



Sun Cluster 3.0-3.1 With Sun StorEdge 9900 Series Storage Device Manual

For Solaris OS

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Preface

The *Sun Cluster 3.0-3.1 With Sun StorEdge 9900 Series Storage Device Manual* provides procedures specific to Sun StorEdge™ 9900 Series storage devices that are placed in a Sun™ Cluster environment.

Use this manual with any version of Sun Cluster 3.0 or 3.1 software on SPARC™ based clusters and any supported version of Sun Cluster 3.1 software on x86 based clusters. Unless otherwise noted, procedures are the same for all Sun Cluster 3.0 or 3.1 versions. Unless otherwise noted, procedures are the same for all supported Sun Cluster 3.1 versions on both SPARC and x86 based systems. See the [“Revision History” on page 6](#) for a list of changes to this manual.

Who Should Use This Book

This book is for Sun representatives who are performing the initial installation of a Sun 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 Sun software and hardware. Do not use this document as a planning or presales 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 discusses how to install Sun StorEdge 9900 storage systems and how to configure logical units on Sun StorEdge 9900 storage systems.

Chapter 2 discusses how to add multipathing software to Sun StorEdge 9900 storage systems.

Chapter 3 discusses how to maintain Sun StorEdge 9900 storage systems in a running cluster.

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 Sun Cluster 3.0-3.1 With Sun StorEdge 9900 Series Storage Device Manual

Revision Date	New Information
January 2006	Added information about single dual-port HBA configurations.
November 2005	Qualified the Sun StorEdge 9970, 9980, and 9990 in x86 based clusters.
September 2005	Added support for the Sun StorEdge 9985 array.

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 Sun Cluster books support the Sun Cluster 3.1, 2004, and 2005 releases. If you are maintaining a different version of Sun Cluster software, refer to the appropriate documentation. All Sun 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 Hardware Documentation

Title	Part Number
<i>Sun StorEdge Traffic Manager Installation and Configuration Guide</i>	817-3674

TABLE P-3 Sun Cluster Documentation

Application	Title
Concepts	<i>Sun Cluster Concepts Guide for Solaris OS</i>
Overview	<i>Sun Cluster Overview for Solaris OS</i>
Hardware administration	<i>Sun Cluster 3.0-3.1 Hardware Administration Manual for Solaris OS</i> Individual hardware administration guides
Software installation	<i>Sun Cluster Software Installation Guide for Solaris OS</i>
Data service administration	<i>Sun Cluster Data Services Planning and Administration Guide for Solaris OS</i> Individual data service guides
Data service development	<i>Sun Cluster Data Services Developer's Guide for Solaris OS</i>
System administration	<i>Sun Cluster System Administration Guide for Solaris OS</i>
Error messages	<i>Sun Cluster Error Messages Guide for Solaris OS</i>
Command and function reference	<i>Sun Cluster Reference Manual for Solaris OS</i>
Release Notes	<i>Sun Cluster 3.1 8/05 Release Notes for Solaris OS</i> <i>Sun Cluster 3.0-3.1 Release Notes Supplement</i>

Using UNIX Commands

This document contains information about commands that are used to install, configure, or upgrade a Sun 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 Solaris™ Operating System (Solaris OS)
- Other software documentation that you received with your system
- Solaris Operating System man pages

Getting Help

If you have problems installing or using Sun 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, Solaris 9)
- The release number of Sun Cluster (for example, Sun Cluster 3.1 8/05)

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/scinstall -pv</code>	Displays Sun Cluster release and package version information

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

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Typographic Conventions

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

TABLE P-4 Typographic Conventions

Typeface or Symbol	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>
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	The command to remove a file is <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . Perform a <i>patch analysis</i> . Do <i>not</i> save the file. [Note that some emphasized items appear bold online.]

Shell Prompts in Command Examples

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

TABLE P-5 Shell Prompts

Shell	Prompt
C shell prompt	machine_name%
C shell superuser prompt	machine_name#
Bourne shell and Korn shell prompt	\$
Bourne shell and Korn shell superuser prompt	#

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Installing and Configuring a Sun StorEdge 9900 Series Storage Array

This chapter contains a *limited* set of procedures about how to install and configure Sun™ StorEdge 9900 Series storage arrays in a Sun Cluster environment. Contact your Sun service provider to perform tasks that are not documented in this chapter.

The StorEdge 9900 Series storage arrays includes the following storage arrays:

- SPARC: Sun StorEdge 9910
- SPARC: Sun StorEdge 9960
- Sun StorEdge 9970
- Sun StorEdge 9980
- SPARC: Sun StorEdge 9985
- Sun StorEdge 9990

You can perform all the procedures in this chapter on all StorEdge 9900 Series storage arrays unless noted otherwise.

This chapter contains the following sections.

- [“Restrictions” on page 11](#)
- [“Installing Storage Arrays” on page 12](#)
- [“Configuring Storage Arrays” on page 17](#)

For conceptual information on multihost disks, see your Sun Cluster concepts documentation document.

Restrictions

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” in *Sun Cluster 3.0-3.1 Hardware Administration Manual for Solaris OS* for more information on storage-based replication.

Installing Storage Arrays

The initial installation of a storage array in a new cluster must be performed by your Sun service provider.

▼ How to Add a Storage Array to an Existing Cluster

Use this procedure to add a new storage array to a running cluster.

This procedure defines **Node A** as the node with which you begin working. **Node B** is another node in the cluster.

If you need to add a storage array to more than two nodes, repeat [Step 22](#) through [Step 37](#) for each additional node that connects to the storage array.

Steps 1. Power on the storage array.

Note – The storage array requires approximately 10 minutes to boot.

Contact your service provider to power on the storage array.

2. If you plan to use multipathing software, verify that the storage array is configured for multipathing.

Contact your service provider to verify that the storage array is configured for multipathing.

3. Configure the new storage array.

Contact your service provider to create the desired logical volumes.

4. Do you need to install a host adapter in **Node A**?

Note – If you use multipathing software, each node requires two paths to the same set of LUNs.

- If no, skip to [Step 12](#).
- If yes, proceed to [Step 5](#).

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

5. **Is the host adapter that you are installing the first host adapter on Node A?**
 - **If no, proceed to [Step 6](#).**
 - **If yes, contact your service provider to install the support packages and configure the drivers before you proceed to [Step 6](#).**
6. **Is your node enabled with the Solaris dynamic reconfiguration (DR) feature?**
 - **If yes, install the host adapter.**

For the procedure about how to install a host adapter, see the documentation that shipped with your host adapter or updated information on the manufacturer's web site.
 - **If no, shut down this node to install the host adapter(s). Proceed to [Step 7](#).**
7. **Determine the resource groups and device groups that are running on Node A and Node B.**

Record this information because you use this information in [Step 37](#) of this procedure to return resource groups and device groups to these nodes.

```
# scstat
```

For more information, see your Sun Cluster system administration documentation.
8. **Shut down and power off Node A.**

For the procedure about how to shut down and power off a node, see your Sun Cluster system administration documentation.
9. **Install the host adapter in Node A.**

For the procedure about how to install a host adapter, see the documentation that shipped with your host adapter or updated information on the manufacturer's web site.
10. **Power on and boot Node A into noncluster mode.**

For the procedure about how to boot a node in noncluster mode, see your Sun Cluster system administration documentation.
11. **If necessary, upgrade the host adapter firmware on Node A.**

PatchPro is a patch-management tool that eases the selection and download of patches required for installation or maintenance of Sun Cluster software. PatchPro provides an Interactive Mode tool especially for Sun Cluster. The Interactive Tool makes the installation of patches easier. PatchPro's Expert Mode tool helps you to maintain your configuration with the latest set of patches. Expert Mode is especially useful for obtaining all of the latest patches, not just the high availability and security patches.

To access the PatchPro tool for Sun Cluster software, go to <http://www.sun.com/PatchPro/>, click Sun Cluster, then choose either Interactive Mode or Expert Mode. Follow the instructions in the PatchPro tool to describe your cluster configuration and download the patches.

For third-party firmware patches, see the SunSolveSM Online site at <http://sunsolve.ebay.sun.com>.

12. Attach the storage array to Node A.

Contact your service provider to install a fiber-optic cable between the storage array and your node.

13. Configure the host adapter and the storage array.

Contact your service provider to configure the adapter and storage array.

14. If you plan to install multipathing software, which multipathing solution do you plan to install?

- **If Sun StorEdge Traffic Manager software, use the procedure in “How to Install Sun Multipathing Software” in *Sun Cluster Software Installation Guide for Solaris OS* and skip to [Step 16](#).**
- **SPARC: If Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software, proceed to [Step 15](#).**

15. SPARC: Install Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software and any required patches for Sun SDLM software support on Node A.

For the procedure about how to install the Sun SDLM software, see the documentation that shipped with your storage array.

16. Shut down Node A.

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

17. Perform a reconfiguration boot to create the new Solaris device files and links on Node A.

```
# boot -r
```

18. On Node A, configure all controllers that are affected by the new physical path.

```
# cfgadm -c configure cN
```

19. On Node A, verify that the same set of LUNs is visible to the expected controllers.

```
# format
```

See the `format` command man page for more information about how to use the command.

20. On Node A, update the paths to the device ID instances.

```
# scdidadm -C  
# scdidadm -r
```

21. (Optional) On Node A, verify that the device IDs are assigned to the new storage array.

```
# scdidadm -l
```

22. Do you need to install a host adapter in Node B?

Note – If you use multipathing software, each node requires two paths to the same set of LUNs.

- If no, skip to [Step 29](#).
- If yes, proceed to [Step 23](#).

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

23. Is the host adapter that you are installing the first host adapter on Node B?

- If no, proceed to [Step 24](#).
- If yes, contact your service provider to install the support packages and configure the drivers before you proceed to [Step 24](#).

24. Is your node enabled with the Solaris dynamic reconfiguration (DR) feature?

- If yes, install the host adapter.

For the procedure about how to install a host adapter, see the documentation that shipped with your host adapter or updated information on the manufacturer's web site.

- If no, proceed to [Step 25](#).

25. Shut down and power off Node B.

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

26. Install the host adapter in Node B.

For the procedure about how to install a host adapter, see the documentation that shipped with your host adapter or updated information on the manufacturer's web site.

27. If necessary, upgrade the host adapter firmware on Node B.

PatchPro is a patch-management tool that eases the selection and download of patches required for installation or maintenance of Sun Cluster software. PatchPro provides an Interactive Mode tool especially for Sun Cluster. The Interactive Tool makes the installation of patches easier. PatchPro's Expert Mode tool helps you to maintain your configuration with the latest set of patches. Expert Mode is especially useful for obtaining all of the latest patches, not just the high availability and security patches.

To access the PatchPro tool for Sun Cluster software, go to <http://www.sun.com/PatchPro/>, click Sun Cluster, then choose either Interactive Mode or Expert Mode. Follow the instructions in the PatchPro tool to describe your cluster configuration and download the patches.

For third-party firmware patches, see the SunSolveSM Online site at <http://sunsolve.ebay.sun.com>.

28. Power on and boot Node B into noncluster mode.

For the procedure about how to boot a node in noncluster mode, see your Sun Cluster system administration documentation.

29. Attach the storage array to Node B.

Contact your service provider to install a fiber-optic cable between the storage array and your node.

30. If you plan to install multipathing software, which multipathing solution do you plan to install?

- If Sun StorEdge Traffic Manager software, use the procedure in "How to Install Sun Multipathing Software" in *Sun Cluster Software Installation Guide for Solaris OS* and skip to **Step 33**.
- SPARC: If Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software, proceed to **Step 31**.

31. SPARC: Install any required patches or software for Sun StorEdge Traffic Manager software support on Node B.

- For the procedure about how to install the Sun StorEdge Traffic Manager software, see the *Sun StorEdge Traffic Manager Installation and Configuration Guide* at <http://www.sun.com/products-n-solutions/hardware/docs/>.
- For a list of required patches for Sun StorEdge Traffic Manager software, see the *Sun StorEdge Traffic Manager Software Release Notes* at <http://www.sun.com/storage/san>.

32. SPARC: Install Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software and any required patches for Sun SDLM software support on Node B.

For the procedure about how to install the Sun SDLM software, see the documentation that shipped with your storage array.

33. Shut down Node B.

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

34. Perform a reconfiguration boot to create the new Solaris device files and links on Node B.

35. On Node B, update the paths to the device ID instances.

```
# scdidadm -C  
# scdidadm -r
```

36. (Optional) On Node B, verify that the device IDs are assigned to the new LUNs.

```
# scdidadm -l
```

37. Return the resource groups and device groups that you identified in Step 7 to Node B.

```
# scswitch -z -g resource-group -h nodename  
# scswitch -z -D device-group-name -h nodename
```

For more information, see your Sun Cluster system administration documentation.

38. Repeat Step 22 through Step 37 for each additional node that connects to the storage array.

39. Perform volume management administration to incorporate the new logical volumes into the cluster.

For more information, see your Solstice DiskSuite/Solaris Volume Manager or VERITAS Volume Manager documentation.

Next Steps The best way to enable multipathing for a cluster is to install and enable it before installing the Sun Cluster software and enabling the cluster. For this procedure, see “How to Install Sun Multipathing Software” in *Sun Cluster Software Installation Guide for Solaris OS*. If you need to add multipathing software to an established cluster, see “How to Add Sun StorEdge Traffic Manager Software” on page 29.

Configuring Storage Arrays

This section contains the procedures about how to configure a storage array in a Sun Cluster environment. The following table lists these procedures. For configuration tasks that are not cluster-specific, see the documentation that shipped with your storage array.

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 `scdidadm -c` 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 `scdidadm -R` command for each affected device.

TABLE 1-1 Task Map: Configuring a Storage Array

Task	Information
Add a logical volume.	See “How to Add a Logical Volume” on page 18.
Remove a logical volume.	See “How to Remove a Logical Volume” on page 19.

▼ How to Add a Logical Volume

Use this procedure to add a logical volume to a cluster. This procedure assumes that your service provider created your logical volume. This procedure also assumes that all nodes are booted and are attached to the storage array.

Steps 1. On all nodes, update the `/devices` and `/dev` entries.

```
# devfsadm
```

2. On each node connected to the storage array, verify that the same set of LUNs is visible to the expected controllers.

```
# format
```

See the `format` command man page for more information about how to use the command.

3. Determine if you are running VERITAS Volume Manager.

- If not, proceed to [Step 4](#)
- If you are running VERITAS Volume Manager, update the list of devices on all nodes that are attached to the logical volume that you created in [Step 2](#).
See your VERITAS Volume Manager documentation for information about how to use the `vxdctl enable` command. Use this command to update new

devices (volumes) in your VERITAS Volume Manager list of devices.

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

```
# scgdevs
```

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 expected behavior.

See Also To create a new resource or reconfigure a running resource to use the new logical volume, see your Sun Cluster data services collection.

▼ How to Remove a Logical Volume

Use this procedure to remove a logical volume. This procedure assumes all nodes are booted and are connected to the storage array. This storage array hosts the logical volume that you are removing.

This procedure defines Node A as the node with which you begin working. Node B is the remaining node.

If you need to remove a storage array from more than two nodes, repeat [Step 9](#) through [Step 11](#) for each additional node. Each node connects to the logical volume.



Caution – This procedure destroys all data on the logical volume that you are removing.

- Steps**
1. If necessary, back up all data. Migrate all resource groups and disk device groups to another node.
 2. Is the logical volume that you plan to remove configured as a quorum device?

```
# scstat -q
```

- If no, proceed to [Step 3](#).
- If yes, 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 your Sun Cluster system administration documentation.

3. **Run the appropriate Solstice DiskSuite/Solaris Volume Manager commands or VERITAS Volume Manager commands to remove the reference to the logical volume from any diskset or disk group.**
For more information, see your Solstice DiskSuite/Solaris Volume Manager or VERITAS Volume Manager documentation.
4. **If the cluster is running VERITAS Volume Manager, update the list of devices on all nodes. These nodes are attached to the logical volume that you are removing.**
See your VERITAS Volume Manager documentation for information about how to use the `vxdisk rm` command to remove devices (volumes) in your VERITAS Volume Manager device list.
5. **Remove the logical volume.**
Contact your service provider to remove the logical volume.
6. **Determine the resource groups and device groups that are running on Node A and Node B.**
Record this information because you use this information in [Step 11](#) of this procedure to return resource groups and device groups to these nodes.

```
# scstat
```
7. **Shut down and reboot Node A by using the `shutdown` command with the `-i 6` option.**
For the procedure about how to shut down and power off a node, see your Sun Cluster system administration documentation.
8. **On Node A, update the `/devices` and `/dev` entries.**

```
# devfsadm -C
# sctidadm -C
```
9. **Shut down and reboot Node B by using the `shutdown` command with the `-i 6` option.**
For the procedure about how to shut down and power off a node, see your Sun Cluster system administration documentation.
10. **On Node B, update the `/devices` and `/dev` entries.**

```
# devfsadm -C
# sctidadm -C
```
11. **Return the resource groups and device groups that you identified in [Step 6](#) to Node B.**

```
# scswitch -z -g resource-group -h nodename
# scswitch -z -D device-group-name -h nodename
```


For more information, see your Sun Cluster system administration documentation.
12. **Repeat [Step 9](#) through [Step 11](#) for each additional node that connects to the logical volume.**

See Also To create a logical volume, see [“How to Add a Logical Volume”](#) on page 18.

Installing Multipathing Software in a Sun StorEdge 9900 Series Storage Array

This chapter contains procedures on how to install and add multipathing software. Multipathing software enables you to define and control redundant physical paths to I/O devices such as storage arrays and networks. If the active path to a device becomes unavailable, the multipathing software can automatically switch to an alternate path to maintain availability. This capability is known as automatic failover. To maximize multipathing capabilities, your servers must be configured with redundant hardware. Redundant hardware includes redundant network interfaces or two host bus adapters that are connected to the same dual-ported storage array.

This chapter contains the following procedures.

- [“SPARC: How to Install Sun StorEdge 9900 Dynamic Link Manager Software” on page 24](#)
- [“How to Install Sun StorEdge Traffic Manager Software” on page 25](#)
- [“SPARC: How to Add Sun StorEdge 9900 Dynamic Link Manager Software” on page 27](#)
- [“How to Add Sun StorEdge Traffic Manager Software” on page 29](#)

Installing Multipathing Software

This section contains procedures on how to install multipathing software in a cluster that *is not* yet installed with Sun Cluster software. Choose one of the following multipathing solutions.

- [SPARC: Sun StorEdge 9900 Dynamic Link Manager software](#)
- [Sun StorEdge Traffic Manager software](#)

▼ SPARC: How to Install Sun StorEdge 9900 Dynamic Link Manager Software

Use this procedure to install Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software in a cluster that is *not* yet installed with Sun Cluster software. This procedure assumes that you installed Solaris Operating System. If your cluster is already running Sun Cluster software, see “Adding Multipathing Software” on page 27 to add multipathing software to a running cluster.

Perform this procedure on one node at a time. This procedure defines Node N as the node on which you are installing the multipathing software.

Steps 1. Install the new storage array.

For instructions on how to install the storage array, see the documentation that shipped with your storage array.

2. Configure the storage array such that each node has two paths to the same set of LUNs. For an example configuration, see Figure 2-1.

Contact your service provider to create the desired logical volumes. These new logical volumes can be configured by using LUN Expansion (LUSE) or Virtual LVI/LUN.

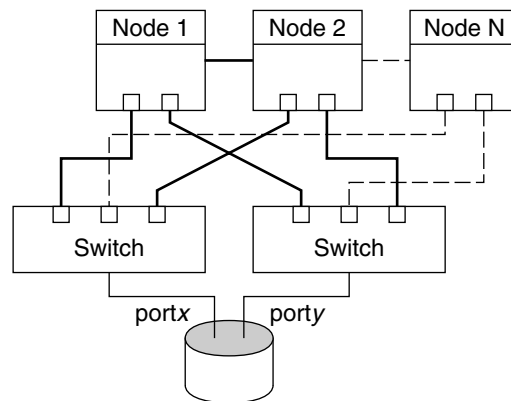


FIGURE 2-1 SPARC: Switched Configuration

3. On each node that is connected to the storage array, use the `format (1M)` command. Use this command to verify that the same set of LUNs is visible to the expected controllers.

```
# format
```

See the `format` command man page for more information about by using the command.

4. **Install and configure Sun SDLM software.**

For instructions on how to install and configure the Sun SDLM software, see the documentation that shipped with your storage array.

5. **Did you perform a reconfiguration reboot when you configured Sun SDLM software?**

- **If yes, proceed to [Step 6](#).**
- **If no, shut down Node N, and perform a reconfiguration reboot to create the new Solaris device files and links on Node N.**

```
# boot -r
```

6. **On each node connected to the storage array, use the `format (1M)` command. Use this command to verify that you see half the number of disks you saw in [Step 3](#).**

```
# format
```

See the `format` command man page for more information about by using the command.

7. **On all remaining nodes and one node at a time, repeat [Step 1](#) through [Step 6](#).**

See Also After you install multipathing software, you might want to install Sun Cluster software. For the procedures on how to install Sun Cluster software, see Sun Cluster software installation documentation.

▼ How to Install Sun StorEdge Traffic Manager Software

Use this procedure to install Sun StorEdge Traffic Manager software in a cluster that is *not* yet installed with Sun Cluster software. This procedure assumes that you installed Solaris Operating System. If your cluster is already running Sun Cluster software, see [“Adding Multipathing Software” on page 27](#) to add multipathing software to a running cluster.

Perform this procedure on one node at a time. This procedure defines Node N as the node on which you are installing the multipathing software.

Steps 1. **Install the new storage array.**

For instructions on how to install the storage array, see the documentation that shipped with your storage array.

2. Configure the storage array so that each node has two paths to the same set of LUNs. For an example configuration, see [Figure 2-2](#).

Contact your service provider to create the desired logical volumes. These new logical volumes can be configured by using LUN Expansion (LUSE) or Virtual LVI/LUN.

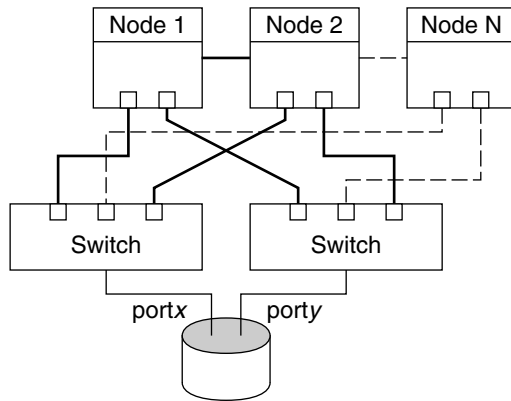


FIGURE 2-2 Switched Configuration

3. On each node connected to the storage array, use the `format (1M)` command. Use this command to verify that the same set of LUNs is visible to the expected controllers.

```
# format
```

See the `format` command man page for more information about by using the command.

4. Install any required patches or software for Sun StorEdge Traffic Manager software support to nodes and enable multipathing.

For the procedure about how to install the Sun StorEdge Traffic Manager software, see “How to Install Sun Multipathing Software” in *Sun Cluster Software Installation Guide for Solaris OS*.

5. Boot Node N.

For more information on booting nodes, see Sun Cluster software installation documentation.

6. Did you perform a reconfiguration reboot when you configured Sun StorEdge Traffic Manager software?

- If yes, proceed to [Step 7](#).
- If no, shut down Node N, and perform a reconfiguration reboot to create the new Solaris device files and links on Node N.

7. On each node connected to the storage array, use the `format (1M)` command. Use this command to verify that you see half the number of disks you saw in [Step 3](#).

```
# format
```

See the `format` command man page for more information about by using the command.

8. On all remaining nodes and one node at a time, repeat [Step 1](#) through [Step 7](#).

See Also After you install multipathing software, you might want to install Sun Cluster software. For the procedure on how to install Sun Cluster software, see Sun Cluster software installation documentation .

Adding Multipathing Software

This section contains a procedure on how to add multipathing software in a running cluster. Choose one of the following multipathing solutions.

- [SPARC: Sun StorEdge 9900 Dynamic Link Manager software](#)
- [Sun StorEdge Traffic Manager software](#)

▼ SPARC: How to Add Sun StorEdge 9900 Dynamic Link Manager Software

Use this procedure to add Sun StorEdge 9900 Dynamic Link Manager (Sun SDLM) software in a running cluster.

Do not use this procedure to convert from host-based mirroring to a multipathing solution. For the procedure on how to convert from host-based mirroring to a multipathing solution, contact your Sun service provider.

Perform this procedure on one node at a time. This procedure defines Node N as the node on which you are installing the multipathing software.

Before You Begin This procedure assumes that you installed and configured your storage array. If you have not installed your storage array, see [“SPARC: How to Install Sun StorEdge 9900 Dynamic Link Manager Software” on page 24](#) to add multipathing software and the storage array at the same time.

Steps 1. **Determine the resource groups and device groups that are running on Node N.**

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

```
# scstat
```

For more information, see the Sun Cluster system administration documentation.

2. **Move all resource groups and device groups off Node N.**

```
# scswitch -s -h from-node
```

For more information, see the Sun Cluster system administration documentation.

3. **Do you need to install additional physical paths between Node N and the storage?**

Note – If you use multipathing software, each node requires two paths to the same set of LUNs. For an example configuration, see [Figure 2-1](#).

- **If no, skip to [Step 8](#).**

- **If yes, proceed to [Step 4](#).**

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

4. **Shut down and power off Node N.**

For the full procedure on how to shut down and power off a node, see Sun Cluster system administration documentation.

5. **Install the host adapters and the cables between Node N and the storage.**

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

6. **Power on and boot Node N into non-cluster mode.**

For more information on booting nodes, see Sun Cluster system administration documentation.

7. **If necessary, upgrade the host adapter firmware on Node N.**

PatchPro is a patch-management tool that eases the selection and download of patches required for installation or maintenance of Sun Cluster software. PatchPro provides an Interactive Mode tool especially for Sun Cluster. The Interactive Tool makes the installation of patches easier. PatchPro's Expert Mode tool helps you to maintain your configuration with the latest set of patches. Expert Mode is especially useful for obtaining all of the latest patches, not just the high availability and security patches.

To access the PatchPro tool for Sun Cluster software, go to <http://www.sun.com/PatchPro/>, click Sun Cluster, then choose either Interactive Mode or Expert Mode. Follow the instructions in the PatchPro tool to describe your cluster configuration and download the patches.

For third-party firmware patches, see the SunSolveSM Online site at <http://sunsolve.ebay.sun.com>.

8. Install and configure Sun SDLM software on Node N, and apply required patches for Sun SDLM software support on Node N.

For instructions on how to install and configure the Sun SDLM software, see the documentation that shipped with your storage array.

9. Did you perform a reconfiguration reboot when you configured Sun SDLM software?

- If yes, proceed to [Step 10](#).
- If no, perform a reconfiguration reboot to create the new Solaris device files and links on Node N.

```
# boot -r
```

10. On Node N, update the paths to the device ID instances.

```
# scdidadm -C  
# scdidadm -r
```

11. Return the resource groups and device groups that you identified in [Step 1](#) to Node N.

```
# scswitch -z -g resource-group -h nodename  
# scswitch -z -D device-group-name -h nodename
```

For more information, see the Sun Cluster system administration documentation.

12. On all remaining nodes and one node at a time, repeat [Step 1](#) through [Step 11](#).

▼ How to Add Sun StorEdge Traffic Manager Software

The best way to enable multipathing for a cluster is to install the multipathing software and enable multipathing before installing the Sun Cluster software and establishing the cluster. For this procedure, see “How to Install Sun Multipathing Software” in *Sun Cluster Software Installation Guide for Solaris OS*. If you need to add multipathing software to an established cluster, use this procedure and be careful to perform the steps that clean up the device IDs.

Do not use this procedure to convert from host-based mirroring to a multipathing solution. For the procedure on how to convert from host-based mirroring to a multipathing solution, contact your Sun service provider.

Perform this procedure on one node at a time. This procedure defines Node N as the node on which you are installing the multipathing software.

Before You Begin This procedure assumes that you have already installed and configured your storage array. If you have not installed your storage array, see “[How to Install Sun StorEdge Traffic Manager Software](#)” on page 25 to add multipathing software and the storage array at the same time.

Steps 1. **Determine the resource groups and device groups that are running on Node N.**
Record this information because you use this information in [Step 14](#) of this procedure to return resource groups and device groups to these nodes.

```
# scstat
```

For more information, see the Sun Cluster system administration documentation.

2. **Move all resource groups and device groups off Node N.**

```
# scswitch -s -h from-node
```

For more information, see the Sun Cluster system administration documentation.

3. **Do you need to install additional physical paths between Node N and the storage?**

Note – If you use multipathing software, each node requires two paths to the same set of LUNs. For an example configuration, see [Figure 2–2](#).

- If no, skip to [Step 8](#).
- If yes, proceed to [Step 4](#).

4. **Shut down and power off Node N.**

For the full procedure on how to shut down and power off a node, see Sun Cluster system administration documentation.

5. **Install the host adapters and the cables between Node N and the storage.**

Note – If you use multipathing software, each node requires two paths to the same set of LUNs.

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

6. Power on and boot Node N into non-cluster mode.

For more information on how to boot nodes, see Sun Cluster system administration documentation.

7. If necessary, upgrade the host adapter firmware on Node N.

PatchPro is a patch-management tool that eases the selection and download of patches required for installation or maintenance of Sun Cluster software. PatchPro provides an Interactive Mode tool especially for Sun Cluster. The Interactive Tool makes the installation of patches easier. PatchPro's Expert Mode tool helps you to maintain your configuration with the latest set of patches. Expert Mode is especially useful for obtaining all of the latest patches, not just the high availability and security patches.

To access the PatchPro tool for Sun Cluster software, go to <http://www.sun.com/PatchPro/>, click Sun Cluster, then choose either Interactive Mode or Expert Mode. Follow the instructions in the PatchPro tool to describe your cluster configuration and download the patches.

For third-party firmware patches, see the SunSolveSM Online site at <http://sunsolve.ebay.sun.com>.

8. Install any required patches or software for Sun StorEdge Traffic Manager software support on Node N.

For instructions on installing the software, see the *Sun StorEdge Traffic Manager Installation and Configuration Guide* at <http://www.sun.com/products-n-solutions/hardware/docs/>.

9. (Optional) Activate multipathing functionality.

- **If you are using the Solaris 10 operating system, issue the following commands to enable multipathing:**

```
# /usr/sbin/stmsboot -e
stmsboot -e    Enables Solaris I/O multipathing
```

See the stmsboot(1M) man page for more information.

- **If you are using the Solaris 8 or 9 operating system, edit the `/kernel/drv/scsi_vhci.conf` file.**

Set the `mpxio-disable` parameter to `no`.

For more information, see the release notes for your storage device.

10. Boot Node N into cluster mode.

```
# boot -r
```

For more information on booting nodes, see Sun Cluster system administration documentation.

11. On each node connected to the storage array, use the `format (1M)` command. Use this command to verify that the same set of LUNs is visible to the expected controllers.

```
# format
```

See the `format` command man page for more information about by using the command.

12. On Node N, configure all controllers that are affected by the new physical path.

```
# cfgadm -c configure cN
```

13. On Node N, update the paths to the device ID instances.

```
# scdidadm -C  
# scdidadm -r
```

`scdidadm -C` and `-r` Update DID mappings with new device names while preserving DID instance numbers for disks that are connected to multiple cluster nodes. DID instance numbers of the local disks might not be preserved. For this reason, the DID disk names for local disks might change.

14. Return the resource groups and device groups that you identified in [Step 1](#) to Node N.

```
# scswitch -z -g resource-group -h nodename  
# scswitch -z -D device-group-name -h nodename
```

For more information, see the Sun Cluster system administration documentation.

15. On each node connected to the storage array, use the `format (1M)` command. Use this command to verify that you see half the number of disks you saw in [Step 11](#).

```
# format
```

See the `format` command man page for more information about by using the command.

16. On all remaining nodes and one node at a time, repeat [Step 1](#) through [Step 14](#).

Maintaining a Sun StorEdge 9900 Storage Array

This chapter contains a limited set of procedures about how to maintain a storage array. Contact your service provider to add, remove, or replace any storage array components.

This chapter contains the following procedures:

- “How to Remove a Storage Array” on page 34
- “How to Replace a Host Adapter” on page 37
- “How to Replace an FC Switch or Storage Array-to-Switch Component” on page 39
- “Replacing a Node-to-Switch Component” on page 39

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 `sddidadm -c` 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 `sddidadm -R` command for each affected device.

Maintaining Storage Arrays

This section contains the procedures for maintaining a storage system in a running cluster. [Table 3-1](#) lists these procedures.

TABLE 3-1 Task Map: Maintaining a Storage Array

Task	Information
Remove a storage array.	“How to Remove a Storage Array” on page 34
Add a node to the storage array.	Sun Cluster system administration documentation
Remove a node from the storage array.	Sun Cluster system administration documentation
Replace a node’s host adapter.	“How to Replace a Host Adapter” on page 37
Replace an FC switch or storage array-to-switch component.	“How to Replace an FC Switch or Storage Array-to-Switch Component” on page 39
Replace a node-to-switch/storage component.	“Replacing a Node-to-Switch Component” on page 39

▼ How to Remove a Storage Array

Use this procedure to permanently remove a storage array. This procedure provides the flexibility to remove the host adapters from the nodes that are attached to the storage array that you are removing.

This procedure defines `Node A` as the node with which you begin working. `Node B` is another node in the cluster.

If you need to remove a storage array from more than two nodes, repeat [Step 15](#) through [Step 22](#) for each additional node that connects to the storage array.



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

- Steps**
1. If necessary, back up all data and migrate all resource groups and disk device groups to another node.
 2. Determine if the storage array that you plan to remove is configured as a quorum device.

```
# scstat -q
```

- If the storage array is not a quorum device, proceed to [Step 3](#).

- If no, skip to [Step 13](#).
- If yes, power off Node A.

11. Remove the host adapter from Node A.

For the procedure about how to remove host adapters, see the documentation that shipped with your host adapter or updated information on the manufacturer's web site.

12. Without enabling the node to boot, power on Node A.

For more information, see the documentation that shipped with your server.

13. Boot Node A into cluster mode.

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

14. On Node A, update the device namespace.

```
# devfsadm -C
```

15. Stop the Sun Cluster software on Node B, and then shut down Node B.

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

16. Disconnect the fiber-optic cable between the storage array and Node B.

17. Do you want to remove the host adapter from Node B?

- If no, skip to [Step 20](#).
- If yes, power off Node B.

18. Remove the host adapter from Node B.

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

19. Without enabling the node to boot, power on Node B.

For more information, see the documentation that shipped with your server.

20. Boot Node B into cluster mode.

For more information on booting nodes, see your Sun Cluster system administration documentation.

21. Return the resource groups and device groups that you identified in [Step 6](#) to Node B.

```
# scswitch -z -g resource-group -h nodename
# scswitch -z -D device-group-name -h nodename
```

22. On Node B, update the device namespace.

```
# devfsadm -C
```

23. Repeat [Step 15](#) through [Step 22](#) for each additional node that connects to the storage array.

24. From one node, remove device ID references to the storage array that was removed.

```
# scdidadm -C
```

▼ 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.

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 *Sun Cluster Hardware Administration Manual for Solaris OS* and skip steps that instruct you to shut down the cluster.

You cannot replace a single, dual-port HBA that has quorum configured on that storage path by using DR. 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 *Sun Cluster 3.0-3.1 Hardware Administration Manual for Solaris OS*.

Exceptions to this restriction include three-node or larger cluster configurations where no storage device has a quorum device configured.

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

Record this information because you use this information in [Step 9](#) of this procedure to return resource groups and device groups to Node A.

```
# scstat
```

2. Move all resource groups and device groups off Node A.

```
# scswitch -s -h nodename
```

3. Shut down Node A.

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

4. Power off Node A.

5. Replace the failed host adapter.

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

6. Do you need to upgrade the node's host adapter firmware?

- **If yes, boot Node A into noncluster mode. Proceed to Step 7.**

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

- **If no, proceed to Step 8.**

7. Upgrade the host adapter firmware on Node A.

PatchPro is a patch-management tool that eases the selection and download of patches required for installation or maintenance of Sun Cluster software. PatchPro provides an Interactive Mode tool especially for Sun Cluster. The Interactive Tool makes the installation of patches easier. PatchPro's Expert Mode tool helps you to maintain your configuration with the latest set of patches. Expert Mode is especially useful for obtaining all of the latest patches, not just the high availability and security patches.

To access the PatchPro tool for Sun Cluster software, go to <http://www.sun.com/PatchPro/>, click Sun Cluster, then choose either Interactive Mode or Expert Mode. Follow the instructions in the PatchPro tool to describe your cluster configuration and download the patches.

For third-party firmware patches, see the SunSolveSM Online site at <http://sunsolve.ebay.sun.com>.

8. Boot Node A into cluster mode.

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

9. Return the resource groups and device groups you identified in Step 1 to Node A.

```
# scswitch -z -g resource-group -h nodename  
# scswitch -z -D device-group-name -h nodename
```

For more information, see your Sun Cluster system administration documentation.

▼ How to Replace an FC Switch or Storage Array-to-Switch Component

Use this procedure to replace an FC switch, or the following storage array-to-switch components in a running cluster.

- Fiber-optic cable that connects an FC switch to a storage array
- GBIC on an FC switch, connecting to a storage array
- FC switch

Step ● Replace the component by using the following references.

- For the procedure about how to replace a fiber-optic cable between a storage array and an FC switch, see the documentation that shipped with your switch hardware.
- For the procedure about how to replace a GBIC on an FC switch, see the documentation that shipped with your switch hardware.
- For the procedure about how to replace an SFP on the storage array, contract your service provider.
- For the procedure about how to replace an FC switch, see the documentation that shipped with your switch hardware.

Note – If you are replacing an FC switch and you intend to save the switch configuration for restoration to the replacement switch, do not connect the cables to the replacement switch until *after* you recall the Fabric configuration to the replacement switch. For more information about how to save and recall switch configurations see the documentation that shipped with your switch hardware.

Note – Before you replace an FC switch, be sure that the `probe_timeout` parameter of your data service software is set to more than 90 seconds. Increasing the value of the `probe_timeout` parameter to more than 90 seconds avoids unnecessary resource group restarts when one of the FC switches is powered off.

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

For the procedure about how to replace a host adapter, see [“How to Replace a Host Adapter” on page 37](#).

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 40](#).
- If your cluster does *not* use multipathing, see [“How to Replace a Node-to-Switch Component in a Cluster Without Multipathing” on page 40](#).

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

Steps 1. **Is your configuration active-passive?**

If yes, and 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

Steps 1. **Check if the physical data path failed.**

If no, proceed to [Step 2](#).

If yes:

- a. **Replace the component.**
Refer to your hardware documentation for any component-specific instructions.
- 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.

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

```
# scstat
```

3. **Move all resource groups and device groups to another node.**

```
# scswitch -s -h from-node
```

4. **Replace the node-to-switch component.**

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

5. **(Optional) If necessary, return the resource groups and device groups that you identified in [Step 2](#) to Node A.**

```
# scswitch -z -g resource-group -h nodename  
# swswitch -z -D device-group -h nodename
```


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