reside on the storage array that you are removing.**  
For more information, see your Oracle Solaris Cluster, Solaris Volume Manager, or Veritas Volume Manager documentation.
- 3 **Disconnect the cables that connected Node N to the FC switches in your storage array.**
- 4 **On all nodes, remove the obsolete Oracle Solaris links and device IDs.**  

```
# devfsadm -C  
# cldevice cclear
```
- 5 **Repeat [Step 3](#) through [Step 4](#) for each node that is connected to the storage array.**

## Replacing a Node-to-Switch Component

Use this procedure to replace a node-to-switch component that has failed or that you suspect might be contributing to a problem.

---

**Note** – Node-to-switch components that are covered by this procedure include the following components:

- Node-to-switch fiber-optic cables
- Gigabit interface converters (GBICs) or small form-factor pluggables (SFPs) on an FC switch
- FC switches

To replace a host adapter, see [“How to Replace a Host Adapter”](#) on page 28.

---

This procedure defines Node A as the node that is connected to the node-to-switch component that you are replacing. This procedure assumes that, except for the component you are replacing, your cluster is operational.

Ensure that you are following the appropriate instructions:

- If your cluster uses multipathing, see [“How to Replace a Node-to-Switch Component in a Cluster That Uses Multipathing”](#) on page 27.
- If your cluster does *not* use multipathing, see [“How to Replace a Node-to-Switch Component in a Cluster Without Multipathing”](#) on page 27.

## ▼ How to Replace a Node-to-Switch Component in a Cluster That Uses Multipathing

- 1 If your configuration is active-passive, and if the active path is the path that needs a component replaced, make that path passive.
- 2 Replace the component.  
Refer to your hardware documentation for any component-specific instructions.
- 3 (Optional) If your configuration is active-passive and you changed your configuration in [Step 1](#), switch your original data path back to active.

## ▼ How to Replace a Node-to-Switch Component in a Cluster Without Multipathing

**Before You Begin** 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.

- 1 Become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC authorization.
- 2 If the physical data path has failed, do the following:
  - a. Replace the component.
  - b. Fix the volume manager error that was caused by the failed data path.
  - c. (Optional) If necessary, return resource groups and device groups to this node.

You have completed this procedure.

- 3 If the physical data path has not failed, determine the resource groups and device groups that are running on Node A.

```
# clresourcegroup status -n NodeA
# cldevicegroup status -n NodeA
```

-n *NodeA*     The node for which you are determining resource groups and device groups.

- 4 Move all resource groups and device groups to another node.

```
# clnode evacuate nodename
```

- 5 Replace the node-to-switch component.

Refer to your hardware documentation for any component-specific instructions.



**1 Become superuser or assume a role that provides `solaris.cluster.read` and `solaris.cluster.modify` RBAC authorization.**

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

Record this information because you use this information in [Step 10](#) and [Step 11](#) of this procedure to return resource groups and device groups to Node A.

```
# clresourcegroup status -n NodeA
# cldevicegroup status -n NodeA
```

-n *NodeA* The node for which you are determining resource groups and device groups.

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

```
# clnode evacuate nodename
```

**4 Shut down Node A.**

For the full 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*.

**5 Power off Node A.**

**6 Replace the failed host adapter.**

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 8](#).**

If you do not need to upgrade firmware, skip to [Step 9](#).

**8 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.



- 2 If the failed disk drive affect the storage array logical volume's availability, If yes, use volume manager commands to detach the submirror or plex.**

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

- 3 If the logical volume (in [Step 1](#)) is configured as a quorum device, choose another volume to configure as the quorum device. Then remove the old quorum device.**

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.

- 4 Replace the failed disk drive.**
- 5 (Optional) If the new disk drive is part of a logical volume that you want to be a quorum device, add the quorum device.**

To add a quorum device, see your Oracle Solaris Cluster system administration documentation.

- 6 If you detached a submirror or plex in [Step 1](#), use volume manager commands to reattach the submirror or plex.**

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





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