



# **Sun Cluster 3.1 - 3.2 With Network-Attached Storage Devices Manual for Solaris OS**



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

Part No: 819-3024-11  
November 2009, Revision B

Copyright 2009 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. All rights reserved.

Sun Microsystems, Inc. has intellectual property rights relating to technology embodied in the product that is described in this document. In particular, and without limitation, these intellectual property rights may include one or more U.S. patents or pending patent applications in the U.S. and in other countries.

U.S. Government Rights – Commercial software. Government users are subject to the Sun Microsystems, Inc. standard license agreement and applicable provisions of the FAR and its supplements.

This distribution may include materials developed by third parties.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, the Solaris logo, the Java Coffee Cup logo, docs.sun.com, StorEdge, Java, and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc. or its subsidiaries in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

Products covered by and information contained in this publication are controlled by U.S. Export Control laws and may be subject to the export or import laws in other countries. Nuclear, missile, chemical or biological weapons or nuclear maritime end uses or end users, whether direct or indirect, are strictly prohibited. Export or reexport to countries subject to U.S. embargo or to entities identified on U.S. export exclusion lists, including, but not limited to, the denied persons and specially designated nationals lists is strictly prohibited.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

---

Copyright 2009 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. Tous droits réservés.

Sun Microsystems, Inc. détient les droits de propriété intellectuelle relatifs à la technologie incorporée dans le produit qui est décrit dans ce document. En particulier, et ce sans limitation, ces droits de propriété intellectuelle peuvent inclure un ou plusieurs brevets américains ou des applications de brevet en attente aux Etats-Unis et dans d'autres pays.

Cette distribution peut comprendre des composants développés par des tierces personnes.

Certains composants de ce produit peuvent être dérivés du logiciel Berkeley BSD, licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays; elle est licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, le logo Solaris, le logo Java Coffee Cup, docs.sun.com, StorEdge, Java et Solaris sont des marques de fabrique ou des marques déposées de Sun Microsystems, Inc., ou ses filiales, aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui, en outre, se conforment aux licences écrites de Sun.

Les produits qui font l'objet de cette publication et les informations qu'il contient sont régis par la législation américaine en matière de contrôle des exportations et peuvent être soumis au droit d'autres pays dans le domaine des exportations et importations. Les utilisations finales, ou utilisateurs finaux, pour des armes nucléaires, des missiles, des armes chimiques ou biologiques ou pour le nucléaire maritime, directement ou indirectement, sont strictement interdites. Les exportations ou réexportations vers des pays sous embargo des Etats-Unis, ou vers des entités figurant sur les listes d'exclusion d'exportation américaines, y compris, mais de manière non exclusive, la liste de personnes qui font objet d'un ordre de ne pas participer, d'une façon directe ou indirecte, aux exportations des produits ou des services qui sont régis par la législation américaine en matière de contrôle des exportations et la liste de ressortissants spécifiquement désignés, sont rigoureusement interdites.

LA DOCUMENTATION EST FOURNIE "EN L'ETAT" ET TOUTES AUTRES CONDITIONS, DECLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES, DANS LA MESURE AUTORISEE PAR LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE A LA QUALITE MARCHANDE, A L'APTITUDE A UNE UTILISATION PARTICULIERE OU A L'ABSENCE DE CONTREFACON.

# Contents

---

<b>Preface</b> .....	5
<b>1 Installing and Maintaining Sun Network-Attached Storage Devices in a Sun Cluster Environment</b> .....	11
Requirements, Recommendations, and Restrictions for Sun NAS Devices .....	11
Requirements for Sun NAS Devices .....	11
Recommendations for Sun NAS Devices .....	13
Restrictions for Sun NAS Devices .....	13
Installing a Sun NAS Device in a Sun Cluster Environment .....	14
▼ How to Install a Sun NAS Device in a Cluster .....	14
Maintaining a Sun NAS Device in a Sun Cluster Environment .....	18
▼ How to Prepare the Cluster for Sun NAS Device Maintenance .....	18
▼ How to Restore Cluster Configuration After Sun NAS Device Maintenance .....	19
▼ How to Remove a Sun NAS Device From a Cluster .....	20
▼ How to Add Sun NAS Directories to a Cluster .....	21
▼ How to Remove Sun NAS Directories From a Cluster .....	23
<b>2 Installing and Maintaining Network Appliance Network-Attached Storage Devices in a Sun Cluster Environment</b> .....	25
Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices .....	25
Requirements for Network Appliance NAS Devices .....	25
Recommendations for Network Appliance NAS Devices .....	27
Restrictions for Network Appliance NAS Devices .....	28
Installing a Network Appliance NAS Device in a Sun Cluster Environment .....	28
▼ How to Install a Network Appliance NAS Device in a Cluster .....	28
Maintaining a Network Appliance NAS Device in a Sun Cluster Environment .....	30
Network Appliance NAS Device Procedures That <i>Do Not</i> Require Cluster Preparation .....	30
▼ How to Prepare the Cluster for Network Appliance NAS Device Maintenance .....	31

- ▼ How to Restore Cluster Configuration After Network Appliance NAS Device  
Maintenance ..... 32
- ▼ How to Remove a Network Appliance NAS Device From a Cluster ..... 33
- ▼ How to Add Network Appliance NAS Directories to a Cluster ..... 34
- ▼ How to Remove Network Appliance NAS Directories From a Cluster ..... 36
  
- Index** .....39

# 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 or 3.2 software on both SPARC® and x86 based systems.

---

**Note** – This Sun 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.

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 a pre-sales guide. You should have already determined your system requirements and purchased the appropriate equipment and software before reading this document.

## How This Book Is Organized

This book contains the following chapters.

[Chapter 1, “Installing and Maintaining Sun Network-Attached Storage Devices in a Sun Cluster Environment,”](#) describes the requirements, recommendations, and restrictions for Sun NAS devices. This chapter also tells you how to install and maintain a Sun NAS device in a Sun Cluster environment.

Chapter 2, “Installing and Maintaining Network Appliance Network-Attached Storage Devices in a Sun Cluster Environment,” describes the requirements, recommendations, and restrictions for Network Appliance NAS devices. This chapter also tells you how to install and maintain a Network Appliance NAS device in a Sun Cluster environment.

## 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 and 3.2 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 that describes the Network Appliance filer is listed in “[Related Third-Party Web Site References](#)” on page 6.

TABLE P-1 Sun Cluster Documentation

---

Documentation
<a href="#">Solaris Cluster 3.2</a>
<a href="#">Sun Cluster 3.1</a>

---

## Related Third-Party Web Site References

---

**Note** – Sun is not responsible for the availability of third-party web sites mentioned in this document. Sun does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Sun will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

---

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-2 Network Appliance Clustered-Filer Documentation

Task	Network Appliance Document
Setting up a Network Appliance NAS appliance	<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>
Installing Network Appliance NAS support software packages on cluster nodes	Log in to <a href="http://now.netapp.com">http://now.netapp.com</a> . 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 10)
- The release number of Sun Cluster (for example, Sun Cluster 3.2)

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> <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

The Sun web site provides information about the following additional resources:

- [Documentation \(http://www.sun.com/documentation/\)](http://www.sun.com/documentation/)
- [Support \(http://www.sun.com/support/\)](http://www.sun.com/support/)
- [Training \(http://www.sun.com/training/\)](http://www.sun.com/training/)

## Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. To share your comments, go to <http://docs.sun.com> and click Feedback.

## Typographic Conventions

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

TABLE P-3 Typographic Conventions

Typeface	Meaning	Example
<code>AaBbCc123</code>	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:



TABLE P-3 Typographic Conventions (Continued)

Typeface	Meaning	Example
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . A <i>cache</i> is a copy that is stored locally. Do <i>not</i> save the file. <b>Note:</b> Some emphasized items appear bold online.

## Shell Prompts in Command Examples

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

TABLE P-4 Shell Prompts

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



# Installing and Maintaining Sun Network-Attached Storage Devices in a Sun Cluster Environment

---

This chapter contains procedures about installing and maintaining Sun 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 Sun NAS Device in a Cluster](#)” on page 14
- “[How to Prepare the Cluster for Sun NAS Device Maintenance](#)” on page 18
- “[How to Remove a Sun NAS Device From a Cluster](#)” on page 20
- “[How to Remove Sun NAS Directories From a Cluster](#)” on page 23

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

## Requirements, Recommendations, and Restrictions for Sun NAS Devices

This section includes only restrictions and requirements that have a direct impact on the procedures in this chapter. A Sun NAS device is supported as a quorum device only in a two-node cluster. For general support information, contact your Sun service provider.

### Requirements for Sun NAS Devices

This section describes the following requirements.

- “[Requirements When Configuring Sun NAS Devices](#)” on page 12
- “[Requirements When Configuring Sun NAS Devices for Use With Oracle Real Application Clusters](#)” on page 12

- [“Requirements When Configuring Sun NAS Devices as Quorum Devices” on page 13](#)

## Requirements When Configuring Sun NAS Devices

When you configure a Sun NAS device, you must meet the following requirements.

- Allow trusted administrative access for rsh.  
Sun Cluster uses rsh to log into the filer to run fencing. Sun Cluster automatically removes file system write permission for a node that has left the cluster, and grants file system write permission for a node that has just joined the cluster. These actions ensure that a node that departed the cluster can no longer modify data.
- Ensure that nodes in the cluster have trusted administrative access to the filer.
- Explicitly grant access to each node in the cluster.  
Do not allow general access to directories and do not add access by specifying a cluster host group.

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

When you configure your Sun NAS device for use with Oracle Real Application Clusters (RAC), you must meet the following requirements.

- You must configure the Sun NAS device with fencing support in order to guarantee data integrity.
- You must create a volume on each Sun NAS device for storing Oracle database files, namely:
  - Data files
  - Control files
  - Online redo log files
  - Archived redo log files
- You must create a quota tree (qt ree) 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 Sun NAS device, you must add an entry to the `/etc/exports` file for the root of the volume that you created for storing Oracle database files.
- You must ensure that the volume is exported *without* the `nosuid` option.
- When adding the Sun NAS directories to the cluster, ensure that the following mount options are set:
  - `forcedirectio`
  - `noac`
  - `proto=tcp`

## Requirements When Configuring Sun NAS Devices as Quorum Devices

The administrator has the option of deciding whether to use the Sun NAS device as a quorum device.

When you use a Sun NAS device as a quorum device, you must meet the following requirements.

- When booting the cluster, you must always boot the Sun 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 the cluster fails because the Sun NAS quorum device was not available, bring up the Sun NAS device. After that action completes, boot the cluster.
- Sun Cluster supports Sun NAS quorum devices starting with the Solaris 10 OS.
- The Sun NAS device must be located on the same network as the cluster nodes. If a Sun NAS quorum device is not located on the same network as the cluster nodes, the quorum device is at risk of not responding at boot time within the timeout period, causing the cluster boot up to fail due to lack of quorum.
- Sun Cluster supports the use of the iSCSI data path for certain storage devices. For more information about which devices can be used with the iSCSI data path, contact your Sun service representative.

## Recommendations for Sun NAS Devices

It is strongly recommended that you use a Sun StorageTek™ 5320 NAS Cluster Appliance. 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 Sun NAS device. Refer to your Sun documentation for instructions about how to configure NTP on the Sun NAS device. Select at least one NTP server for the Sun NAS device that also serves the cluster nodes.

## Restrictions for Sun NAS Devices

A Sun NAS device must be connected to all nodes. A Sun NAS device is supported as a quorum device only in a two-node cluster. A Sun NAS device appears as a SCSI shared disk to the quorum subsystem. The iSCSI connection to the Sun NAS device is completely invisible to the quorum subsystem.

There is no fencing support for NFS-exported file systems from a NAS device when used in a non-global zone, including nodes of a zone cluster. Fencing support of NAS devices is only provided in global zones.

# Installing a Sun NAS Device in a Sun Cluster Environment

## ▼ How to Install a Sun 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 administrative access to the Sun NAS device.

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

### 1 Set up the Sun NAS device.

You can set up the Sun NAS device at any point in your cluster installation. Follow the instructions in your Sun NAS device's documentation.

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

### 2 On each cluster node, add the Sun 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, as shown in the following example:

```
sunnas-123 192.168.11.123
```

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

Add an entry to the `/etc/inet/netmasks` file for the subnet on which the filer is located, as shown in the following example.

```
192.168.11.0 255.255.255.0
```

### 4 In `/etc/nsswitch.conf` on every cluster node, ensure that `files` precedes `nis` and `dns` information sources for `hosts` and `netmasks` information types, as shown in the following example.

```
hosts:      files nis
```

- 5 Use Sun StorEdge™ Web Administrator to add net addresses for all cluster nodes to the Sun NAS device.**

“Product Overview” in the *Sun StorageTek NAS OS Administration Guide* describes the Sun StorEdge Web Administrator graphical user interface (GUI). “Adding and Editing Hosts” in the *Sun StorageTek NAS OS Administration Guide* describes how to add net addresses.

- 6 Log into your Sun NAS device and use the Sun StorEdge `hostlook` command to verify that the net address for each cluster node resolves correctly, as shown in the following example.**

```
pschost-2# telnet 10.8.165.42
Trying 10.8.165.42...
Connected to 10.8.165.42.
Escape character is '^]'.
connect to (? for list) ? [menu] admin
password for admin access ? *****
nlnas20 > hostlook pschost-1
pschost-1:
  Name:  pschost-1
  Addr:  10.8.165.42
```

If the NIS+ configuration is correct and is used as the primary Host Order naming service, information about the entered host is displayed.

- 7 If you are attaching the cluster to the Sun StorageTek 5320 NAS Cluster Appliance filer for the first time, log into the NAS device and use the `load` command to load the NAS fencing command, as shown in the following example.**

```
pschost-2# telnet 10.8.165.42
Trying 10.8.165.42...
Connected to 10.8.165.42.
Escape character is '^]'.
connect to (? for list) ? [menu] admin
password for admin access ? *****
nlnas20 > load fencing
nlnas20 >
```

- 8 If you are attaching the cluster to the Sun StorageTek 5320 NAS Cluster Appliance filer for the first time, configure the fencing command so that it loads automatically after the filer reboots.**

- a. Use `ftp(1)` to get the `/dvol/etc/inetload.ncf` file from your Sun NAS device onto your local machine.
- b. Using a text editor, in the `inetload.ncf` file on your local machine, add the following entry.
 

```
fencing
```
- c. Use `ftp` to put back the `inetload.ncf` file onto your Sun NAS device (in `/dvol/etc/inetload.ncf`).

**9 Use Sun StorEdge Web Administrator to add trusted administrator access to every cluster node.**

“Product Overview” in the *Sun StorageTek NAS OS Administration Guide* describes the Sun StorEdge Web Administrator graphical user interface (GUI).

- a. **In Web Administrator, create a host group for the cluster, which includes every node in the cluster, by selecting, in the Navigation Pane, UNIX Configuration→Configure NFS→Set Up Hostgroups.**
- b. **Use `ftp(1)` to get the `/dvol/etc/approve` file from your Sun NAS device onto your local machine.**
- c. **Using a text editor, in the `approve` file on your local machine, add the following entry.**

```
admin * @cluster-host-group access=trusted
```

---

**Note** – You must add this entry *before* any existing entries in the `approve` file, as shown in the following example.

```
admin * @schostgroup access=trusted
admin * @general access=granted
```

This `approve` file is searched in sequence and stops at the first match. Placing the entry that you add before any existing entries ensures that it is matched first.

---

<code>admin</code>	A service type that controls administrative access to StorEdge configuration menus and commands through <code>rlogin</code> and <code>rsh</code> or <code>ssh</code> clients. Each <code>admin</code> entry in the <code>approve</code> file specifies the users and hosts that are allowed administrative access.
<code>@cluster-host-group</code>	The name of the host group that you previously created (preceded by the “at” symbol (@)).
<code>access=trusted</code>	How the host group can access administrative services on the Sun NAS device. Sun Cluster requires that you grant trusted access for the cluster nodes. Trusted access grants the user access without having to specify an administrative password.

For example, change the contents of your `approve` file from that shown in the first example to that shown in the second example.

```
# Approve file -- controls client access to resources
files / @trusted access=rw uid0=0

# Approve file -- controls client access to resources
files / @trusted access=rw uid0=0
admin * @schostgroup access=trusted
```



d. Use `ftp` to put back the `approve` file onto your Sun NAS device (in `/dvol/etc/approve`).

- 10 Log into your NAS device and use the Sun StorEdge `reload` command to reload the updated `approve` file, as shown in the following example.

```
pschost-2# telnet 10.8.165.42
Trying 10.8.165.42...
Connected to 10.8.165.42.
Escape character is '^]'.
connect to (? for list) ? [menu] admin
password for admin access ? *****
nlnas20 > approve reload
nlnas20 >
```

- 11 Configure Sun Cluster fencing support for the Sun NAS device. If you skip this step, Sun Cluster will not provide fencing support for the NAS device.

a. From any cluster node, add the device.

- If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice add -t sun myfiler
```

`-t sun` Enter `sun` as the type of device you are adding.

`myfiler` Enter the name of the Sun NAS device that you are adding.

- If you are using Sun Cluster 3.1, use the following command:

```
# scnas -a -h myfiler -t sunnas
```

`-a` Add the device to cluster configuration.

`-h myfiler` Enter the name of the Sun NAS device you are adding.

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

- If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice list
```

For more information about the `clnasdevice` command, see the [clnasdevice\(1CL\)](#) man page.

- If you are using Sun Cluster 3.1, use the following command:

```
# scnas -p
```

- 12 Add the Sun NAS directories to the cluster when the NAS device has been configured to support fencing.**

Follow the directions in [“How to Add Sun NAS Directories to a Cluster”](#) on page 21.

- 13 (Optional) Configure a LUN on the Sun 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 Sun NAS quorum device.

## Maintaining a Sun NAS Device in a Sun Cluster Environment

This section contains procedures about maintaining Sun 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 Sun NAS Device Maintenance”](#) on page 18 before performing the maintenance procedure. After performing the maintenance procedure, perform the steps in [“How to Restore Cluster Configuration After Sun NAS Device Maintenance”](#) on page 19 to return the cluster to its original configuration.

### ▼ How to Prepare the Cluster for Sun NAS Device Maintenance

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

**Before You Begin** This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

- 1 Stop I/O to the Sun NAS device.**
- 2 On each cluster node, unmount the Sun NAS device directories.**
- 3 Determine whether a LUN on this Sun NAS device is a quorum device.**
  - If you are using Sun Cluster 3.2, use the following command:**

```
# clquorum show
```

- If you are using Sun Cluster 3.1, use the following command:

```
# scstat -q
```

- 4 If no LUNs on this Sun NAS device are quorum devices, you are finished with this procedure.
- 5 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 6, “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 Sun NAS Device Maintenance

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

- 1 Mount the Sun NAS directories.
- 2 Determine whether you want an iSCSI LUN on this Sun NAS device to be a quorum device.
  - If no, continue to “[How to Prepare the Cluster for Sun NAS Device Maintenance](#)” on page 18.
  - 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 Sun NAS Device Maintenance](#)” on page 18.
- 3 Restore I/O to the Sun NAS device.

## ▼ How to Remove a Sun NAS Device From a Cluster

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

- Your cluster is operating.
- You have prepared the cluster by performing the steps in “[How to Prepare the Cluster for Sun NAS Device Maintenance](#)” on page 18.
- You have removed any device directories from the cluster by performing the steps in “[How to Remove a Sun NAS Device From a Cluster](#)” on page 20.

---

**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 Sun NAS device is removed.

---

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

### 1 From any cluster node, remove the device.

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice remove myfiler
```

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

- **If you are using Sun Cluster 3.1, use the following command:**

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

-r Remove the device from cluster configuration.

-h Enter the name of the Sun NAS device that you are removing.

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

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice list
```

- If you are using Sun Cluster 3.1, use the following command:

```
# scnas -p
```

## ▼ How to Add Sun NAS Directories to a Cluster

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

- Your cluster is operating.
- The Sun NAS device is properly configured and the directories the cluster will use have been exported.

See “Requirements, Recommendations, and Restrictions for Sun 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 Sun NAS Device in a Cluster” on page 14.

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

### 1 Use Sun StorEdge Web Administrator to create the Sun NAS volumes.

“Product Overview” in the *Sun StorageTek NAS OS Administration Guide* describes the Sun StorEdge Web Administrator graphical user interface (GUI). “Creating File Volumes or Segments” in the *Sun StorageTek NAS OS Administration Guide* describes how to create file volumes.

### 2 Use Sun StorEdge Web Administrator to add read/write access to every cluster node.



**Caution** – You must explicitly grant read/write access to each cluster node. Do *not* enable general access and do *not* add access by specifying a cluster host group.

“Setting Up NFS Exports” in the *Sun StorageTek NAS OS Administration Guide* describes how to add read/write access to nodes in the cluster.

### 3 Log into your NAS device and use the Sun StorEdge `list` command to verify the changes that you made to the approve file, as shown in the following example.

```
pschost-2# telnet 10.8.165.42
Trying 10.8.165.42...
Connected to 10.8.165.42.
```

```

Escape character is '^'.
connect to (? for list) ? [menu] admin
password for admin access ? *****
nlnas20 > approve list
=====
acache: approve
=====
files / @trusted access=rw uid0=0
admin * @schostgroup access=trusted
files /vol1 schost1 access=rw
files /vol1 schost2 access=rw
files /vol2 schost1 access=rw
files /vol2 schost2 access=rw
=====
acache: hostgrps
=====
trusted schostgroup
nlnas20 >

```

#### 4 From any cluster node, add the directories.

- If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice add-dir -d /export/dir1,/export/dir2 myfiler
```

-d /export/dir1, /export/dir2      Enter the directory or directories that you are adding.

myfiler                              Enter the name of the Sun NAS device containing the directories.

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

- If you are using Sun Cluster 3.1, use the following command:

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

-a                              Add the directory or directories to cluster configuration.

-h myfiler                      Enter the name of the Sun NAS device whose directories you are adding.

-d                              Enter 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 Sun NAS device.

#### 5 Confirm that the directories have been added.

- If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice show -v
```

- If you are using Sun Cluster 3.1, use the following command:

```
# scnas -p
```

**6 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 Sun 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 Sun NAS device for Oracle Real Application Clusters database files, set the following mount options:

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

When mounting Sun 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 Sun NAS Directories From a Cluster

**Before You Begin** This procedure assumes that your cluster is operating.

---

**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.

---

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

**1 If you are using hard mounts rather than the automounter, unmount the Sun 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.**

For more information about the `clnasdevice` command, see the [clnasdevice\(1CL\)](#) man page.

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice remove-dir -d /export/dir1 myfiler
```

`-d /export/dir1` Enter the directory or directories that you are removing.

`myfiler` Enter the name of the Sun NAS device containing the directories.

For more information about the `clnasdevice` command, see the [clnasdevice\(1CL\)](#) man page.

- **If you are using Sun Cluster 3.1, use the following command:**

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

`-r` Remove the directory or directories from cluster configuration.

`-h myfiler` Enter the name of the Sun NAS device whose directories you are removing.

`-d` Enter 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
```

**3 Confirm that the directories have been removed.**

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice show -v
```

- **If you are using Sun Cluster 3.1, use the following command:**

```
# scnas -p
```

**See Also** To remove the device, see [“How to Remove a Sun NAS Device From a Cluster”](#) on page 20.



# 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 28
- “How to Prepare the Cluster for Network Appliance NAS Device Maintenance” on page 31
- “How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance” on page 32
- “How to Remove a Network Appliance NAS Device From a Cluster” on page 33
- “How to Remove Network Appliance NAS Directories From a Cluster” on page 36

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

This section describes the following requirements.

- “Requirements When Configuring Network Appliance NAS Devices” on page 26
- “Requirements When Configuring Network Appliance NAS Devices for Use With Oracle Real Application Clusters” on page 26

- “Requirements When Configuring Network Appliance NAS Devices as Quorum Devices” on page 27

## Requirements When Configuring Network Appliance NAS Devices

When you configure a Network Appliance NAS device, you must meet the following requirements.

- Allow HTTP administrative access.  
Sun Cluster uses the HTTP administrative access to support fencing. Sun Cluster automatically removes file system write permission for a node that has left the cluster, and grants file system write permission for a node that has just joined the cluster. These actions ensure that a node that departed the cluster can no longer modify data. You must have the administrator login and password. You need these items when you are configuring the device in the cluster.
- Cluster nodes must be configured with Solaris Internet Protocol Multipathing (IPMP).  
See *IP Network Multipathing Administration Guide* for details on configuring IPMP.
- Ensure that the `SUNwzlib` package is available on your cluster.  
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
```
- When exporting Network Appliance 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 Network Appliance NAS Devices for Use With Oracle Real Application Clusters

When you configure your Network Appliance NAS device for use with Oracle Real Application Clusters (RAC), you must meet the following requirements.

- You must configure the Network Appliance NAS device with fencing support in order to guarantee data integrity.
- You must 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
- You must 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, you must add an entry to the `/etc/exports` file for the root of the volume that you created for storing Oracle database files.
- You must ensure that the volume is exported *without* the `nosuid` option.
- When adding the Network Appliance NAS directories to the cluster, ensure that the following mount options are set:
  - `forcedirectio`
  - `noac`
  - `proto=tcp`

## Requirements When Configuring Network Appliance NAS Devices as Quorum Devices

The administrator has the option of deciding whether to use the Network Appliance NAS device as a quorum device.

When you use a Network Appliance NAS device as a quorum device, you must meet the following requirements.

- You must install the iSCSI license from Network Appliance.
- You must configure an iSCSI LUN on the Network Appliance NAS device for use as the quorum device.
- When booting the cluster, you must always boot the Network Appliance 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 the cluster fails because the Network Appliance NAS quorum device was not available, bring up the NAS device. After that action completes, boot the cluster.

## Recommendations for Network Appliance NAS Devices

It is strongly recommended that you use a Network Appliance 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 Network Appliance NAS device as a quorum device, you can only add the quorum device when all cluster nodes are operating and communicating with the Network Appliance NAS device.

There is no fencing support for NFS-exported file systems from a NAS device when used in a non-global zone, including nodes of a zone cluster. Fencing support of Network Appliance NAS devices is only provided in global zones.

## 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 Network Appliance NAS device.

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

#### 1 Set up the Network Appliance 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 6 for a list of related device documentation.

When setting up your Network Appliance NAS device, follow the standards that are described in [“Requirements, Recommendations, and Restrictions for Network Appliance NAS Devices”](#) on page 25.

#### 2 Install the NAS-support software package `NTAPclnas` 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 Network Appliance 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 6 for instructions about downloading and installing this software.

- 3 **On each cluster node, add the Network Appliance 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 **Configure Sun Cluster fencing support for the Network Appliance NAS device. If you skip this step, Sun Cluster will not provide fencing support for the Network Appliance NAS device.**
  - a. **From any cluster node, add the device.**
    - **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice add -t netapp -p userid=root myfiler
```

Please enter password

`-t netapp`            Enter netapp as the type of device you are adding.

`-p userid=root`        Enter the HTTP administrator login for the NAS device.

`myfiler`              Enter the name of the NAS device you are adding.
    - **If you are using Sun Cluster 3.1, use the following command:**

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

Please enter password

`-a`                    Add the device to cluster configuration.

`-h myfiler`            Enter the name of the NAS device you are adding.

`-o userid=root`        Enter 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.**

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice list
```

For more information about the `clnasdevice` command, see the [clnasdevice\(1CL\)](#) man page.

- **If you are using Sun Cluster 3.1, use the following command:**

```
# scnas -p
```

7 **Add the Network Appliance NAS directories to the cluster when the NAS device has been configured to support fencing.**

Follow the directions in [“How to Add Network Appliance NAS Directories to a Cluster”](#) on page 34.

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 Network Appliance NAS quorum device.

## Maintaining a Network Appliance NAS Device in a Sun Cluster Environment

This section contains procedures about maintaining Network Appliance 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 31 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 32 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 31](#) before the maintenance procedure. Perform the steps in [“How to Restore Cluster Configuration After Network Appliance NAS Device Maintenance” on page 32](#) 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 Network Appliance 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 Network Appliance NAS device before the cluster nodes).

If your cluster loses access to a Network Appliance 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 Network Appliance 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 Network Appliance NAS device maintenance you are performing might affect the device's availability to the cluster nodes.

### Before You Begin

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,” in \*Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS\*](#).

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

### 1 Stop I/O to the NAS device.

- 2 On each cluster node, unmount the Network Appliance NAS device directories.
- 3 Determine whether a LUN on this Network Appliance NAS device is a quorum device.
  - If you are using Sun Cluster 3.2, use the following command:  

```
# clquorum show
```
  - If you are using Sun Cluster 3.1, use the following command:  

```
# scstat -q
```
- 4 If no LUNs on this Network Appliance NAS device are quorum devices, you are finished with this procedure.
- 5 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 6, “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 Network Appliance NAS device maintenance that might affect the device's availability to the cluster nodes.

- 1 Mount the Network Appliance NAS directories.
- 2 Determine whether you want an iSCSI LUN on this Network Appliance 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 31.

### 3 Restore I/O to the Network Appliance 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 operating.
- You have prepared the cluster by performing the steps in [“How to Prepare the Cluster for Network Appliance NAS Device Maintenance”](#) on page 31.
- 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 36.

---

**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 Network Appliance NAS device is removed.

---

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,” in \*Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS\*](#).

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

### 1 From any cluster node, remove the device.

- If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice remove myfiler
```

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

- **If you are using Sun Cluster 3.1, use the following command:**

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

-r Remove the device from cluster configuration.

-h Enter the name of the NAS device you are removing.

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

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice list
```

- **If you are using Sun Cluster 3.1, use the following command:**

```
# 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 operating.
- The Network Appliance 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 25](#) 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 28](#).

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,” in \*Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS\*](#).

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

### 1 From any cluster node, add the directories.

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice add-dir -d /export/dir1,/export/dir2 myfiler
```

-d /export/dir1, /export/dir2 Enter the directory or directories that you are adding.

*myfiler* Enter the name of the NAS device containing the directories.

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

- **If you are using Sun Cluster 3.1, use the following command:**

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

- a Add the directory or directories to cluster configuration.
- h *myfiler* Enter the name of the NAS device whose directories you are adding.
- d Enter 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.

## 2 Confirm that the directories have been added.

- **If you are using Sun Cluster 3.2, use the following command:**

```
# clnasdevice show -v
```

- **If you are using Sun Cluster 3.1, use the following command:**

```
# scnas -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 Network Appliance 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 Network Appliance NAS device for Oracle Real Application Clusters database files, set the following mount options:

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

When mounting Network Appliance 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 operating.

---

**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.

---

This procedure provides the long forms of the Sun Cluster commands. Most commands also have short forms. Except for the forms of the command names, the commands are identical. For a list of the commands and their short forms, see [Appendix A, “Sun Cluster Object-Oriented Commands,”](#) in *Sun Cluster 3.1 - 3.2 Hardware Administration Manual for Solaris OS*.

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

### 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.

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

#### ▪ If you are using Sun Cluster 3.2, use the following command:

```
# clnasdevice remove-dir -d /export/dir1 myfiler
```

`-d /export/dir1` Enter the directory or directories that you are removing.

`myfiler` Enter the name of the NAS device containing the directories.

For more information about the `clnasdevice` command, see the `clnasdevice(1CL)` man page.

#### ▪ If you are using Sun Cluster 3.1, use the following command:

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

`-r` Remove the directory or directories from cluster configuration.

- h *myfiler* Enter the name of the NAS device whose directories you are removing.
- d Enter 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
```

### 3 Confirm that the directories have been removed.

- If you are using Sun Cluster 3.2, use the following command:  

```
# clnasdevice show -v
```
- If you are using Sun Cluster 3.1, use the following command:  

```
# scnas -p
```

**See Also** To remove the device, see [“How to Remove a Network Appliance NAS Device From a Cluster”](#) on page 33.



# Index

---

## A

- access, directories used by nodes, 12
- adding Network Appliance NAS device directories, 34-35
- adding Network Appliance NAS devices, 28-30
- adding Sun NAS device directories, 21-23
- adding Sun NAS devices, 14-18
- administrative access, 26
  - cluster nodes, 12
  - fencing support, 12
  - filer, 12
  - nodes, 12
- approve file, 16
  - listing, 21
  - reloading, 17
- archived redo log files
  - in Network Appliance NAS devices, 26-27
  - in Sun NAS devices, 12

## B

- boot order, 13, 27

## C

- clnasdevice add command, 17, 29
- clnasdevice add-dir command, 22, 34
- clnasdevice list command, 17, 20, 30, 34
- clnasdevice remove command, 20, 33
- clnasdevice remove-dir command, 24, 36

- clnasdevice show command, 22, 35
- clquorum show command, 18, 32
- cluster nodes
  - access, 12
  - administrative access, 12
- cluster preparation, 18-19, 31-32
- cluster restoration, 19, 32-33
- clustered filers, 13, 27
- commands
  - clnasdevice add, 17, 29
  - clnasdevice add-dir, 22, 34
  - clnasdevice list, 17, 20, 30, 34
  - clnasdevice remove, 20, 33
  - clnasdevice remove-dir, 24, 36
  - clnasdevice show, 22, 35
  - clquorum show, 18, 32
  - hostlook, 15
  - list approve file, 21
  - load fencing, 15
  - reload approve file, 17
- control files
  - in Network Appliance NAS devices, 26-27
  - in Sun NAS devices, 12

## D

- databases
  - volumes for, 12, 26-27
- devices
  - See Network Appliance NAS
  - See Sun NAS

directory configuration, 26

## E

/etc/vfstab file  
    adding mount points, 23, 35  
/etc/exports file, 12, 27  
exportsfile, 12, 27

## F

fencing  
    configuring for Network Appliance NAS devices, 28-30  
    configuring for Sun NAS devices, 14-18  
    loading, 15

filer, administrative access, 12

filers

    See Network Appliance NAS  
    See Sun NAS

files

    approve, 16  
    /etc/exports, 12, 27  
    exports, 12, 27  
    inetload.ncf, 15  
    vfstab. adding mount points, 23, 35

## H

help, 7-8  
host groups, creating, 16  
host look StorEdge command, 15  
hosts file, 14  
HTTP administrative access, 26

## I

inetload.ncf file, 15  
installing Network Appliance NAS devices, 28-30  
installing Sun NAS devices, 14-18  
IPMP, 26

iSCSI, 27

## L

license, iSCSI, 27  
list StorEdge command, 21  
load fencing StorEdge command, 15  
LUNs, 27

## M

maintenance  
    preparing the cluster, 18-19, 31-32  
    restoring the cluster, 19, 32-33  
mount options  
    Network Appliance NAS devices, 27  
    Sun NAS devices, 12  
mount points  
    modifying the /etc/vfstab file, 23, 35

## N

NAS devices

    adding Network Appliance, 28-30  
    adding Network Appliance device directories, 34-35  
    adding Sun, 14-18  
    adding Sun NAS device directories, 21-23  
    installing Network Appliance, 28-30  
    installing Sun, 14-18  
    recommendations for Network Appliance, 27  
    recommendations for Sun, 13  
    removing Network Appliance, 33-34  
    removing Network Appliance device directories, 36-37  
    removing Sun, 20-21  
    removing Sun NAS device directories, 23-24  
    requirements for Network Appliance, 25-27  
    requirements for Sun, 11-13  
    restrictions, 28  
    restrictions for Sun, 13  
net addresses, resolving, 15  
netmasks file, 14



Network Appliance devices, 25  
  mount options, 27  
Network Appliance NAS devices, configuring fencing support, 28-30  
network-attached storage devices  
  See NAS devices  
network configuration  
  time synchronization, 13, 27  
network time protocol, 13, 27  
nodes  
  access, 12  
  administrative access, 12  
nsswitch file, 14  
NTP, 13, 27

## O

online redo log files  
  in Network Appliance NAS devices, 26-27  
  in Sun NAS devices, 12  
Oracle Parallel Server, 5

## P

preparing the cluster for maintenance, 18-19, 31-32

## Q

qtrees  
  Network Appliance NAS devices, 26  
  Sun NAS devices, 12  
quorum devices, 13, 27  
quota trees  
  Network Appliance NAS devices, 26  
  Sun NAS devices, 12

## R

recommendations for Network Appliance NAS device use, 27  
recommendations for Sun NAS device use, 13

reload StorEdge command, 17  
removing Network Appliance NAS device directories, 36-37  
removing Network Appliance NAS devices, 33-34  
removing Sun NAS device directories, 23-24  
removing Sun NAS devices, 20-21  
requirements for Network Appliance NAS device use, 25-27  
requirements for Sun NAS device use, 11-13  
restoring the cluster after maintenance, 19, 32-33  
restrictions of Network Appliance NAS device use, 28  
restrictions of Sun NAS device use, 13

## S

Solaris OS requirements, 26  
StorEdge Web Administrator, 15, 21  
Sun devices, 11  
  mount options, 12  
SUN NAS devices, configuring fencing support, 13  
SUNWzlib package requirement, 26  
supported devices, 13, 27

## T

technical support, 7-8

## V

vfstab file  
  adding mount points, 23, 35

## W

Web Administrator, 15, 21

