



# Sun Cluster Data Service for NFS Guide for Solaris OS

---

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

Part No: 817-6999-10  
August 2005, Revision A

Copyright 2005 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

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, docs.sun.com, AnswerBook, AnswerBook2, SunPlex, Java, and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc. 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.

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.

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 2005 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées du système Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, docs.sun.com, AnswerBook, AnswerBook2, SunPlex, Java, et Solaris sont des marques de fabrique ou des marques déposées, de Sun Microsystems, Inc. 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.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REpondre A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.



050504@11223



# Contents

---

Preface 5

**Installing and Configuring Sun Cluster HA for NFS 11**

Overview of the Installation and Configuration Process for Sun Cluster HA for NFS 12

Planning the Sun Cluster HA for NFS Installation and Configuration 13

Service Management Facility Restrictions 13

Loopback File System Restrictions 13

Installing Sun Cluster HA for NFS Packages 14

▼ How to Install Sun Cluster HA for NFS Packages Using the Web Start Program 14

▼ How to Install Sun Cluster HA for NFS Packages Using the `scinstall` Utility 15

Registering and Configuring Sun Cluster HA for NFS 16

Setting Sun Cluster HA for NFS Extension Properties 17

▼ How to Register and Configure Sun Cluster HA for NFS 17

▼ How to Change Share Options on an NFS File System 22

▼ How to Dynamically Update Shared Paths on an NFS File System 24

How to Tune Sun Cluster HA for NFS Method Timeouts 25

How to Configure `SUNW.HAStoragePlus` Resource Type 25

Securing Sun Cluster HA for NFS With Kerberos V5 26

▼ How to Prepare the Nodes 26

▼ How to Create Kerberos Principals 27

Enabling Secure NFS 30

Tuning the Sun Cluster HA for NFS Fault Monitor 30

Fault Monitor Startup 30

Fault Monitor Stop 30

Operations of Sun Cluster HA for NFS Fault Monitor During a Probe	31
Upgrading the <code>SUNW.nfs</code> Resource Type	33
Information for Registering the New Resource Type Version	33
Information for Migrating Existing Instances of the Resource Type	34

**A Sun Cluster HA for NFS Extension Properties 35**

Index	39
-------	----

# Preface

---

*Sun Cluster Data Service for NFS Guide for Solaris OS* explains how to install and configure Sun™ Cluster HA for Network File System (NFS) 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.

---

This document is intended for system administrators with extensive knowledge of Sun software and hardware. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

The instructions in this document assume knowledge of the Solaris™ Operating System and expertise with the volume manager software that is used with Sun Cluster.

---

**Note** – 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.

---

---

## UNIX Commands

This document contains information about commands that are specific to installing and configuring Sun Cluster data services. The document does *not* contain comprehensive information about basic UNIX® commands and procedures, such as shutting down the system, booting the system, and configuring devices. Information about basic UNIX commands and procedures is available from the following sources:

- Online documentation for the Solaris Operating System
- Solaris Operating System man pages
- Other software documentation that you received with your system

---

## Typographic Conventions

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

**TABLE P-1** 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%</code> you have mail.
<b>AaBbCc123</b>	What you type, contrasted with onscreen computer output	<code>machine_name%</code> <b>su</b> 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-2** 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	#

---

## Related Documentation

Information about related Sun Cluster topics is available in the documentation that is listed in the following table. All Sun Cluster documentation is available at <http://docs.sun.com>.

Topic	Documentation
Data service administration	<i>Sun Cluster Data Services Planning and Administration Guide for Solaris OS</i> Individual data service guides
Concepts	<i>Sun Cluster Concepts Guide for Solaris OS</i>
Overview	<i>Sun Cluster Overview for Solaris OS</i>
Software installation	<i>Sun Cluster Software Installation Guide for Solaris OS</i>
System administration	<i>Sun Cluster System Administration Guide for Solaris OS</i>
Hardware administration	<i>Sun Cluster 3.0-3.1 Hardware Administration Manual for Solaris OS</i> Individual hardware administration guides
Data service development	<i>Sun Cluster Data Services Developer's Guide for Solaris OS</i>

Topic	Documentation
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>

For a complete list of Sun Cluster documentation, see the release notes for your release of Sun Cluster at <http://docs.sun.com>.

---

## Related Third-Party Web Site References

Third-party URLs that are referenced in this document provide additional related information.

---

**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.

---



---

## Documentation, Support, and Training

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



---

## Product Training

Sun Microsystems offers training in many Sun technologies through a variety of instructor-led courses and self-paced courses. For information about the training courses that Sun offers and to enroll in a class, visit Sun Microsystems Training at <http://training.sun.com/>.

---

## 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 and serial numbers of your systems
- The release number of the Solaris Operating System (for example, Solaris 8)
- The release number of Sun Cluster (for example, Sun Cluster 3.0)

Use the following commands to gather information about each node on 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>SPARC: prtdiag -v</code>	Displays system diagnostic information
<code>scinstall -pv</code>	Displays Sun Cluster release and package version information

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



# Installing and Configuring Sun Cluster HA for NFS

---

This chapter describes the steps to install and configure Sun Cluster HA for Network File System (NFS) on your Sun Cluster nodes.

This chapter contains the following sections.

- “Overview of the Installation and Configuration Process for Sun Cluster HA for NFS” on page 12
- “Planning the Sun Cluster HA for NFS Installation and Configuration” on page 13
- “Installing Sun Cluster HA for NFS Packages” on page 14
- “Registering and Configuring Sun Cluster HA for NFS” on page 16
- “Securing Sun Cluster HA for NFS With Kerberos V5” on page 26
- “Tuning the Sun Cluster HA for NFS Fault Monitor” on page 30
- “Upgrading the SUNW.nfs Resource Type” on page 33

You must configure Sun Cluster HA for NFS as a failover data service. See Chapter 1, “Planning for Sun Cluster Data Services,” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* and the *Sun Cluster Concepts Guide for Solaris OS* document for general information about data services, resource groups, resources, and other related topics.

---

**Note** – You can use SunPlex™ Manager to install and configure this data service. See the SunPlex Manager online help for details.

---

Use the worksheets in “Configuration Worksheets” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* to plan your resources and resource groups before you install and configure Sun Cluster HA for NFS.

The NFS mount points that are placed under the control of the data service must be the same on all of the nodes that can master the disk device group that contains those file systems.

Sun Cluster HA for NFS requires that all NFS client mounts be “hard” mounts.

No Sun Cluster node may be an NFS client of a file system that is exported by Sun Cluster HA for NFS and is being mastered on a node in the same cluster. Such cross-mounting of Sun Cluster HA for NFS is prohibited. Use the cluster file system to share files among cluster nodes.

Starting with Solaris 9, if Solaris Resource Manager is used to manage system resources allocated to NFS on a cluster, all Sun Cluster HA for NFS resources which can fail over to a common cluster node must have the same Solaris Resource Manager project ID. This project ID is set with the `Resource_project_name` resource property.



---

**Caution** – If you use VERITAS Volume Manager (available for use in SPARC based clusters only), you can avoid “stale file handle” errors on the client during NFS failover. Ensure that the `vxio` driver has identical pseudo-device major numbers on all of the cluster nodes. You can find this number in the `/etc/name_to_major` file after you complete the installation.

---

---

## Overview of the Installation and Configuration Process for Sun Cluster HA for NFS

The following table lists the sections that describe the installation and configuration tasks.

**TABLE 1** Task Map: Installing and Configuring Sun Cluster HA for NFS

Task	For Instructions
Install Sun Cluster HA for NFS packages	“Installing Sun Cluster HA for NFS Packages” on page 14
Set up and configure Sun Cluster HA for NFS	“Registering and Configuring Sun Cluster HA for NFS” on page 16
Secure Sun Cluster HA for NFS with Kerberos V5	“Securing Sun Cluster HA for NFS With Kerberos V5” on page 26
Tune the Sun Cluster HA for NFS fault monitor	“Tuning the Sun Cluster HA for NFS Fault Monitor” on page 30
Upgrade the <code>SUNW.nfs</code> resource type	“Upgrading the <code>SUNW.nfs</code> Resource Type” on page 33

---

# Planning the Sun Cluster HA for NFS Installation and Configuration

This section contains the information that you need to plan the installation and configuration of your Sun Cluster HA for NFS.

## Service Management Facility Restrictions

Starting with Solaris 10, the following Service Management Facility (SMF) services are related to NFS.

- `/network/nfs/cbd`
- `/network/nfs/mapid`
- `/network/nfs/server`
- `/network/nfs/rquota`
- `/network/nfs/client`
- `/network/nfs/status`
- `/network/nfs/nlockmgr`

The Sun Cluster HA for NFS data service sets the property `application/auto_enable` to `FALSE` and the property `startd/duration` to `transient` for three of these services.

- `/network/nfs/server`
- `/network/nfs/status`
- `/network/nfs/nlockmgr`

These property settings have the following consequences for these services.

- When services that depend on these services are enabled, these services are not automatically enabled.
- In the event of any failure, SMF does not restart the daemons that are associated with these services.
- In the event of any failure, SMF does not restart these services.

## Loopback File System Restrictions

Do *not* use the loopback file system (LOFS) if both conditions in the following list are met:

- Sun Cluster HA for NFS is configured on a highly available local file system.
- The `automountd` daemon is running.

If both of these conditions are met, LOFS must be disabled to avoid switchover problems or other failures. If only one of these conditions is met, it is safe to enable LOFS.

If you require both LOFS and the automountd daemon to be enabled, exclude from the automounter map all files that are part of the highly available local file system that is exported by Sun Cluster HA for NFS.

---

## Installing Sun Cluster HA for NFS Packages

If you did not install the Sun Cluster HA for NFS packages during your initial Sun Cluster installation, perform this procedure to install the packages. Perform this procedure on each cluster node where you are installing the Sun Cluster HA for NFS packages. To complete this procedure, you need the Sun Cluster Agents CD.

If you are installing more than one data service simultaneously, perform the procedure in “Installing the Software” in *Sun Cluster Software Installation Guide for Solaris OS*.

Install the Sun Cluster HA for NFS packages by using one of the following installation tools:

- The Web Start program
- The `scinstall` utility

---

**Note** – If you are using Solaris 10, install these packages *only* in the global zone. To ensure that these packages are not propagated to any local zones that are created after you install the packages, use the `scinstall` utility to install these packages. Do *not* use the Web Start program.

---

### ▼ How to Install Sun Cluster HA for NFS Packages Using the Web Start Program

You can run the Web Start program with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar. For more information about the Web Start program, see the `installer(1M)` man page.

- Steps**
1. **On the cluster node where you are installing the Sun Cluster HA for NFS packages, become superuser.**

2. (Optional) If you intend to run the Web Start program with a GUI, ensure that your `DISPLAY` environment variable is set.
3. **Insert the Sun Cluster Agents CD into the CD-ROM drive.**  
If the Volume Management daemon `vold(1M)` is running and configured to manage CD-ROM devices, it automatically mounts the CD-ROM on the `/cdrom/cdrom0` directory.
4. **Change to the Sun Cluster HA for NFS component directory of the CD-ROM.**  
The Web Start program for the Sun Cluster HA for NFS data service resides in this directory.  

```
# cd /cdrom/cdrom0/components/SunCluster_HA_NFS_3.1
```
5. **Start the Web Start program.**  

```
# ./installer
```
6. **When you are prompted, select the type of installation.**
  - To install only the C locale, select Typical.
  - To install other locales, select Custom.
7. **Follow the instructions on the screen to install the Sun Cluster HA for NFS packages on the node.**  
After the installation is finished, the Web Start program provides an installation summary. This summary enables you to view logs that the Web Start program created during the installation. These logs are located in the `/var/sadm/install/logs` directory.
8. **Exit the Web Start program.**
9. **Remove the Sun Cluster Agents CD from the CD-ROM drive.**
  - a. To ensure that the CD-ROM is not being used, change to a directory that does *not* reside on the CD-ROM.
  - b. Eject the CD-ROM.  

```
# eject cdrom
```

**Next Steps** Go to “[Registering and Configuring Sun Cluster HA for NFS](#)” on page 16.

## ▼ How to Install Sun Cluster HA for NFS Packages Using the `scinstall` Utility

Perform this procedure on all of the cluster members that can master Sun Cluster HA for NFS.

**Before You Begin** Ensure that you have the Sun Cluster Agents CD.

- Steps**
1. **Load the Sun Cluster Agents CD into the CD-ROM drive.**
  2. **Run the `scinstall` utility with no options.**  
This step starts the `scinstall` utility in interactive mode.
  3. **Select the menu option, Add Support for New Data Service to This Cluster Node.**  
The `scinstall` utility prompts you for additional information.
  4. **Provide the path to the Sun Cluster Agents CD.**  
The utility refers to the CD as the “data services cd.”
  5. **Specify the data service to install.**  
The `scinstall` utility lists the data service that you selected and asks you to confirm your choice.
  6. **Exit the `scinstall` utility.**
  7. **Unload the CD from the drive.**

**Next Steps** Go to [“Registering and Configuring Sun Cluster HA for NFS” on page 16.](#)

---

## Registering and Configuring Sun Cluster HA for NFS

This procedure describes how to use the `scradm(1M)` command to register and configure Sun Cluster HA for NFS.

---

**Note** – Other options also enable you to register and configure the data service. See “Tools for Data Service Resource Administration” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* for details about these options.

---

Before you register and configure Sun Cluster HA for NFS, run the following command to verify that the Sun Cluster HA for NFS package, `SUNWscnfs`, is installed on the cluster.

```
# pkginfo -l SUNWscnfs
```

If the package has not been installed, see [“Installing Sun Cluster HA for NFS Packages” on page 14](#) for instructions on how to install the package.



## Setting Sun Cluster HA for NFS Extension Properties

The sections that follow contain instructions for registering and configuring resources. For information about the Sun Cluster HA for NFS extension properties, see [Appendix A](#). The Tunable entry indicates when you can update a property.

To set an extension property of a resource, include the following option in the `scrgadm (1M)` command that creates or modifies the resource:

`-x property=value`

`-x property`

Identifies the extension property that you are setting

`value`

Specifies the value to which you are setting the extension property

You can also use the procedures in Chapter 2, “Administering Data Service Resources,” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* to configure resources after the resources are created.

### ▼ How to Register and Configure Sun Cluster HA for NFS

**Steps** 1. **Become superuser on a cluster member.**

2. **Verify that all of the cluster nodes are online.**

```
# scstat -n
```

3. **Create the Pathprefix directory.**

Create a Pathprefix directory on the HA file system (global file system or failover file system). Sun Cluster HA for NFS resources will use this directory to maintain administrative information.

You can specify any directory for this purpose. However, you must manually create a Pathprefix directory for each resource group that you create.

```
# mkdir -p Pathprefix-directory
```

4. **Create a failover resource group to contain the NFS resources.**

```
# scrgadm -a -g resource-group -y Pathprefix=Pathprefix-directory [-h nodelist]
```

`-a`

Specifies that you are adding a new configuration.

`-g resource-group`

Specifies the failover resource group.

`-y Pathprefix=Pathprefix-directory`

Specifies a directory that resources in this resource group will use to maintain administrative information. This is the directory that you created in [Step 3](#).

`[-h nodelist]`

Specifies an optional, comma-separated list of physical node names or IDs that identify potential masters. The order here determines the order in which the Resource Group Manager (RGM) considers primary nodes during failover.

**5. Verify that you have added all of your logical hostname resources to the name service database.**

To avoid any failures because of name service lookups, verify that all IP addresses to hostname mappings that are used by Sun Cluster HA for NFS are present in the server's and client's `/etc/inet/hosts` file. This requirement also applies to any IPMP test IP addresses of logical host names that are used by Sun Cluster HA for NFS.

**6. Configure name service mapping in the `/etc/nsswitch.conf` file on the cluster nodes to first check the local files before trying to access NIS or NIS+ for rpc lookups.**

This configuration prevents timing-related errors for rpc lookups during periods of public network or name service unavailability.

**7. Modify the hosts entry in `/etc/nsswitch.conf` so that upon resolving a name locally the host does not first contact NIS/DNS, but instead immediately returns a successful status.**

This modification enables HA-NFS to fail over correctly in the presence of public network failures.

```
# hosts: cluster files [SUCCESS=return] nis
# rpc: files nis
```

**8. (Optional) Customize the `nfsd` or `lockd` startup options.**

**a. To customize `nfsd` options, on each cluster node open the `/etc/init.d/nfs.server` file, find the command line starting with `/usr/lib/nfs/nfsd`, and add any additional arguments desired.**

**b. To customize `lockd` startup options, on each cluster node open the `/etc/init.d/nfs.client` file, find the command line starting with `/usr/lib/nfs/lockd`, and add any command line arguments desired.**

Starting with Solaris 9, you can set the `lockd` grace period with the `LOCKD_GRACE_PERIOD` parameter in the `/etc/default/nfs` file. However, if the grace period is set in a command line argument in the `/etc/init.d/nfs.client` file, this will override the value set in `LOCKD_GRACE_PERIOD`.

---

**Note** – The command lines must remain limited to a single line. Breaking the command line into multiple lines is not supported. The additional arguments must be valid options documented in man pages `nfsd(1M)` and `lockd(1M)`.

---

**9. Add the desired logical hostname resources into the failover resource group.**

You must set up a logical hostname resource with this step. The logical hostname that you use with Sun Cluster HA for NFS **cannot** be a `SharedAddress` resource type.

```
# scrgadm -a -L -g resource-group -l logical-hostname, ... [-n netiflist]
```

-a

Specifies that you are adding a new configuration.

-L -g *resource-group*

Specifies the resource group that is to hold the logical hostname resources.

-l *logical-hostname, ...*

Specifies the logical hostname resource to be added.

-n *netiflist*

Specifies an optional, comma-separated list that identifies the IP Networking Multipathing groups that are on each node. Each element in *netiflist* must be in the form of `netif@node`. `netif` can be given as an IP Networking Multipathing group name, such as `sc_ipmp0`. The node can be identified by the node name or node ID, such as `sc_ipmp0@1` or `sc_ipmp@phys-schost-1`.

---

**Note** – Sun Cluster does not currently support using the adapter name for `netif`.

---

**10. From any cluster node, create the `SUNW.nfs` subdirectory.**

Create a subdirectory called `SUNW.nfs` below the directory that the `Pathprefix` property identifies in [Step 4](#).

```
# mkdir Pathprefix-directory/SUNW.nfs
```

**11. Create a `dfstab.resource` file in the `SUNW.nfs` directory that you created in [Step 10](#), and set up share options.**

**a. Create the `Pathprefix/SUNW.nfs/dfstab.resource` file.**

This file contains a set of share commands with the shared path names. The shared paths should be subdirectories on a cluster file system.

---

**Note** – Choose a *resource* name suffix to identify the NFS resource that you plan to create (in [Step 13](#)). A good resource name refers to the task that this resource is expected to perform. For example, a name such as `user-nfs-home` is a good candidate for an NFS resource that shares user home directories.

---

**b. Set up the `share` options for each path that you have created to be shared.**

The format of this file is exactly the same as the format that is used in the `/etc/dfs/dfstab` file.

```
# share -F nfs [-o specific_options] [-d "description"] pathname
-F nfs
  Identifies the file system type as nfs.
-o specific_options
  Grants read-write access to all of the clients. See the share(1M) man page
  for a list of options. Set the rw option for Sun Cluster.
-d description
  Describes the file system to add.
pathname
  Identifies the file system to share.
```

When you set up your share options, consider the following points.

- When constructing share options, do not use the `root` option, and do not mix the `ro` and `rw` options.
- Do not grant access to the hostnames on the cluster interconnect.  
Grant read and write access to all of the cluster nodes and logical hosts to enable the Sun Cluster HA for NFS monitoring to do a thorough job. However, you can restrict write access to the file system or make the file system entirely read-only. If you do so, Sun Cluster HA for NFS fault monitoring can still perform monitoring without having write access.
- If you specify a client list in the `share` command, include all of the physical hostnames and logical hostnames that are associated with the cluster, as well as the hostnames for all of the clients on all of the public networks to which the cluster is connected.
- If you use net groups in the `share` command (rather than names of individual hosts), add all of those cluster hostnames to the appropriate net group.

The `share -o rw` command grants write access to all of the clients, including the hostnames that the Sun Cluster software uses. This command enables Sun Cluster HA for NFS fault monitoring to operate most efficiently. See the following man pages for details.

- `dfstab(4)`
- `share(1M)`

- `share_nfs(1M)`

## 12. Register the NFS resource type.

```
# scrgadm -a -t resource-type
```

`-a -t resource-type`

Adds the specified resource type. For Sun Cluster HA for NFS, the resource type is `SUNW.nfs`.

## 13. Create the NFS resource in the failover resource group.

```
# scrgadm -a -j resource -g resource-group -t resource-type
```

`-a`

Specifies that you are adding a configuration.

`-j resource`

Specifies the name of the resource to add, which you defined in [Step 11](#). This name can be your choice but must be unique within the cluster.

`-g resource-group`

Specifies the name of a previously created resource group to which this resource is to be added.

`-t resource-type`

Specifies the name of the resource type to which this resource belongs. This name must be the name of a registered resource type.

## 14. Run the `scswitch(1M)` command to perform the following tasks.

- Enable the resource and the resource fault monitor.
- Manage the resource group.
- Switch the resource group into the `ONLINE` state.

```
# scswitch -Z -g resource-group
```

### Example 1 Setting Up and Configuring Sun Cluster HA for NFS

The following example shows how to set up and configure Sun Cluster HA for NFS.

1. To create a logical host resource group and specify the path to the administrative files used by NFS (`Pathprefix`), the following command is run.

```
# scrgadm -a -g resource-group-1 -y Pathprefix=/global/nfs
```

2. To add logical hostname resources into the logical host resource group, the following command is run.

```
# scrgadm -a -L -g resource-group-1 -l schost-1
```

3. To make the directory structure contain the Sun Cluster HA for NFS configuration files, the following command is run.

```
# mkdir -p /global/nfs/SUNW.nfs
```

4. To create the `dfstab.resource` file under the `nfs/SUNW.nfs` directory and set share options, the following command is run.

```
# share -F nfs -o rw=engineering -d "home dirs" nfs/SUNW.nfs
```

5. To register the NFS resource type, the following command is run.

```
# scrgadm -a -t SUNW.nfs
```

6. To create the NFS resource in the resource group, the following command is run.

```
# scrgadm -a -j r-nfs -g resource-group-1 -t SUNW.nfs
```

7. To enable the resources and their monitors, manage the resource group, and switch the resource group into online state, the following command is run.

```
# scswitch -Z -g resource-group-1
```

## ▼ How to Change Share Options on an NFS File System

If you use the `rw`, `rw=`, `ro`, or `ro=` options to the `share -o` command, NFS fault monitoring works best if you grant access to all of the physical hosts or `netgroups` that are associated with all of the Sun Cluster servers.

If you use `netgroups` in the `share(1M)` command, add all of the Sun Cluster hostnames to the appropriate `netgroup`. Ideally, grant both read access and write access to all of the Sun Cluster hostnames to enable the NFS fault probes to do a complete job.

---

**Note** – Before you change share options, read the `share_nfs(1M)` man page to understand which combinations of options are legal.

---

You can also modify shared paths and options dynamically without bringing offline the Sun Cluster HA for NFS resource. See [“How to Dynamically Update Shared Paths on an NFS File System”](#) on page 24.

To modify the share options on an NFS file system while the Sun Cluster HA for NFS resource is offline, perform the following steps.

- Steps**
1. **Become superuser on a cluster node.**
  2. **Turn off fault monitoring on the NFS resource.**

```
# scswitch -n -M -j resource
```

```
-M
```

Disables the resource fault monitor

3. **Test the new share options.**

- a. Before you edit the `dfstab.resource` file with new share options, execute the new `share` command to verify the validity of your combination of options.

```
# share -F nfs [-o specific_options] [-d "description"] pathname
```

`-F nfs`

Identifies the file system type as NFS.

`-o specific_options`

Specifies an option. You might use `rw`, which grants read-write access to all of the clients.

`-d description`

Describes the file system to add.

`pathname`

Identifies the file system to share.

- b. If the new `share` command fails, immediately execute another `share` command with the old options. When the new command executes successfully, proceed to [Step 4](#).
4. Edit the `dfstab.resource` file with the new share options.

- a. To remove a path from the `dfstab.resource` file, perform the following steps in order.

- i. Execute the `unshare(1M)` command.

```
# unshare -F nfs [-o specific_options] pathname
```

`-F nfs`

Identifies the file system type as NFS.

`-o specific_options`

Specifies the options that are specific to NFS file systems.

`pathname`

Identifies the file system that is made unavailable.

- ii. From the `dfstab.resource` file, delete the `share` command for the path that you want to remove.

```
# vi dfstab.resource
```

- b. To add a path or change an existing path in the `dfstab.resource` file, verify that the mount point is valid, then edit the `dfstab.resource` file.

---

**Note** – The format of this file is exactly the same as the format that is used in the `/etc/dfs/dfstab` file. Each line consists of a `share` command.

---

## 5. Enable fault monitoring on the NFS resource.

```
# scswitch -e -M -j resource
```

## ▼ How to Dynamically Update Shared Paths on an NFS File System

You can dynamically modify the shared paths on an NFS file system without bringing offline the Sun Cluster HA for NFS resource. The general procedure consists of modifying the `dfstab.resource` file for Sun Cluster HA for NFS and then manually running the appropriate command, either the `share` command or the `unshare` command. The command is immediately effective, and Sun Cluster HA for NFS handles making these paths highly available.

Ensure that the paths that are shared are always available to Sun Cluster HA for NFS during failover so that local paths (on non-HA file systems) are not used.

If paths on a file system that is managed by HAStoragePlus are shared, the HAStoragePlus resource must be in the same resource group as the Sun Cluster HA for NFS resource, and the dependency between them must be set correctly.

- Steps**
1. Use the `scstat -g` command to find out the node on which the Sun Cluster HA for NFS resource is online.
  2. On this node run the `/usr/sbin/share` command to see the list of paths currently shared. Determine the changes you want to make to this list.
  3. To add a new shared path, perform the following steps.
    - a. Add the `share` command to the `dfstab.resource` file.

Sun Cluster HA for NFS shares the new path the next time it checks the file. The frequency of these checks is controlled by the `Thorough_Probe_Interval` property (by default 120 seconds).
    - b. Run the `share` command manually to make the newly added shared path effective immediately. Running the command manually is recommended because the user can be certain that the shared paths are available to potential clients. Sun Cluster HA for NFS detects that the newly added path is already shared and does not complain.
  4. To unshare a path, perform the following steps.
    - a. Run the `dfmounts (1M)` command to ensure that no clients are currently using the path.

Although a path can be unshared even if clients are using it, these clients would get a stale file error handle and would need special care (forced unmount, or even reboot) to recover.



- b. Remove the shared path from the `dfstab.resource` file.
  - c. Run the `unshare` command manually.
5. To modify options for an existing shared path, perform the following steps.
- a. Modify the `dfstab.resource` file as needed.
  - b. Run the appropriate command (`share` or `unshare`) manually.

## How to Tune Sun Cluster HA for NFS Method Timeouts

The time that Sun Cluster HA for NFS methods require to finish depends on the number of paths that the resources share through the `dfstab.resource` file. The default timeout for these methods is 300 seconds.

As a general guideline, allocate 10 seconds toward the method timeouts for each path that is shared. Default timeouts are designed to handle 30 shared paths.

- If the number of shared paths is less than 30, do not reduce the timeout.
- If the number of shared paths exceeds 30, multiply the number of paths by 10 to compute the recommended timeout. For example, if the `dfstab.resource` file contains 50 shared paths, the recommended timeout is 500 seconds.

Update the following method timeouts if the number of shared paths is greater than 30.

- `Prenet_start_timeout`
- `Postnet_stop_timeout`
- `Start_timeout`
- `Stop_timeout`
- `Validate_timeout`
- `Update_timeout`
- `Monitor_Start_timeout`
- `Monitor_Stop_timeout`
- `Monitor_Check_timeout`

To change method timeouts, use the `scrgadm -c` option, as in the following example.

```
% scrgadm -c -j resource -y Prenet_start_timeout=500
```

## How to Configure SUNW.HAStoragePlus Resource Type

The `SUNW.HAStoragePlus` resource type was introduced in Sun Cluster 3.0 5/02. This new resource type performs the same functions as `SUNW.HAStorage`, and synchronizes actions between HA storage and Sun Cluster HA for NFS.

SUNW.HASStoragePlus also has an additional feature to make a local file system highly available. Sun Cluster HA for NFS is both failover and disk-intensive, and therefore, you should set up the SUNW.HASStoragePlus resource type.

See the SUNW.HASStoragePlus(5) man page and “Relationship Between Resource Groups and Disk Device Groups” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* for background information. See “Synchronizing the Startups Between Resource Groups and Disk Device Groups” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* for the procedure. (If you are using a Sun Cluster 3.0 version prior to 5/02, you must set up SUNW.HASStorage instead of SUNW.HASStoragePlus. See “Synchronizing the Startups Between Resource Groups and Disk Device Groups” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS* for the procedure.)

---

## Securing Sun Cluster HA for NFS With Kerberos V5

You can secure Sun Cluster HA for NFS with Kerberos V5 by configuring the Kerberos client. This configuration includes adding a Kerberos principal for NFS over the logical hostnames on all cluster nodes.

To configure the Kerberos client, perform the following procedures.

- Prepare the nodes. See “How to Prepare the Nodes” on page 26.
- Create Kerberos principals. See “How to Create Kerberos Principals” on page 27.
- Enable the secured NFS. See “Enabling Secure NFS” on page 30.

### ▼ How to Prepare the Nodes

**Steps** 1. **Configure the KDC (Key Distribution Center) server which will be used by the Cluster nodes.**

Refer to Solaris Kerberos/SEAM (Sun Enterprise Authentication Mechanism) documentation for details.

2. **Set up the time synchronization.**

The KDC server must be time synchronized with the cluster nodes as well as any clients which will be using the Sun Cluster HA for NFS services from the cluster. The NTP (Network Time Protocol) method performs time corrections with greater granularity than other methods, and therefore the time synchronization is more reliable. In order to benefit from this greater reliability, use NTP for the time

synchronization.

**3. Verify the DNS client configuration.**

The DNS client configuration must be complete and working on all cluster nodes as well as on any NFS clients which will be using secure NFS services from the cluster. Use `resolv.conf` (4) to verify the DNS client configuration.

The DNS domain name must be made known to the Kerberos configuration by keeping a mapping in the `domain_realm` section of `krb5.conf` (4) file.

The following example shows a mapping of DNS domain name `mydept.company.com` to Kerberos realm `ACME.COM`.

```
[domain_realm]
.mydept.company.com = ACME.COM
```

**4. Ensure that the Master KDC server is up when the Kerberos client software is configured on the cluster nodes.**

**5. Ensure that the same configuration file and the same service key table file are available to all cluster nodes.**

The `/etc/krb5/krb5.conf` file must be configured the same on all the cluster nodes. In addition, the default Kerberos keytab file (service key table), `/etc/krb5/krb5.keytab`, must be configured the same on all the cluster nodes. This can be achieved either by copying the files to all cluster nodes or by keeping a single copy of each file on a global file system and installing symbolic links to `/etc/krb5/krb5.conf` and `/etc/krb5/krb5.keytab` on all cluster nodes.

You can also use a failover file system to make files available to all cluster nodes. However, a file a failover file system is visible on only one node at a time. Therefore, if Sun Cluster HA for NFS is being used in different resource groups, potentially mastered on different nodes, the files are not visible to all cluster nodes. In addition, this configuration complicates Kerberos client administrative tasks.

**6. Ensure that all Kerberos-related entries in the file `/etc/nfssec.conf` are uncommented.**

On all cluster nodes, as well as on any NFS clients that are configured to use secure NFS services from the cluster, all Kerberos-related entries in the file `/etc/nfssec.conf` must be uncommented. See `nfssec.conf` (4).

## ▼ How to Create Kerberos Principals

The following steps create the required Kerberos principals and keytab entries in the KDC database. For each cluster node, the keytab entries for which service principals are created depend on the version of Solaris that is running on the cluster node.

- With Solaris 8, both the “root” and the “host” entries must be created.
- With Solaris 9, only the “host” entry must be created.

The principal for the “nfs” service over the logical hostname is created on one node only and then added manually to the default Kerberos keytab file on each cluster node. The Kerberos configuration file `krb5.conf` and the keytab file `krb5.keytab` must be stored as individual copies on each cluster node and must not be shared on a global file system.

**Steps** 1. **On each cluster node, log in to the KDC server as the administrator and create the host principal for each cluster node.**

Note that, with Solaris 8, you must create both host and root principals for each cluster node.

Principals must be created using the fully qualified domain names.

Add these entries to the default keytab file on each node. These steps can be greatly simplified with the use of cluster console utilities (see `cconsole(1M)`).

The following example creates the root and host entries. Perform this step on all cluster nodes, substituting the physical hostname of each cluster node for the hostname in the example.

```
# kadmin -p username/admin
Enter Password:
kadmin: addprinc -randkey host/phys-red-1.mydept.company.com
Principal "host/phys-red-1.mydept.company.com@ACME.COM" created.

kadmin: addprinc -randkey root/phys-red-1.mydept.company.com
Principal "root/phys-red-1.mydept.company.com@ACME.COM" created.

kadmin: ktadd host/phys-red-1.mydept.company.com
Entry for principal host/phys-red-1.mydept.company.com with kvno 2,
encryption type DES-CBC-CRC added to keytab WRFILE:/etc/krb5/krb5.keytab.

kadmin: ktadd root/phys-red-1.mydept.company.com
Entry for principal root/phys-red-1.mydept.company.com with kvno 2,
encryption type DES-CBC-CRC added to keytab WRFILE:/etc/krb5/krb5.keytab.

kadmin: quit
#
```

2. **On one cluster node, create the principal for the Sun Cluster HA for NFS service for the logical hostnames which provide Sun Cluster HA for NFS service.**

Principals must be created using the fully qualified domain names. Perform this step on only one cluster node.

```
# kadmin -p username/admin
Enter Password:
kadmin: addprinc -randkey nfs/relo-red-1.mydept.company.com
Principal "nfs/relo-red-1.mydept.company.com@ACME.COM" created.

kadmin: ktadd -k /var/tmp/keytab.hanfs nfs/relo-red-1.mydept.company.com
Entry for principal nfs/relo-red-1.mydept.company.com with kvno 3,
encryption type DES-CBC-CRC added to keytab WRFILE:/var/tmp/keytab.hanfs.

kadmin: quit
#
```

In the above example, `relo-red-1` is the logical hostname used with Sun Cluster HA for NFS.

**3. Securely copy the keytab database `/var/tmp/keytab.hanfs` specified in Step 2 to the rest of the cluster nodes.**

Do not use insecure copying methods such as regular `ftp` or `rcp`, and so forth. For additional security, you can use the cluster private interconnect to copy the database.

The following example copies the database.

```
# scp /var/tmp/keytab.hanfs clusternode2-priv:/var/tmp/keytab.hanfs
# scp /var/tmp/keytab.hanfs clusternode3-priv:/var/tmp/keytab.hanfs
```

**4. On all cluster nodes, add the keytab entry for the “nfs” service over logical hostname to the local keytab database.**

The following example uses the `ktutil (1M)` command to add the entry. Remove the temporary keytab file `/var/tmp/keytab.hanfs` on all cluster nodes after it has been added to the default keytab database `/etc/krb5/krb5.keytab`.

```
# ktutil
ktutil: rkt /etc/krb5/krb5.keytab
ktutil: rkt /var/tmp/keytab.hanfs
ktutil: wkt /etc/krb5/krb5.keytab
ktutil: quit#
# rm /var/tmp/keytab.hanfs
```

**5. Verify the Kerberos client configuration.**

List the default keytab entries on each cluster node and make sure that the key version number (KVNO) for the “nfs” service principal is the same on all cluster nodes.

```
# klist -k
Keytab name: FILE:/etc/krb5/krb5.keytab
KVNO Principal
-----
2   host/phys-red-1.mydept.company.com@ACME.COM
2   root/phys-red-1.mydept.company.com@ACME.COM
3   nfs/relo-red-1.mydept.company.com@ACME.COM
```

On all cluster nodes, the principal for the “nfs” service over the logical host must have the same KVNO number. In the above example, the principal for the “nfs” service over the logical host is

`nfs/relo-red-1.mydept.company.com@ACME.COM`, and the KVNO is 3.

**6. (Solaris 9 only) The user credentials database `gsscred` must be up-to-date for all users who access secure NFS services from the cluster.**

Build the user credential database by running the following command on all cluster nodes.

```
# gsscred -m kerberos_v5 -a
```

See `gsscred (1M)` man pages for details.

Note that the above approach builds the user credentials database only once. Some other mechanism must be employed, for example, `cron(1M)`, to keep the local copy of this database up-to-date with changes in the user population.

This step is not necessary for Solaris release 10.

## Enabling Secure NFS

Use the `-o sec=option` option of the `share(1M)` command in the `dfstab.resource-name` entry to share your file systems securely. See `nfssec(5)` man pages for details of specific option settings. If the Sun Cluster HA for NFS resource is already configured and running, see [“How to Change Share Options on an NFS File System” on page 22](#) for information about updating the entries in the `dfstab.resource-name` file. Note that the `sec=dh` option is not supported on Sun Cluster configurations.

---

## Tuning the Sun Cluster HA for NFS Fault Monitor

The Sun Cluster HA for NFS fault monitor is contained in a resource whose resource type is `SUNW.nfs`.

For general information about the operation of fault monitors, see *“Tuning Fault Monitors for Sun Cluster Data Services”* in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

## Fault Monitor Startup

The NFS resource `MONITOR_START` method starts the NFS system fault monitor. This start method first checks if the NFS system fault monitor (`nfs_daemons_probe`) is already running under the process monitor daemon (`rpc.pmfd`). If the NFS system fault monitor is not running, the start method starts the `nfs_daemons_probe` process under the control of the process monitor. The start method then starts the resource fault monitor (`nfs_probe`), also under the control of the process monitor.

## Fault Monitor Stop

The NFS resource `MONITOR_STOP` method stops the resource fault monitor. If no other NFS resource fault monitor is running on the local node, the stop method stops the NFS system fault monitor.

## Operations of Sun Cluster HA for NFS Fault Monitor During a Probe

This section describes the operations of the following fault monitoring processes:

- NFS system fault monitoring
- NFS resource fault monitoring
- Monitoring of file sharing

### NFS System Fault Monitoring Process

The NFS system fault monitor probe monitors the NFS daemons (`nfsd`, `mountd`, `statd`, and `lockd`) and the RPC portmapper service daemon (`rpcbind`) on the local node. The probe checks for the presence of the process and its response to a null `rpc` call. This monitor uses the following NFS extension properties:

- `Rpcbind_nullrpc_timeout`
- `Rpcbind_nullrpc_reboot`
- `Statd_nullrpc_timeout`
- `Lockd_nullrpc_timeout`
- `Mountd_nullrpc_timeout`
- `Mountd_nullrpc_restart`
- `Nfsd_nullrpc_timeout`
- `Nfsd_nullrpc_restart`

See “Setting Sun Cluster HA for NFS Extension Properties” on page 17.

Each NFS system fault monitor probe cycle performs the following steps in a loop. The system property `Cheap_probe_interval` specifies the interval between probes.

1. The fault monitor probes `rpcbind`.

If the process terminates unexpectedly, but a warm restart of the daemon is in progress, `rpcbind` continues to probe other daemons.

If the process terminates unexpectedly, then the fault monitor reboots the node.

If a null `rpc` call to the daemon terminates unexpectedly, `Rpcbind_nullrpc_reboot=True`, and `Failover_mode=HARD`, then the fault monitor reboots the node.

2. The fault monitor probes `statd` first, and then `lockd`.

If `statd` or `lockd` terminate unexpectedly, the system fault monitor attempts to restart both daemons.

If a null `rpc` call to these daemons terminates unexpectedly, the fault monitor logs a message to `syslog` but does not restart `statd` or `lockd`.

3. The fault monitor probes `mountd`.

If `mountd` terminates unexpectedly, the fault monitor attempts to restart the daemon.

If the null `rpc` call to the daemon terminates unexpectedly and `Mountd_nullrpc_restart=True`, the fault monitor attempts to restart `mountd` if the cluster file system is available.

4. The fault monitor probes `nfsd`.  
If `nfsd` terminates unexpectedly, the fault monitor attempts to restart the daemon.  
If the null `rpc` call to the daemon terminates unexpectedly and `Nfsd_nullrpc_restart=TRUE`, then the fault monitor attempts to restart `nfsd` if the cluster file system is available.
5. If any of the above NFS daemons (except `rpcbind`) fail to restart during a probe cycle, the NFS system fault monitor will retry the restart in the next cycle. When all of the NFS daemons are restarted and healthy, the resource status is set to `ONLINE`. The monitor tracks unexpected terminations of NFS daemons in the last `Retry_interval`. When the total number of unexpected daemon terminations has reached `Retry_count`, the system fault monitor issues a `scha_control` giveover. If the giveover call fails, the monitor attempts to restart the failed NFS daemon.
6. At the end of each probe cycle, if all daemons are healthy, the monitor clears the history of failures.

## NFS Resource Fault Monitoring Process

NFS resource fault monitoring is specific to each NFS resource. The fault monitor of each resource checks the status of each shared path to monitor the file systems that the resource exports.

Before starting the NFS resource fault monitor probes, all of the shared paths are read from the `dfstab` file and stored in memory. In each probe cycle, the probe performs the following steps.

1. If `dfstab` has been changed since the last read, the probe refreshes the memory.  
If an error occurs while reading the `dfstab` file, the resource status is set to `FAULTED`, and the monitor skips the remainder of the checks in the current probe cycle.
2. The fault monitor probes all of the shared paths in each iteration by performing `stat()` on the path.  
If any path is not functional, the resource status is set to `FAULTED`.
3. The probe checks for the presence of NFS daemons (`nfsd`, `mountd`, `lockd`, `statd`) and `rpcbind`.
4. If any of these daemons are down, the resource status is set to `FAULTED`.
5. If all shared paths are valid and NFS daemons are present, the resource status is reset to `ONLINE`.



## Monitoring of File Sharing

The Sun Cluster HA for NFS fault monitor probe monitors the success or failure of file sharing by monitoring the following files:

- `/etc/dfs/sharetab`
- `/etc/mnttab`
- `Pathprefix/SUNW.nfs/dfstab.resource`

The *Pathprefix* part of the file path is the value of the *Pathprefix* extension property for the resource group, and *resource* is the resource name.

If the probe detects any modification to any of these files, it shares the paths in `dfstab.resource` again.

---

## Upgrading the SUNW.nfs Resource Type

Upgrade the `SUNW.nfs` resource type if the following conditions apply:

- You are upgrading the Sun Cluster HA for NFS data service to Sun Cluster 3.1 8/05 from an earlier version of the data service.
- You are upgrading to Solaris 10 from an earlier version of the operating system.

For general instructions that explain how to upgrade a resource type, see “Upgrading a Resource Type” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*. The information that you require to complete the upgrade of the resource type is provided in the subsections that follow.

## Information for Registering the New Resource Type Version

The release of Sun Cluster data services indicates the release in which the version of the resource type was introduced.

To determine the version of the resource type that is registered, use one command from the following list:

- `scrgadm -p`
- `scrgadm -pv`

The resource type registration (RTR) file for this resource type is `/opt/SUNWscnfs/etc/SUNW.nfs`.

## Information for Migrating Existing Instances of the Resource Type

The information that you require to edit each instance of the resource type is as follows:

- You must perform the migration when the resource is in an unmanaged state.
- For Sun Cluster 8/05, the required value of the `Type_version` property is 3.1.

The following example shows a command for modifying an instance of the `SUNW.nfs` resource type.

**EXAMPLE 2** Migrating Instances of the `SUNW.nfs` Resource Type

```
# scrgadm -c -j nfs-rs -y Type_version=3.1 \
```

This command modifies the `Type_version` property of the `nfs-rs` resource to 3.1.

## Sun Cluster HA for NFS Extension Properties

---

This section describes the extension properties for the resource type `SUNW.nfs`. This resource type represents the Network File System (NFS) application in a Sun Cluster configuration.

For details about system-defined properties, see the `r_properties(5)` man page and the `rg_properties(5)` man page.

The extension properties of the `SUNW.nfs` resource type are as follows:

### `lockd_nullrpc_timeout`

The time-out value (in seconds) to use when probing `lockd`

<b>Data type</b>	Integer
<b>Default</b>	120
<b>Range</b>	Minimum = 60
<b>Tunable</b>	At any time

### `Monitor_retry_count`

The number of times that the process monitor facility (PMF) restarts the fault monitor during the time window that the `Monitor_retry_interval` property specifies. Note that this property refers to restarts of the fault monitor itself, rather than the resource.

<b>Data type</b>	Integer
<b>Default</b>	4
<b>Range</b>	0 – 2,147,483,641
	A value of -1 indicates an infinite number of restart attempts.
<b>Tunable</b>	At any time

#### Monitor\_retry\_interval

The time (in minutes) over which failures of the fault monitor are counted. If the number of times that the fault monitor fails is more than the value that is specified in the extension property `Monitor_retry_count` within this period, the PMF restarts the fault monitor.

<b>Data type</b>	Integer
<b>Default</b>	2
<b>Range</b>	0 – 2,147,483,641 -1 indicates an infinite amount of time.
<b>Tunable</b>	At any time

#### Mountd\_nullrpc\_restart

A Boolean to indicate whether to restart `mountd` when a null `rpc` call fails.

<b>Data type</b>	Boolean
<b>Default</b>	True
<b>Range</b>	Not applicable
<b>Tunable</b>	At any time

#### Mountd\_nullrpc\_timeout

The time-out value (in seconds) to use when probing `mountd`.

<b>Data type</b>	Integer
<b>Default</b>	120
<b>Range</b>	Minimum = 60
<b>Tunable</b>	At any time

#### Nfsd\_nullrpc\_restart

A Boolean to indicate whether to restart `nfsd` when a null `rpc` call fails.

<b>Data type</b>	Boolean
<b>Default</b>	False
<b>Range</b>	Not applicable
<b>Tunable</b>	At any time

#### Nfsd\_nullrpc\_timeout

The time-out value (in seconds) to use when probing `nfsd`.

<b>Data type</b>	Integer
<b>Default</b>	120
<b>Range</b>	Minimum = 60
<b>Tunable</b>	At any time

`Rpcbind_nullrpc_reboot`

A Boolean to indicate whether to reboot the system when a null rpc call on `rpcbind` fails.

**Data type** Boolean  
**Default** False  
**Range** Not applicable  
**Tunable** At any time

`Rpcbind_nullrpc_timeout`

The time-out value (in seconds) to use when probing `rpcbind`.

**Data type** Integer  
**Default** 120  
**Range** Minimum = 60  
**Tunable** At any time

`Statd_nullrpc_timeout`

The time-out value (in seconds) to use when probing `statd`.

**Data type** Integer  
**Default** 120  
**Range** Minimum = 60  
**Tunable** At any time



# Index

---

## A

automountd daemon, 13-14

## C

C locale, 15

commands, node information, 9

configuring, Sun Cluster HA for NFS, 17-22

## D

directories, /var/sadm/install/logs, 15

## E

extension properties, SUNW.nfs resource  
type, 35-37

## F

fault monitor

Sun Cluster HA for NFS, 30

operation, 31

startup, 30

stops, 30

files

installation logs, 15

RTR, 33

## G

global zone, 14

## I

installing

Sun Cluster HA for NFS, 14-16

by using scinstall utility, 15-16

by using Web Start program, 14-15

log files created, 15

## K

Kerberos, securing Sun Cluster HA for  
NFS, 26-30

## L

local zones, 14

locales, 15

log files, installation, 15

loopback file system (LOFS), restrictions  
with, 13-14

## M

method timeouts, Sun Cluster HA for NFS, 25

## P

planning installation and configuration, 13-14  
properties

*See also* extension properties

Type\_version, 34

prtconf -v command, 9

prtdiag -v command, 9

psrinfo -v command, 9

## R

registering, Sun Cluster HA for NFS, 17-22

resource type registration (RTR) file, 33

resource type upgrade, 33

restrictions

loopback file system (LOFS), 13-14

Service Management Facility, 13

zones, 14

RTR (resource type registration) file, 33

## S

scinstall -pv command, 9

scinstall utility, 15-16

Securing Sun Cluster HA for NFS with Kerberos

V5, 26-30

Service Management Facility, restrictions

with, 13

share options

Sun Cluster HA for NFS, 22, 24

showrev -p command, 9

Sun Cluster HA for NFS

changing share options, 22, 24

fault monitor, 30

installation

installing software, 14-16

installing

by using scinstall utility, 15-16

by using Web Start program, 14-15

registering and configuring, 17-22

SUNW.HAStoragePlus resource type, 25

task map, 12

tuning method timeouts, 25

SUNW.HAStoragePlus resource type, Sun

Cluster HA for NFS, 25

SUNW.nfs resource type, extension

properties, 35-37

## T

task map, Sun Cluster HA for NFS, 12

training, 9

Type\_version property, 34

## U

upgrading the resource type, 33

## V

/var/sadm/install/logs directory, 15

## W

Web Start program, 14-15

## Z

zones, 14