



Sun Cluster 3.1 With Network-Attached Storage Devices Manual for Solaris OS



Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054
U.S.A.

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Preface

This manual provides procedures specific to supporting network-attached storage (NAS) systems placed in a Sun Cluster environment. Sun Cluster supports NAS devices, for shared storage only, beginning with version 3.1 9/04. It supports NAS devices as quorum devices beginning with version 3.1 8/05. Use this manual with Sun Cluster 3.1 software on both SPARC® and x86 based systems.

Note – In this document, the term “x86” refers to the Intel 32-bit family of microprocessor chips and compatible microprocessor chips made by AMD.

Sun Cluster software runs on two platforms, SPARC and x86. The information in this document pertains to both platforms unless otherwise specified in a special chapter, section, note, bulleted item, figure, table, or example.

In this document, references to Oracle Real Application Clusters also apply to Oracle Parallel Server unless otherwise stated.

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 one chapter with the following major sections:

“Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices” on page 11 lists limitations of your use of NAS storage devices in a Sun Cluster environment.

“Installing a Network Appliance NAS Device in a Sun Cluster Environment” on page 14 contains the procedure about installing NAS storage devices in a Sun Cluster environment.

“Maintaining a Network Appliance NAS Device in a Sun Cluster Environment” on page 15 contains procedures about maintaining NAS storage devices in a Sun Cluster environment.

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 3.1 With Network-Attached Storage Devices Manual for Solaris OS Revisions

Revision Date	New Information
June 2006	Added the requirement for package <code>SUNWzlib</code> (see “Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices” on page 11). Added steps in “How to Install a Network Appliance NAS Device in a Cluster” on page 14.
December 2005	Added the requirement that NAS quorum devices must be on the local network. See “Requirements When Configuring NAS Devices as Quorum Devices” on page 13.

Related Books

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.

Documentation specific to the Network Appliance filer is listed in “Related Third-Party Web Site References” on page 7.

TABLE P-2 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

TABLE P-2 Sun Cluster Documentation (Continued)

Application	Title
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>

Related Third-Party Web Site References

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When installing or maintaining a Network Appliance filer in a Sun Cluster environment, access the <http://now.netapp.com> site. Search for the documents that are listed in the following table for device-specific instructions.

TABLE P-3 Network Appliance Clustered-Filer Documentation

Task	Network Appliance Document
Setting up a NAS device	<i>System Administration File Access Management Guide</i>
Setting up a LUN	<i>Host Cluster Tool for Unix Installation Guide</i>
Installing ONTAP software	<i>Software Setup Guide, Upgrade Guide</i>
Exporting volumes for the cluster	<i>Data ONTAP Storage Management Guide</i>

TABLE P-3 Network Appliance Clustered-Filer Documentation (Continued)

Task	Network Appliance Document
Installing NAS support software packages on cluster nodes	Log in to http://now.netapp.com . From the Software Download page, download the <i>Host Cluster Tool for Unix Installation Guide</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.

Documentation, Support, and Training

Sun Function	URL	Description
Documentation	http://www.sun.com/documentation/	Download PDF and HTML documents, and order printed documents
Support and Training	http://www.sun.com/supporttraining/	Obtain technical support, download patches, and learn about Sun courses

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 Maintaining Network Appliance Network-Attached Storage Devices in a Sun Cluster Environment

This chapter contains procedures about installing and maintaining Network Appliance network-attached storage (NAS) devices in a Sun™ Cluster environment. Before you perform any of the procedures in this chapter, read the entire procedure. If you are not reading an online version of this document, have the books listed in “[Related Books](#)” on page 6 available.

This chapter contains the following procedures:

- “[How to Install a Network Appliance NAS Device in a Cluster](#)” on page 14
- “[How to Prepare the Cluster for Network Appliance NAS Device Maintenance](#)” on page 16
- “[How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance](#)” on page 17
- “[How to Remove a Network Appliance NAS Device From a Cluster](#)” on page 18
- “[How to Remove Network Appliance NAS Directories From a Cluster](#)” on page 19

For conceptual information about multihost storage devices, see the *Sun Cluster Concepts Guide for Solaris OS*.

Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices

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

Requirements for Network Appliance NAS Devices

Requirements When Configuring All NAS Devices

When you use a Network Appliance NAS device, the following are always required:

- The Network Appliance NAS device requires the `SUNWzlib` package to run on Sun Cluster. If you installed the End User Solaris Software Group on your cluster, you must add the `SUNWzlib` package using the `pkgadd` command.

```
# pkgadd SUNWzlib
```

- You must configure the NAS device to allow HTTP administrative access.
You must have the administrator login and password. You need these items when you are configuring the device in the cluster.
- When exporting NAS directories for use with the cluster, you must use the form `rw=nodename1;nodename2` to specify access to the directories. You make these entries in the `exports` file on the NAS device.

Requirements When Configuring NAS Devices for Use With Oracle Real Application Clusters

When setting up your NAS device:

- Create a volume on each Network Appliance NAS device for storing Oracle database files, namely:
 - Data files
 - Control files
 - Online redo log files
 - Archived redo log files
- Create a quota tree (qtree) for the each directory in the following list:
 - The directory that contains Oracle data files for the cluster
 - The Oracle home directory that is to be mounted on each node
- On each Network Appliance NAS device, add an entry to the `/etc/exports` file for the root of the volume that you created for storing Oracle database files.
- Ensure that the volume is exported *without* the `nosuid` option.
- When adding the NAS directories to the cluster, ensure that the following mount options are set:
 - `forcedirectio`
 - `noac`
 - `proto=tcp`

Requirements When Configuring NAS Devices as Quorum Devices

When you use a NAS device as a quorum device, the following are required:

- You must install the iSCSI license from your NAS device vendor.
- You must configure an iSCSI LUN on the NAS device for use as the quorum device.
- Cluster physical node names must be in the same LAN as the NAS device.
- When booting the cluster, you must always boot the NAS device before you boot the cluster nodes.

If you boot devices in the wrong order, your nodes cannot find the quorum device. If a node should fail in this situation, your cluster might be unable to remain in service. If your cluster experiences these failures, you must either reboot the entire cluster or remove the NAS quorum device and add it again.

- A cluster can use a NAS device for only a single quorum device.

You can configure other shared storage if you need additional quorum devices. Additional clusters using the same NAS device can use separate LUNs on that device as their quorum devices.

Recommendations for Network Appliance NAS Device

It is strongly recommended that you use a NetApp clustered filer. Clustered filers provide high availability with respect to the filer data and do not constitute a single point of failure in the cluster.

It is strongly recommended that you use the network time protocol (NTP) to synchronize time on the cluster nodes and the NAS device. Refer to your Network Appliance documentation for instructions about how to configure NTP on the NAS device. Select at least one NTP server for the NAS device that also serves the cluster nodes.

Restrictions for Network Appliance NAS Devices

When configuring a NAS device as a quorum device, you can only add the quorum device when all cluster nodes are operational and communicating with the NAS device.

Installing a Network Appliance NAS Device in a Sun Cluster Environment

▼ How to Install a Network Appliance NAS Device in a Cluster

Before You Begin This procedure relies on the following assumptions:

- Your cluster nodes have the operating system and Sun Cluster software installed.
- You have the HTTP administrator login and password for the NAS device.

1 Set up the NAS device.

You can set up the device at any point in your cluster installation. Follow the instructions in your device's documentation. See [“Related Third-Party Web Site References”](#) on page 7 for a list of related device documentation.

When setting up your NAS device, follow the standards that are described in [“Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices”](#) on page 11.

2 Install the NAS-support software package `NTAPc1nas` on each node in the cluster.

Perform this step after you have installed the Solaris OS and the Sun Cluster software.

If this is the first NAS device in your cluster, or if you need to upgrade the NAS-support software package, perform this step. See [“Related Third-Party Web Site References”](#) on page 7 for instructions about downloading and installing this software.

3 On each cluster node, add the NAS device name to the `/etc/inet/hosts` file.

Add a hostname-to-address mapping for the device in the `/etc/inet/hosts` file on all cluster nodes. For example:

```
netapp-123 192.168.11.123
```

4 On each cluster node, add the device netmasks to the `/etc/inet/netmasks` file.

Add an entry to the `/etc/inet/netmasks` file for the subnet the filer is on. For example:

```
192.168.11.0 255.255.255.0
```

5 Verify that the `hosts` and `netmasks` entries in `/etc/nsswitch.conf` file on all cluster nodes have files appearing before `nis` and `dns`. If they are not, edit the corresponding line in `/etc/nsswitch.conf` by moving files before `nis` and `dns`.

6 Add the NAS device to the cluster.

a. From any cluster node, add the device by using the `scnas` command.

```
# scnas -a -h myfiler -t netapp -o userid=root
```

-a Add the device to cluster configuration.

-h Is the name of the NAS device you are adding.

-o userid Is the HTTP administrator login for the NAS device.

b. At the prompt, type the HTTP administrator password.

c. Confirm that the device has been added to the cluster.

```
# scnas -p
```

For more information about the `scnas` command, see the `scnas(1M)` man page.

7 Add the NAS directories to the cluster.

Follow the directions in [“How to Add Network Appliance NAS Directories to a Cluster”](#) on page 18.

8 (Optional) Configure a LUN on the NAS device as a quorum device.

See [“How to Add a Network Appliance Network-Attached Storage \(NAS\) Quorum Device”](#) in *Sun Cluster System Administration Guide for Solaris OS* for instructions for configuring a NAS quorum device.

Maintaining a Network Appliance NAS Device in a Sun Cluster Environment

This section contains procedures about maintaining NAS devices that are attached to a cluster. If a device’s maintenance procedure might jeopardize the device’s availability to the cluster, you must always perform the steps in [“How to Prepare the Cluster for Network Appliance NAS Device Maintenance”](#) on page 16 before performing the maintenance procedure. After performing the maintenance procedure, perform the steps in [“How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance”](#) on page 17 to return the cluster to its original configuration.

Network Appliance NAS Device Procedures That *Do Not* Require Cluster Preparation

The following Network Appliance clustered-filer procedures can be performed without affecting the filer's availability.

- Monitoring the status of the cluster as a whole
- Viewing information about the cluster
- Enabling and disabling takeover on a cluster to perform software upgrades or other maintenance
- Halting a filer in a cluster without causing a takeover
- Performing a takeover on the partner filer
- Performing license operations on the cluster feature
- Enabling and disabling the negotiated failover feature on a cluster



Caution – When performing any maintenance procedure other than those listed, perform the steps in [“How to Prepare the Cluster for Network Appliance NAS Device Maintenance”](#) on page 16 before the maintenance procedure. Perform the steps in [“How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance”](#) on page 17 after performing the maintenance procedure.

If you fail to prepare the cluster, you can experience loss of cluster availability. If the cluster loses access to the NAS device's directories, your cluster applications will experience I/O errors, might not be able to fail over correctly, and might fail. If your cluster experiences this kind of failure, you must reboot the entire cluster (booting NAS device before the cluster nodes). If your cluster loses access to a NAS quorum device, and then a node fails, the entire cluster can become unavailable. In this case, you must either reboot the entire cluster (booting NAS device before the cluster nodes) or remove the quorum device and configure it again.

▼ **How to Prepare the Cluster for Network Appliance NAS Device Maintenance**

Follow the instructions in this procedure whenever the NAS device maintenance you are performing might affect the device's availability to the cluster nodes.

- 1 **Stop I/O to the NAS device.**
- 2 **On each cluster node, unmount the NAS device directories.**

3 Determine whether a LUN on this NAS device is a quorum device.

```
# scstat -q
```

- If no, you are finished with this procedure.
- If a LUN is a quorum device, perform the following steps:
 - a. If your cluster uses other shared storage devices, select and configure another quorum device.
 - b. Remove this quorum device.

See Chapter 5, “Administering Quorum,” in *Sun Cluster System Administration Guide for Solaris OS* for instructions about adding and removing quorum devices.

Note – If your cluster requires a quorum device (for example, a two-node cluster) and you are maintaining the only shared storage device in the cluster, your cluster is in a vulnerable state throughout the maintenance procedure. Loss of a single node during the procedure causes the other node to panic and your entire cluster becomes unavailable. Limit the amount of time for performing such procedures. To protect your cluster against such vulnerability, add a shared storage device to the cluster.

▼ How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance

Follow the instructions in this procedure after performing any NAS device maintenance that might affect the device’s availability to the cluster nodes.

- 1 Mount the NAS directories.
- 2 Determine whether you want an iSCSI LUN on this NAS device to be a quorum device.
 - If no, continue to [Step 3](#).
 - If yes, configure the LUN as a quorum device, following the steps in “How to Add a Network Appliance Network-Attached Storage (NAS) Quorum Device” in *Sun Cluster System Administration Guide for Solaris OS*.

Remove any extraneous quorum device that you configured in “How to Prepare the Cluster for Network Appliance NAS Device Maintenance” on page 16.
- 3 Restore I/O to the NAS device.

▼ How to Remove a Network Appliance NAS Device From a Cluster

Before You Begin This procedure relies on the following assumptions:

- Your cluster is operational.
- You have prepared the cluster by performing the steps in “How to Prepare the Cluster for Network Appliance NAS Device Maintenance” on page 16.
- You have removed any device directories from the cluster by performing the steps in “How to Remove Network Appliance NAS Directories From a Cluster” on page 19.

Note – When you remove the device from cluster configuration, the data on the device is not available to the cluster. Ensure that other shared storage in the cluster can continue to serve the data when the NAS device is removed

1 From any cluster node, remove the device by using the `scnas` command.

```
# scnas -r -h myfiler
```

-r Remove the device from cluster configuration

-h Is the name of the NAS device you are removing

For more information about the `scnas` command, see the `scnas(1M)` man page.

2 Confirm that the device has been removed from the cluster.

```
# scnas -p
```

▼ How to Add Network Appliance NAS Directories to a Cluster

Before You Begin The procedure relies on the following assumptions:

- Your cluster is operational.
- The NAS device is properly configured and the directories the cluster will use have been exported.
See “Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices” on page 11 for the details about required device configuration.
- You have added the device to the cluster by performing the steps in “How to Install a Network Appliance NAS Device in a Cluster” on page 14.

1 From any cluster node, add the directories by using the `scnasdir` command.

```
# scnasdir -a -h myfiler -d /vol/DB1 -d /vol/DB2
```

- a Add the directory or directories to cluster configuration.
- h Is the name of the NAS device whose directories you are adding.
- d Is the directory to add. Use this option once for each directory you are adding. This value must match the name of one of the directories exported by the NAS device.

For more information about the `scnasdir` command, see the `scnasdir(1M)` man page.

2 Confirm that the directories have been added.

```
# scnasdir -p
```

3 If you do not use the automounter, mount the directories by performing the following steps:

- a. On each node in the cluster, create a mount-point directory for each NAS directory that you added.

```
# mkdir -p /path-to-mountpoint
```

path-to-mountpoint Name of the directory on which to mount the directory

- b. On each node in the cluster, add an entry to the `/etc/vfstab` file for the mount point.

If you are using your NAS device for Oracle Real Application Clusters database files, set the following mount options:

- `forcedirectio`
- `noac`
- `proto=tcp`

When mounting NAS directories, select the mount options appropriate to your cluster applications. Mount the directories on each node that will access the directories. Sun Cluster places no additional restrictions or requirements on the options that you use.

▼ How to Remove Network Appliance NAS Directories From a Cluster

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

Note – When you remove the device directories, the data on those directories is not available to the cluster. Ensure that other device directories or shared storage in the cluster can continue to serve the data when these directories have been removed.

1 If you are using hard mounts rather than the automounter, unmount the NAS directories:

- a. On each node in the cluster, unmount the directories you are removing.

```
# umount /mount-point
```

- b. On each node in the cluster, remove the entries in the `/etc/vfstab` file for the directories you are removing.

2 From any cluster node, remove the directories by using the `scnasdir` command.

```
# scnasdir -r -h myfiler -d /vol/DB1 -d /vol/DB2
```

-r Remove the directory or directories from cluster configuration.

-h Is the name of the NAS device whose directories you are removing.

-d Is the directory to remove. Use this option once for each directory you are removing.

To remove all of this device's directories, specify `all` for the `-d` option:

```
# scnasdir -r -h myfiler -d all
```

For more information about the `scnasdir` command, see the `scnasdir(1M)` man page.

3 Confirm that the directories have been removed.

```
# scnasdir -p
```

See Also To remove the device, see [“How to Remove a Network Appliance NAS Device From a Cluster” on page 18](#).

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