Netra™ High Availability Suite Foundation Services 2.1 7/05 Custom Installation Guide

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Preface

The *Netra High Availability Suite Foundation Services 2.1 7/05 Custom Installation Guide* explains how to install the Netra™ High Availability (HA) Suite Foundation Services 2.1 7/05 on the nodes of a cluster. Nodes of a cluster can be *master-eligible nodes*, *diskless nodes*, or *dataless nodes*.

You can install the Netra High Availability Suite Foundation Services 2.1 7/05 using the `nhinstall` tool or by manually installing the software. This book describes both installation methods.

Who Should Use This Book

This book is for system integrators and operators who install the Foundation Services. To install the Foundation Services, you should be familiar with the process of installing the Solaris Operating System.

Before You Read This Book

Read the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview* for an overview of the product.

How This Book Is Organized

This book contains the following chapters and appendixes:

Chapter 1 lists the installation methods available and the software you must install.

Chapter 2 explains how to install and configure the `nhinstall` tool. It also describes the main tasks involved in installaing the software using the `nhinstall` tool.

Chapter 3 explains how to use the `nhinstall` tool to install the Solaris Operating System and the Foundation Services on the nodes of the cluster.

Chapter 4 describes the preparation and main tasks that are involved in manually installing the software on the cluster.

Chapter 5 explains how to install and configure the Solaris Operating System and the Foundation Services manually on the master-eligible nodes.

Chapter 6 explains how to install and configure the Solaris Operating System and the Foundation Services manually for the diskless nodes.

Chapter 7 explains how to install and configure the Solaris Operating System and the Foundation Services manually on the dataless nodes.

Chapter 8 describes how to add a node to a cluster, whether that cluster was originally created using the `nhinstall` tool or created manually.

Chapter 9 explains how to prepare the installation server and the cluster nodes for an upgrade, and how to perform a rolling upgrade on diskless, dataless, and master-eligible nodes.

Appendix A provides the directory structure that is created on the master-eligible nodes during installation.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following documentation for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at

http://docs.sun.com

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; onscreen computer output	Edit your .login file. Use ls -a to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with onscreen computer output	% **su** Password:
AaBbCc123	Book titles, new words or terms, and words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide*. These are called *class* options. To delete a file, type **rm** *filename*.

* The settings on your browser might differ from these settings.

Related Documentation

The Foundation Services documentation set is available in both HTML and PDF.

Application	Title	Part Number
Introduction to concepts	*Netra High Availability Suite Foundation Services 2.1 7/05 Overview*	819-0977-11
Basic setup and installation	*Netra High Availability Suite Foundation Services 2.1 7/05 Quick Start Guide*	819-0978-11
Supported hardware and configurations	*Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*	819-0975-11
Detailed installation methods	*Netra High Availability Suite Foundation Services 2.1 7/05 Custom Installation Guide*	819-0973-11
Cluster administration	*Netra High Availability Suite Foundation Services 2.1 7/05 Cluster Administration Guide*	819-0972-11
Using the Cluster Membership Manager	*Netra High Availability Suite Foundation Services 2.1 7/05 CMM Programming Guide*	819-0971-11
Using the SAF CMM API	*Netra High Availability Suite Foundation Services 2.1 7/05 SAF Programming Guide*	819-0984-11
Using the Node Management Agent	*Netra High Availability Suite Foundation Services 2.1 7/05 NMA Programming Guide*	819-0976-11
Using SMCT (deprecated feature)	*Netra High Availability Suite Foundation Services 2.1 7/05 SMCT Installation Guide*	819-0980-11
Configuring outside the cluster using CGTP	*Netra High Availability Suite Foundation Services 2.1 7/05 Standalone CGTP Guide*	819-0981-11
Man pages for Foundation Services features and APIs	*Netra High Availability Suite Foundation Services 2.1 7/05 Reference Manual*	819-0979-11
Definitions and acronyms	*Netra High Availability Suite Foundation Services 2.1 7/05 Glossary*	819-0974-11
Common problems	*Netra High Availability Suite Foundation Services 2.1 7/05 Troubleshooting Guide*	819-0982-11
Late-breaking news	*Netra High Availability Suite Foundation Services 2.1 7/05 Release Notes*	819-2333-10
README	*Netra High Availability Suite Foundation Services 2.1 7/05 README*	819-2334-10

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CHAPTER 1

Making Choices When Installing a Cluster

Before installing the software on your cluster, choose a method of installation and the software for the nodes of your cluster, as described in this chapter.

Choosing an Installation Method

Plan the installation and configuration of your cluster thoroughly to avoid setbacks and delays. Before you start to install the software on your cluster, verify that you have the required installation hardware and cluster hardware.

- For information about planning your cluster and choosing the method of installation, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.
- For information about the supported hardware, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

The Foundation Services product provides two ways of installing software on the cluster:

- **Installation with the `nhinstall` tool.** The `nhinstall` tool enables you to install the Foundation Services on a cluster. This tool is flexible and provides various configuration options that you can adapt to your requirements. For more information, see Chapter 2 and Chapter 3.
- **Manual installation.** You can manually install the software on a cluster that contains master-eligible nodes and diskless nodes or dataless nodes.

  Manual installation provides greater flexibility when installing components of the Foundation Services. However, a manual installation can result in a cluster configuration that is not easily reproducible on other clusters. For more information, see Chapter 4 through Chapter 7.

Choosing Your Software

The Foundation Services run on a cluster installed with the Solaris Operating System.

For information about the Solaris versions supported on particular hardware, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Release Notes*.

Install the Solaris Operating System and other supplementary software to enhance the *reliability*, *availability*, and *serviceability* of your cluster.

Install the following software on the nodes of the cluster:

- Software included in the Solaris distribution
  - Java™ Software Development Kit (SDK) Standard Edition for all nodes
  - Volume management software for master-eligible nodes: Solstice DiskSuite™ or Solaris™ Volume Manager depending on the version of Solaris used.
  - Solaris Dynamic Host Configuration Protocol (DHCP) for diskless nodes
- Software included in the Foundation Services distribution:
  - Java Dynamic Management Kit (DMK)
  - Sun StorEdge™ Network Data Replicator (SNDR)

Sun StorEdge Network Data Replicator (SNDR) is part of the AVS software suite.

For information about supported software versions, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Release Notes*.

Note – Some examples in this book only use IPv4 addresses, but IPv6 is supported.

CHAPTER 2

Installing and Configuring the `nhinstall` Tool

The `nhinstall` tool enables you to install and configure the software and services on your cluster nodes. You install and configure the `nhinstall` tool on the installation server.

You can use the `nhinstall` tool to install a cluster that consists of master-eligible nodes, diskless nodes, and dataless nodes.

For information about setting up the installation environment and configuring the `nhinstall` tool, see the following sections:

Overview of Installing With the `nhinstall` Tool

The `nhinstall` tool enables you to install and configure the Foundation Services on the cluster. This tool must be installed on an installation server. The installation server must be connected to your cluster. For details on how to connect nodes of the cluster and the installation server, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

The `nhinstall` tool runs on the installation server. This tool installs the Solaris Operating System and the Foundation Services on the cluster nodes. For a description of the types of nodes in a cluster, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

The following table lists the tasks for installing the software with the `nhinstall` tool. Perform the tasks in the order shown.

TABLE 2-1 Tasks for Installing the Software by Using the `nhinstall` Tool

	Task	For Instructions
1.	Choose the software.	"Choosing Your Software" on page 2
2.	Prepare the installation environment.	"Preparing the Installation Environment" on page 4
3.	Install the `nhinstall` tool on the installation server.	"Installing the `nhinstall` Tool" on page 6
4.	Configure the `nhinstall` tool.	"Configuring the `nhinstall` Tool" on page 7
5.	Install the software using the `nhinstall` tool.	Chapter 3
6.	Verify that the cluster is configured correctly.	"Verifying the Installation" on page 32

Preparing the Installation Environment

Before installing the `nhinstall` tool on the installation server, you must create a Solaris distribution on the installation server. You must also prepare the installation server to install the Solaris Operating System and the Foundation Services on the cluster nodes.

▼ To Create a Solaris Distribution on the Installation Server

To install the Solaris Operating System on the cluster, create a Solaris distribution on the installation server. The Solaris distribution is used to install the Solaris Operating System on the cluster nodes. If you are installing more than one Solaris distribution on the cluster, perform the steps in the procedure for each Solaris distribution.

1. **Make sure that you have at least 1.5 GBytes of free disk space on the installation server.**
2. **Log in as superuser on the installation server.**

3. **Create a directory for the Solaris distribution:**

```
# mkdir Solaris-distribution-dir
```

where *Solaris-distribution-dir* is the directory where the distribution is to be stored on the installation server.

4. **Change to the directory where the** `setup_install_server` **command is located:**

```
# cd Solaris-dir/Solaris_x/Tools
```

- *Solaris-dir* is the directory that contains the Solaris installation software. This directory could be on a CD-ROM or in an NFS-shared directory.
- *x* is `8` or `9` depending on the Solaris version you want to install.

5. **Run the** `setup_install_server` **command:**

```
# ./setup_install_server Solaris-distribution-dir
```

For more information about the `setup_install_server` command, see the appropriate do cumentation:

- *Solaris 8 Advanced Installation Guide* and the setup_install_server(1M) man page
- *Solaris 9 Installation Guide* and the setup_install_server(1M) man page
- *Solaris 10 Release and Installation Collection* and the setup_install_server(1M) man page

▼ To Prepare the Installation Server

Before you begin the installation process, make sure that the installation server is configured correctly.

1. **Configure the installation server as described in the** *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide.*

2. **If you are planning to install remotely from another system, open a shell window to connect to the installation server.**

3. **Confirm that the Solaris software packages that contain Perl 5.0 are installed on the installation server.**

   Use the `pkginfo` command to check for the `SUNWp15u`, `SUNWp15p`, and `SUNWp15m` Perl packages.

4. **Delete any entries for your cluster nodes in the following files:**
   - `/etc/hosts`
   - `/etc/ethers`, if the file exists
   - `/etc/bootparams`, if the file exists
5. **Disable the installation server as a router by creating an `/etc/notrouter` file:**

```
# touch /etc/notrouter
```

   If a system running the Solaris Operating System has two network interfaces, the system is configured as a router by default. However, for security reasons, a Foundation Services cluster network must not be routed.

6. **Modify the `/etc/nsswitch.conf` file on the installation server so that `files` is positioned before `nis` in the `hosts`, `ethers`, and `bootparams` entries:**

```
hosts: files nis
ethers: files nis
bootparams: files nis
```

7. **From the installation server, open a terminal window to connect to the console of each cluster node.**

   You can also connect to the consoles from the system that you use to connect to the installation server.

Installing the `nhinstall` Tool

Install the package containing the `nhinstall` tool on the installation server described in the following procedure.

▼ To Install the `nhinstall` Tool

1. **Log in to the installation server as superuser.**

2. **Install the** `nhinstall` **package,** `SUNWnhins`**:**

```
# pkgadd -d /software-distribution-dir/NetraHAS2.1/Packages/ SUNWnhins
```

where *software-distribution-dir* is the directory that contains the Foundation Services packages.

3. **To access the man pages on the installation server, install the man page package,** `SUNWnhman`**:**

```
# pkgadd -d /software-distribution-dir/NetraHAS2.1/Packages/ SUNWnhman
```

where *software-distribution-dir* is the directory that contains the Foundation Services packages.

Configuring the `nhinstall` Tool

After you have installed the package containing the `nhinstall` tool, configure the `nhinstall` tool to install the Foundation Services on your cluster. To configure the `nhinstall` tool, modify the following configuration files:

- `env_installation.conf`

  Use this configuration file to define the installation environment. This file enables you to define the IP address of the installation server and the locations of the software distributions for the Solaris Operating System and Foundation Services. You must modify this configuration file. For details on each available option, see the **env_installation.conf**`(4)` man page.

- `cluster_definition.conf`

  Use this configuration file to define the nodes, disks, and options in your cluster configuration. You must modify this configuration file. For details on each available option, see the **cluster_definition.conf**`(4)` man page.

- `addon.conf`

  Use this configuration file to specify additional packages and patches that you want to install during the installation process. You must configure your `addon.conf` file with packages specific to your hardware. For help with your specific configuration, contact your Foundation Services representative. This file is optional. If this file is not configured, the `nhinstall` tool does not install any

additional patches or packages. For more information, see the **addon.conf**(4) man page and the *Netra High Availability Suite Foundation Services 2.1 7/05 README*.

- `nodeprof.conf`

  Use this configuration file if you want to specify the set of Solaris packages to be installed on the cluster. The default package set is defined in the `nodeprof.conf.template` file. For more information, see the **nodeprof.conf**(4) man page.

- `dataless_nodeprof.conf`

  If you do not create this file, the same set of Solaris packages is installed on the master-eligible and dataless nodes. Create the `dataless_nodeprof.conf` file, if you want to customize the Solaris installation on the dataless nodes. For more information, see the **dataless_nodeprof.conf**(4) man page.

- `diskless_nodeprof.conf`

  If you do not create this file, the same set of Solaris packages is installed on the master-eligible and diskless nodes. Create the `diskless_nodeprof.conf` file, if you want to customize the Solaris installation on the diskless nodes. For more information, see the **diskless_nodeprof.conf**(4) man page.

The following sections describe in detail the main configuration options of the `nhinstall` tool:

Configuring the Disk Partitions on Master-Eligible Nodes

Use the `SLICE` or `SHARED_SLICE` parameters to specify the disk partitions on the master-eligible nodes.

If you plan to use Netra High Availability Suite for replicating NFS-served data over IP, use the SLICE parameter for all partitions.

If you plan to locate NFS-served data on shared disks, use the SHARED_SLICE parameter for the partition storing this data and use SLICE for the local partitions (the root filesystem, for example).

TABLE 2-2 through TABLE 2-4 list the space requirements for sample disk partitions of master-eligible nodes in a cluster with diskless nodes, either with IP-replicated data or with a shared disk.

TABLE 2-2 Example Disk Partitions of Master-Eligible Nodes With NFS-Served Data Replicated Over IP

Disk Partition	File System Name	Description	Example Size
0	`/`	The root file system, boot partition, and volume management software. This partition must be mounted with the `logging` option.	2 Gbytes minimum
1	`swap`	Minimum size when physical memory is less than 1 Gbyte.	1 Gbyte
3	`/export`	Exported file system reserved for diskless nodes. The `/export` file system must be mounted with the `logging` option. This partition is further sliced if diskless nodes are added to the cluster.	1 Gbyte + 100 Mbytes per diskless node

TABLE 2-2 Example Disk Partitions of Master-Eligible Nodes With NFS-Served Data Replicated Over IP

Disk Partition	File System Name	Description	Example Size
4	`/SUNWcgha/local`	This partition is reserved for NFS status files, services, and configuration files. The `/SUNWcgha/local` file system must be mounted with the `logging` option.	2 Gbytes
5	Reserved for Reliable NFS internal use	Bitmap partition reserved for `nhcrfsd`. This volume is associated with the `/export` file system.	1 Mbyte
6	Reserved for Reliable NFS internal use	Bitmap partition reserved for `nhcrfsd`. This partition is associated with the `/SUNWcgha/local` file system.	1 Mbyte
7	`replica` OR `/test1`	If you have configured volume management, this partition must be named `replica`. This partition is mounted with the `logging` option. See "Configuring Volume Management" on page 19.	The remaining space

TABLE 2-3 Local Disk Partitions of Master-Eligible Nodes With NFS-Served Data on Shared Disks

Disk Partition	File System Name	Description	Example Size
0	`/`	The root file system, boot partition, and volume management software. This partition must be mounted with the `logging` option.	2 Gbytes minimum
1	`swap`	Minimum size when physical memory is less than 1 Gbyte.	1 Gbyte
7	`replica`	Partition used to store SVM meta database.	8 Mbytes

TABLE 2-4 Shared Disk Partitions of Master-Eligible Nodes With NFS-Served Data on Shared Disks

Disk Partition	File System Name	Description	Example Size
0	`/export`	Exported file system reserved for diskless nodes. The `/export` file system must be mounted with the `logging` option. This partition is further sliced if diskless nodes are added to the cluster.	1 Gbyte + 100 Mbytes per diskless node
1	`/SUNWcgha/local`	This partition is reserved for NFS status files, services, and configuration files. The `/SUNWcgha/local` file system must be mounted with the `logging` option.	2 Gbytes
7	`replica`	Partition used to store SVM meta database.	8 Mbytes

Note – Partition 2 is reserved for overlapping the entire disk. It is automatically created and must not be defined.

Configuring Disk Partitions on Dataless Nodes

Configure the SLICE parameter in the `cluster_definition.conf` file to specify the disk partitions on the dataless nodes.

TABLE 2-5 lists the space requirements for example disk partitions of dataless nodes.

TABLE 2-5 Example Disk Partitions of Dataless Nodes

Disk Partition	File System Name	Description	Example Size
0	`/`	The root file system, boot partition, and volume management software. This partition must be mounted with the `logging` option.	2 Gbytes minimum
1	`swap`	Minimum size when physical memory is less than 1 Gbyte.	1 Gbyte

Note – Partition 2 is reserved for overlapping the entire disk. It is automatically created and must not be defined.

Mirroring Shared Disks

Configure the `MIRROR` parameter to mirror a shared disk to another shared disk.

Configuring the Disk Fencing

To prevent simultaneous access to the shared data in case of split-brain, SCSI disk reservation is used. The SCSI version is configured by the *SHARED_DISK_FENCING* parameter. It can be set to `SCSI2` or `SCSI3`.

Configuring the Scoreboard Bitmaps

You can configure the `nhinstall` tool to store the scoreboard bitmaps of IP-replicated partitions either in memory or on the disk.

If the `BITMAP_IN_MEMORY` parameter is set to `YES` in the `cluster_definition.conf` file, the bitmaps are configured to be stored in memory. When the master node is shut down gracefully, the scoreboard bitmap is saved on the disk.

If the `BITMAP_IN_MEMORY` parameter is set to `NO`, the bitmaps are configured to be written on the disk at each update.

Configuring the NFS Option `noac`

You can configure the `nhinstall` tool to use the NFS option `noac` for the directories that are mounted remotely. The `noac` option suppresses data and attribute caching.

- If the `NFS_USER_DIR_NOAC` parameter is set to `YES` in the `cluster_definition.conf` file, the `noac` option is configured when mounting remote directories.
- If the `NFS_USER_DIR_NOAC` parameter is set to `NO`, the `noac` option is not configured, which enables data and attribute caching.

Configuring a Direct Link Between the Master-Eligible Nodes

You can configure the `nhinstall` tool to set up a direct link between the master-eligible nodes by using the serial port on each master-eligible node. Make sure that you have connected the serial ports with a cable before configuring the direct link. This connection prevents a *split brain situation*, where there are two master nodes in the cluster because the network between the master node and the vice-master node fails. For an illustration of the connection between the master-eligible nodes, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

The `DIRECT_LINK` parameter in the `cluster_definition.conf` file enables you to define the serial device on each master-eligible node, the speed of the serial line, and the heartbeat (in seconds) checking the link between the two nodes. For example:

```
DIRECT_LINK=/dev/ttya /dev/ttya11520020
```

Configuring Automatic Reboot for the Master-Eligible Nodes

You can configure the `nhinstall` tool to reboot the master-eligible nodes automatically during the installation.

- If the `AUTO_REBOOT` parameter is set to `YES` in the `env_installation.conf` file, you are prompted to boot the master-eligible nodes the first time only. After the first boot, the master-eligible nodes are automatically rebooted by the `nhinstall` tool.
- If `AUTO_REBOOT` is set to `NO`, the `nhinstall` tool prompts you to reboot the master-eligible nodes at different stages of the installation. This process requires you to move between console windows to perform tasks directly on the nodes.

Configuring the Carrier Grade Transport Protocol

You can configure the `nhinstall` tool to install and configure the Carrier Grade Transport Protocol (CGTP).

- If the `USE_CGTP` parameter is set to `YES` in the `cluster_definition.conf` file, the `nhinstall` tool installs CGTP.
- If the `USE_CGTP` parameter is set to `NO`, `nhinstall` does not install the CGTP packages and patches. In this case, your cluster is configured with a single network interface. You do not have a redundant cluster network. For information about the advantages of redundant network interfaces, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring the Environment for Diskless Nodes

If you define diskless nodes with the `NODE` or *DISKLESS* parameters in the `cluster_definition.conf` file, the `nhinstall` tool installs the Solaris services for the diskless nodes. The tool also configures the boot options for each diskless node on the master-eligible nodes.

If you do not define any diskless nodes in the `cluster_definition.conf` file, the `nhinstall` tool gives you the choice of installing the Solaris services for diskless nodes anyway. Type `y` if you plan to add diskless nodes to the cluster at a later date. Otherwise, the `nhinstall` tool does not install the Solaris services for the diskless nodes on the master-eligible nodes. In this case, you cannot use `nhinstall` to add diskless nodes to the cluster at a later date without reinstalling the software. Therefore, try to include possible future nodes in your cluster configuration.

Note – You can manually add diskless nodes to a running cluster as described in Chapter 8.

Configuring the Boot Policy for Diskless Nodes

You can configure the `nhinstall` tool to have the diskless nodes in the cluster boot dynamically, statically, or by using the node's client ID. The `DISKLESS_BOOT_POLICY` parameter in the `cluster_definition.conf` configuration file enables you to choose a boot policy for the diskless nodes in your cluster. All diskless nodes in a cluster are configured with the same boot policy.

The following table summarizes the boot policies supported by the `nhinstall` tool.

TABLE 2-6 Boot Policies for Diskless Nodes

Boot Policy	Description
DHCP dynamic boot policy	IP address dynamically assigned from a pool of IP addresses when the diskless node is booted. If you set the `DISKLESS_BOOT_POLICY` parameter to `DHCP_DYNAMIC`, `nhinstall` configures the diskless nodes with a dynamic boot policy. This option is configured by default if you do not define the `DISKLESS_BOOT_POLICY` parameter. THis option is not recommended for a production cluster.
DHCP static boot policy	IP address based on the Ethernet address of the diskless node. The Ethernet address is specified in the `cluster_definition.conf` file. If you set the `DISKLESS_BOOT_POLICY` parameter to `DHCP_STATIC`, `nhinstall` configures the diskless nodes with a static boot policy.
DHCP client ID boot policy	IP address generated from the diskless node's client ID in a CompactPCI server. If you set the `DISKLESS_BOOT_POLICY` parameter to `DHCP_CLIENT_ID`, `nhinstall` configures the diskless nodes to use the client ID to generate the IP address.

For further information about the boot policies for diskless nodes, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring DHCP Configuration Files Locally on Master-Eligible Nodes

By default, `nhinstall` configures diskless nodes so that the DHCP configuration files are stored in the highly available directory `/SUNWcgha/remote/var/dhcp` on the master-eligible nodes. You can configure the cluster to put the DHCP configuration files in a local directory, `/var/dhcp`, on the master eligible nodes by adding the following line to the `cluster_definition.conf` file.

```
REPLICATED_DHCP_FILES=NO
```

When you install with `nhinstall` and with this feature enabled, `nhinstall` copies the DHCP configuration files from the master to the vice-master node.

Note – Do not use this feature if the DHCP configuration is dynamic, that is, if information is stored in the DHCP configuration files at run time.

If you enable this feature, each time you update the DHCP configuration files on the master after initial cluster installation, you must copy these files to the vice-master node. For more information, see the **cluster_definition.conf**`(4)` and **nhadm**`(1M)` man pages.

Configuring the Watchdog Timer

You can configure the `nhinstall` tool to install the Foundation Services Watchdog Timer on each node in the cluster.

Set the `USE_WDT` parameter to `YES` in the `cluster_definition.conf` file only if you are using Netra servers that have hardware watchdogs at the Lights-Off Management (LOM) level. You might need to install additional software packages. For further information, see the `addon.conf.template` file. When this parameter is set to `YES`, the Foundation Services Watchdog Timer is installed and configured.

Set the `USE_WDT` parameter to `NO` if you are using Netra servers with hardware watchdogs at the OpenBoot™ PROM (OBP) level. These hardware watchdogs are monitored by the server's software. For a list of the types of watchdogs of different Netra servers, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

Configuring the Default Router to the Public Network

By default, `nhinstall` configures the installation server to be the default router to the public network. To choose another machine as the router to the public network specify the IP address of the default router of your choice in the `cluster_definition.conf` file as follows:

`DEFAULT_ROUTER_IP=`*IP address*

For more information, see the **cluster_definition.conf**(`4`) man page.

Configuring the Cluster IP Addresses

You can configure IPv4 addresses of any class for the nodes of your cluster by using the `nhinstall` tool. The `CLUSTER_NETWORK` parameter enables you to specify the netmask and the subnets for the *NIC0*, *NIC1*, and `cgtp0` interfaces of your nodes. For example, to define Class B IP addresses for the nodes, the `CLUSTER_NETWORK` parameter is defined as follows:

```
CLUSTER_NETWORK=255.255.0.0 192.168.0.0 192.169.0.0 192.170.0.0
```

Configuring the Floating External Address of the Master Node

You can configure the `nhinstall` tool to set a floating external address. A floating external address is an external IP address that is assigned to the master role rather than to a specific node. This IP address enables you to connect to the current *master node* from systems outside the cluster network.

As an option, IPMP (IP Multipathing) can be used to support a floating external address on dual redundant links.

- `EXTERNAL_MASTER_ADDRESS` controls an external floating address not managed by IPMP. It makes EXTERNAL_ACCESS (the former directive) obsolete.
- `EXTERNAL_IPMP_MASTER_ADDRESS` controls an external floating address managed by IPMP.

If you specify an IP address and a network interface for the external address parameter in the `cluster_definition.conf` file, the floating external address is configured. The External Address Manager daemon, `nheamd`, that monitors floating

addresses and IPMP groups on master-eligible nodes is also installed. This daemon makes sure that the external IP address is always assigned to the current master node. For more information, see the **nheamd**(1M) man page.

If you do not configure the external address parameter in the `cluster_definition.conf` configuration file, the floating external address is not created. Therefore, the master node cannot be accessed by systems outside the cluster network.

Configuring External IP Addresses for Cluster Nodes

You can configure the `nhinstall` tool to set external IP addresses on network interfaces to a public network. Then, the nodes can be accessed from systems outside the cluster network.

▼ To Configure External IP Addresses for Cluster Nodes

1. **Set the `PUBLIC_NETWORK` parameter in the `cluster_definition.conf` file specifying the subnet and netmask for the subnet.**

   This parameter also configures the network interface of the installation server. Therefore, the `SERVER_IP` parameter is an IP address that is on the same subnetwork as defined for `PUBLIC_NETWORK`. The `SERVER_IP` parameter is defined in the `env_installation.conf` file. For more information, see the **env_installation.conf**(4) man page.

2. **Specify the external IP address, external node name, and the external network interface for each `NODE` definition. For example:**

```
MEN=10 08:00:20:f9:c5:54 - - - - FSNode1 192.168.12.5 hme1
MEN=20 08:00:20:f9:a8:12 - - - - FSNode2 192.168.12.6 hme1
```

   - `192.168.12.5` and `192.168.12.6` are the external IP addresses.
   - `FSNode1` and `FSNode2` are the external node names.
   - `hme1` is the external network interface.

Sharing Physical Interfaces Between CGTP and IPMP Using VLAN

Physical links can be shared between CGTP and IPMP only when CGTP is used over a VLAN. Before using this configuration, refer to detailed information about Solaris VLAN and IPMP in the Solaris *System Administration Guide: IP Services*.

Not all network interfaces support VLAN. Check that your interfaces support this use.

Solaris shows VLAN interfaces as separate physical interfaces, even though there is only one. Since VLANs are configured by using special names for the interfaces, you must define the topology and the interface names for that topology Keep the following points in mind when defining your topology:

- Be careful not to set the booting interface on a VLAN. Installation is impossible unless the installation server and boot server are both configured to be part of the VLAN.
- Do not set the IPMP interfaces on a VLAN unless all other interfaces on all nodes in the group can belong to the same VLAN (including the clients).
- CGTP can be configured with both links on a VLAN, or with only one.
- The VLANs on the switches must be configured before starting the installation.
- It is IMPORTANT to have a third node (the client, for example, or a router) with an address in the same subnetwork as the IPMP test addresses, as a reference. Many reference nodes are available in order to avoid SPOFs.

For example, consider the three-node cluster shown in FIGURE 2-1. Three `ce` NICs are on each MEN. In both MENs, `ce0` is connected to switch 1, `ce1` to switch 2 and `ce2` to switch 3. The external router, to which clients connect, is connected to switches 2 and 3. This restricts `ce1` and `ce2` for external access. CGTP can be used on any two NICs. In this case, `ce0` and `ce1` were chosen, making `ce1` a shared interface.

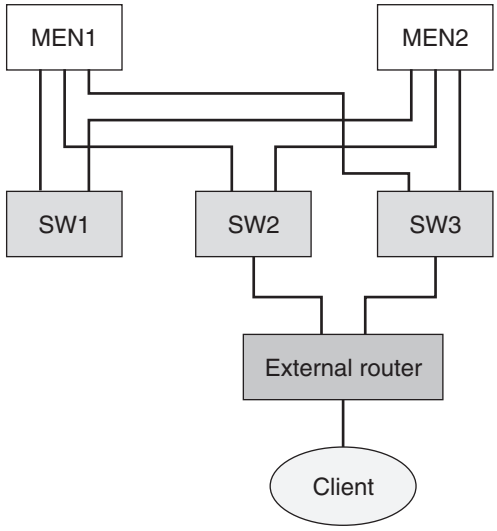

FIGURE 2-1 Cluster Sharing CGTP and IPMP

The VLAN is created with VID 123 over the interface `ce1` by plumbing an interface called `ce123001`. In this example, `ce0` and `ce123001` will be used for CGTP, and `ce1` and `ce2` for IPMP. Create the tagged VLAN on SW2 (for information on how to create a VLAN, please refer to your switch's documentation), create a `cluster_definition.conf` file respecting these interfaces, and launch the installation as for any other case.

Configuring Volume Management

The volume management feature enables you to do the following:

- Increase data availability, because you can mirror disks locally
- Increase the number of available replicated partitions, because you can create multiple soft partitions

The volume management software that is installed depends on the version of the Solaris Operating System that you plan to install. For information on supported software versions, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Release Notes*.

For a Netra 20 server with a Fibre Channel-Arbitrated Loop (FC-AL) disk as a master-eligible node, you must install the Volume Management feature of the Solaris Operating System. For more information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

To install the Volume Management software on the nodes of your cluster, perform one of the following procedures:

- "To Configure Basic Volume Management for Netra 20 Servers With FC-AL Disks" on page 20
- "To Configure Advanced Volume Management" on page 20

▼ To Configure Basic Volume Management for Netra 20 Servers With FC-AL Disks

You can use the `nhinstall` tool to install and configure volume management for Netra 20 servers with FC-AL disks. Configure the `nhinstall` tool to support logical disk partitions for FC-AL disks by installing the volume management feature as follows:

1. **In the `env_installation.conf` file, set `SOLARIS_INSTALL` to `ALL`.**
2. **Configure the `cluster_definition.conf` file:**

   a. **Set `LOGICAL_SLICE_SUPPORT` to `YES`.**

   b. **Set the `SLICE` definition for the last partition to `replica`.**

   For a detailed example, see the **cluster_definition.conf**`(4)` man page.

3. **Run the `nhinstall` tool to install the Solaris Operating System and Foundation Services on the master-eligible nodes.**

   For more information, see "To Launch the `nhinstall` Tool" on page 29.

   The `nhinstall` tool installs and configures the appropriate volume management software depending on the version of the Solaris Operating System you chose to install.

▼ To Configure Advanced Volume Management

To configure advanced volume management, install the Solaris Operating System and configure the Volume Management feature to suit your needs. Then configure `nhinstall` to install only the Foundation Services.

1. **Install the Solaris Operating System with volume management on the master-eligible nodes.**

   For more information, see the documentation for your volume management software:

   - For Solaris 8, *Solstice DiskSuite 4.2.1 Installation and Product Notes*
   - For Solaris 9 or Solaris 10, *Solaris Volume Manager Administration Guide*

   This documentation is available at `http://docs.sun.com`.

Note – Install the same packages of the same version of the Solaris Operating System on both master-eligible nodes. Create identical disk partitions on the disks of both master-eligible nodes.

2. **Configure a physical Ethernet card interface that corresponds to the first network interface,** *NIC0***.**

3. **Configure the** `/etc/netmasks` **file.**

   See the **netmasks**`(4)` man page.

4. **Configure the sizes of the disk partitions.**

   For more information, see TABLE 2-2.

5. **In the** `env_installation.conf` **file, set** `SOLARIS_INSTALL` **to** `DISKLESS_DATALESS_ONLY`**.**

   The Solaris Operating System is configured on the dataless nodes and the Solaris services are configured for the diskless environment.

6. **In the** `cluster_definition.conf` **file, do the following:**

   a. **Set the** `LOGICAL_SLICE_SUPPORT` **parameter to** `NO`**.**

   b. **For the** `SLICE` **parameter, specify the metadevice names of the disk partitions.**

      For example:

```
SLICE=d1 2048 /                -        logging
```

      For details on the `SLICE` parameter, see the **cluster_definition.conf**`(4)` man page.

7. **Run the** `nhinstall` **tool to install the Foundation Services on the master-eligible nodes.**

   For more information, see "To Launch the `nhinstall` Tool" on page 29.

Specifying the Version of the Operating System to be Installed on the Cluster

Some hardware types require specific or modified versions of the Solaris Operating System that `nhinstall` is unable to detect automatically. In these cases, you must explicitly force `nhinstall` to recognize the version of the operating system you want to install on the cluster. To determine if your cluster hardware requires such action, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

Selecting the Solaris Package Set to be Installed

To install a Solaris package set on cluster nodes other than the default package set, specify the Solaris package set to be installed. For a list of the contents of the default package set, see the `/opt/SUNWcgha/config.standard/nodeprof.conf.template` file. For information about installing a Solaris package set on cluster nodes, see the **nodeprof.conf**`(4)` man page. For information about installing a customized Solaris package set on the diskless nodes, see the **diskless_nodeprof.conf**`(4)` man page. For information about installing a customized Solaris package set on the dataless nodes, see the **dataless_nodeprof.conf**`(4)`.

Installing a Different Version of the Operating System on Diskless and Dataless Nodes

To install a version of the Solaris operating system on diskless nodes that is different from the one you are installing on master-eligible nodes, specify the location of the two Solaris distributions in the `env_installation.conf` file. For example:

`SOLARIS_DIR=`*/export/su28u7fcs*

`DISKLESS_SOLARIS_DIR=`*/export/su29HW8a*

To install a version of the Solaris operating system on dataless nodes that is different from the one you are installing on master-eligible nodes, specify the location of the two Solaris distributions in the `env_installation.conf` file. For example:

`SOLARIS_DIR=`*/export/su28u7fcs*

`DATALESS_SOLARIS_DIR=`*/export/su29HW8a*

By default, the values provided to the *DISKLESS_SOLARIS_DIR* and *DATALESS_SOLARIS_DIR* parameters are set to be the same as that provided to the *SOLARIS_DIR* parameter. For more information, see the **env_installation.conf**`(4)` man page.

Configuring a Data Management Policy

There are three data management policies available with the Foundation Services. By default, the `nhinstall` tool sets the data management policy to be `Integrity` for data replication over IP, and `Availability` when using shared disks. To choose another policy, change the value of the following variable in the `cluster_definition.conf` file.

`DATA_MGT_POLICY=INTEGRITY | AVAILABILITY | ADAPTABILITY`

For more information, see the **cluster_definition.conf**(4) man page and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring a Masterless Cluster

By default, diskless and dataless nodes reboot if there is no master in the cluster. If you do not want the diskless and dataless nodes to reboot in this situation, add the following line to the `cluster_definition.conf` file:

```
MASTER_LOSS_DETECTION=YES
```

For more information, see the **cluster_definition.conf**(4) man page and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring Reduced Duration of Disk Synchronization

By default `nhinstall` enables this feature. It reduces the time taken for full synchronization between the master and the vice-master disks by synchronizing only the blocks that contain replicated data.

Note – Only use this feature with UFS file systems.

To disable this feature and have all blocks replicated, add the following line to the `cluster definition.conf` file:

```
SLICE_SYNC_TYPE=RAW
```

For more information, see the **cluster_definition.conf**(4) man page and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring Sanity Check of Replicated Slices

To activate the sanity check of replicated slices, add the following line to the `cluster_definition.conf` file:

```
CHECK_REPLICATED_SLICES=YES
```

By default, the `nhinstall` tool does not activate this feature. For more information, see the **cluster_definition.conf**(4) man page and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring Delayed Synchronization

By default, disk synchronization starts automatically when the cluster software is installed. If you want to delay the start of disk synchronization, add the following line to the `cluster_definition.conf` file:

```
SYNC_FLAG=NO
```

You can trigger disk synchronization at a time of your choice using the `nhenablesync` tool. For more information, see the **cluster_definition.conf**(4) and **nhenablesync**(1M) man pages and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Configuring Serialized Slice Synchronization

By default, `nhinstall` configures the cluster so that slices are synchronized in parallel. Synchronizing slices one slice at a time reduces the network and disk overhead but increases the time it takes for the vice-master to synchronize with the master. During this time, the vice-master is not eligible to take on the role of master. To enable serialized slice synchronization, add the following line to the `cluster_definition.conf` file:

```
SERIALIZE_SYNC=YES
```

For more information, see the **cluster_definition.conf**(4) man page and *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

Installing the Node Management Agent (NMA)

By default, the Node Management Agent is installed.

Set the `INSTALL_NMA` parameter to `NO` to avoid installing this agent.

Installing the Node State Manager (NSM)

By default, the Node State Manager is not installed.

Set the `INSTALL_NSM` parameter to `YES` to install NSM.

Installing the SAF Cluster Membership API (SAF CLM)

By default, the SAF CLM API is not installed.

Set the `INSTALL_SAFCLM` parameter to `YES` to install NSM.

CHAPTER 3

Installing the Software by Using the `nhinstall` Tool

The `nhinstall` tool installs the Solaris Operating System and the Foundation Services on the cluster according to the options that are set in the configuration files.

To use `nhinstall` to install the software, see the following sections:

Stages of the Installation Process

You can configure the `nhinstall` tool to install both the Solaris Operating System and the Foundation Services on the cluster. You can also install the Solaris Operating System manually and then configure the `nhinstall` tool to install only the Foundation Services on the cluster. For more information, see "Configuring the `nhinstall` Tool" on page 7.

After you have configured the installation server, you are ready to install the software on the nodes of the cluster. TABLE 3-1 describes the stages of the installation process in an example scenario. In this scenario, the `nhinstall` tool is configured with the following parameters defined in the `env_installation.conf` file:

- `SOLARIS_INSTALL=ALL`
- `AUTO_REBOOT=YES`

The following parameters are defined in the `cluster_definition.conf` file:

- `USE_CGTP=YES`

- USE_WDT=NO

Diskless and dataless nodes are specified in the NODE parameter or by the DISKLESS and DATALESS parameters.

For information about installation parameters, see the **env_installation.conf**(4) and **cluster_definition.conf**(4) man pages.

The following table lists the stages of an automatic installation using the nhinstall tool. The times quoted are a guideline only.

TABLE 3-1 Stages of the Installation Process

	Stage	Action Carried Out By	Related Section
1.	Launch the nhinstall tool.	You	"To Launch the nhinstall Tool" on page 29
2.	Configure the network interfaces.	nhinstall	
3.	Prepare the Solaris JumpStart environment for the master-eligible nodes and the dataless nodes (5 minutes).	nhinstall	
4.	Boot the master-eligible nodes and the dataless nodes to install the Solaris Operating System (30 minutes - 1 hour).	You	"To Boot the Master-Eligible Nodes and Dataless Nodes to Install the Solaris Operating System" on page 30
5.	Install the Foundation Services and the CGTP patches on the master-eligible nodes (20 minutes).	nhinstall	
6.	Reboot the master-eligible nodes.	nhinstall	"To Boot the Master-Eligible Nodes" on page 76
7.	Configure the Solaris services for diskless nodes on the master-eligible nodes (20 - 45 minutes).	nhinstall	
8.	Install the Solaris packages, the Foundation Services packages, and the CGTP patches for diskless nodes (5 minutes) and the Foundation Services packages, and the CGTP patches for dataless nodes.	nhinstall	
9.	Reboot the master-eligible and dataless nodes.	You	"To Boot the Master-Eligible Nodes" on page 76
10.	Boot the diskless nodes.	You	"To Boot the Diskless Nodes" on page 32
11.	Run the nhadm tool on the master-eligible nodes to ensure that installation was successful.	You	"Verifying the Installation" on page 32

Note – The time guidelines are estimates only. The actual times that are required depend on the type of installation server, your configuration options, and the number of nodes in your cluster.

Launching the `nhinstall` Tool

Before running the `nhinstall` tool, make sure that you have configured the `nhinstall` tool and prepared the installation environment as described in Chapter 2.

The following procedures are based on "Stages of the Installation Process" on page 27. These procedures must be carried out in the documented sequence.

▼ To Launch the `nhinstall` Tool

1. **Log in to the installation server as superuser.**
2. **Start the `nhinstall` tool on the installation server:**

```
# cd /opt/SUNWcgha/sbin
# ./nhinstall -r config-file-directory -l logfile
```

For details, see the **nhinstall** `(1M)` man page.

If you have chosen a two-node cluster configuration in the `cluster_definition.conf` file, you are prompted to install the Solaris services for diskless nodes:

```
Do you want to install the Solaris services for
diskless nodes anyway [y/n]:
```

If you type `y`, the `nhinstall` tool installs the Solaris services for diskless nodes, which gives you the option of adding diskless nodes to the cluster at a later stage.

After you have made this choice, the `nhinstall` tool configures the network interfaces, prepares the master-eligible nodes, and prepares the Solaris JumpStart environment. This process takes approximately 5 minutes.

Note – If the Solaris JumpStart procedure stops, the utility might not restart because the `/tmp/.install_client.lck` file prevents two Solaris JumpStart commands from being executed simultaneously. If Solaris JumpStart stops, make sure that there are no other Solaris JumpStart processes running. Then delete the lock file.

After the Solaris JumpStart environment has been prepared, the `nhinstall` tool displays instructions. Follow these instructions by performing the following procedure.

▼ To Boot the Master-Eligible Nodes and Dataless Nodes to Install the Solaris Operating System

Perform the following steps on both master eligible nodes and on each dataless node listed in the `nhinstall` output.

1. **At the console window of the node, get the `ok` prompt.**

   a. **To get the `telnet` prompt, press `Control-]`.**

   b. **To get the `ok` prompt, type `send brk` at the `telnet` prompt.**

```
# Control-]
telnet> send brk
Type  'go' to resume
ok>
```

   The first master eligible-node is the first master-eligible node that is defined in the `cluster_definition.conf` file with the `NODE` definition or with the `MEN` parameter. For details, see "Configuring the `nhinstall` Tool" on page 7.

2. **Set the boot variables by using the `setenv` command.**

   a. **Configure the processors to use local Ethernet (MAC) addresses:**

```
ok> setenv local-mac-address? true
```

   b. **Configure the processors to retry booting when autoboot fails:**

```
ok> setenv auto-boot-retry? true
```

3. **Make a note of the network device aliases:**

```
ok> devalias
```

Note the device alias of the network adapter of the master-eligible node that is connected to the same switch as the installation server's network interface. If there is no device alias, define one using the `nvalias` command. In the case of Netra 20 servers, the network adapter used is not the native adapter. In this case, you need to define the device alias.

For more information, see the *OpenBoot 4.x Command Reference Manual*.

4. **Start the installation of the Solaris Operating System on the node:**

```
ok> boot net - install
```

where `net` is the device alias.

5. **When you have started the installation of the** Solaris Operating System **on the node, continue the installation by typing** `y` **at this prompt:**

```
Answer 'y' after the command has been entered on all nodes: y
```

The installation takes approximately 30 minutes for the master-eligible nodes and dataless nodes. The progress of the installation and the packages that are being installed are displayed on the console window of each master-eligible node.

When the Solaris packages have been installed, each node is automatically rebooted. Several status messages are displayed regarding service startup and connectivity.

The `nhinstall` tool checks which version of the Solaris Operating System has been installed. The `nhinstall` tool also checks whether the Foundation Services are already installed on the master-eligible nodes. If the Foundation Services are already installed, the `nhinstall` tool exits and displays an error message. If you want to upgrade to the new version of the Foundation Services, see Chapter 9 through Chapter 12. Otherwise, remove the existing Foundation Services packages and restart the installation as described in "Resetting the `nhinstall` Tool for a New Installation" on page 34.

The `nhinstall` tool then installs the Foundation Services and the CGTP patches on the master-eligible nodes.

Wait 15 to 20 minutes while the Foundation Services packages and the CGTP patches are installed on all nodes. After installing packages and patches on the master-eligible and dataless nodes, these nodes are rebooted and `nhinstall` waits for the data to be ready.

▼ To Boot the Diskless Nodes

After installation, the `nhinstall` tool displays the following instructions:

```
The software installation is complete.
Setup the eeprom boot parameters on your diskless nodes:
At the ok prompt, type:
  ok> setenv local-mac-address? true
  ok> setenv auto-boot-retry? true
  ok> setenv boot-device net:dhcp,,,,,5 net2:dhcp,,,,,5
  ok> setenv diag-switch? false
You can now boot your diskless nodes.
```

To configure the boot parameters, perform the following procedure.

1. **Get the `ok` prompt on each diskless node.**
2. **Execute the following commands at the `ok` prompt on each diskless node:**

```
ok> setenv local-mac-address? true
ok> setenv auto-boot-retry? true
ok> setenv boot-device net:dhcp,,,,,5 net2:dhcp,,,,,5
ok> setenv diag-switch? false
```

Note – If you are going to use *client_id* on a Netra CT diskless node, set the `Boot_Devices` environment variable. For more information, see the *Netra CT Server System Administration Guide*.

---

3. **Boot each diskless node:**

```
ok> reset
```

Verifying the Installation

After you have completed the installation and configuration, check that the cluster nodes have connectivity.

▼ To Verify the Installation

1. **Become superuser on all nodes.**
2. **Run the** `nhadm` **tool:**

```
# /opt/SUNWcgha/sbin/nhadm check starting
```

If all checks pass the validation, the installation of the Foundation Services on the nodes of your cluster has been successful. For more information, see the **nhadm**(1M) and the **cluster_nodes_table**(4) man pages.

Troubleshooting and Restarting the `nhinstall` Tool

Most warnings displayed by the `nhinstall` tool do not require you to take any action.

When the `nhinstall` tool is launched, the tool parses the configuration files. If the `nhinstall` tool encounters errors in the files, it exits and provides a list of error messages. A progress indicator monitors the progress of the installation so you can continue the installation from the point of failure when you restart the `nhinstall` tool.

If an error occurs during the installation process, fix the error and then restart the `nhinstall` tool:

```
# cd /opt/SUNWcgha/sbin
# ./nhinstall -r config_file_directory -l logfile
```

Note – If you modify the configuration files to correct an error, the `nhinstall` tool displays a warning that the configuration has changed. The tool then prompts you to reset the installation. For information, see "Resetting the `nhinstall` Tool for a New Installation" on page 34.

Resetting the nhinstall Tool for a New Installation

If you are installing a new version of the software on the cluster or a new cluster configuration, you must start the installation from the beginning. You can reset the `nhinstall` tool in one of two ways:

- By removing the progress indicator
- By clearing the installation files and directories, including the progress indicator

▼ To Remove the Progress Indicator and Reset the nhinstall Tool

To reset the `nhinstall` tool by removing the progress indicator, perform the following steps:

1. **Log in to the installation server as superuser.**
2. **Reset the `nhinstall` tool and remove the progress indicator:**

```
# cd /opt/SUNWcgha/sbin
# ./nhinstall -r config_file_directory reset
```

The next time that you launch the `nhinstall` tool, the installation starts from the beginning.

▼ To Clear the Installation Environment and Reset the nhinstall Tool

To reset the `nhinstall` tool and clear the installation directories and files, perform the following steps:

1. **Log in to the installation server as superuser.**

2. **Unshare all shared and exported directories, and remove the temporary files, including the progress indicator:**

```
# cd /opt/SUNWcgha/sbin
# ./nhinstall -r config_file_directory clear
```

The shared and exported directories are no longer shared or exported. All temporary files are deleted. The installation environment is cleared. The next time that you launch the `nhinstall` tool, the installation starts from the beginning.

CHAPTER 4

Preparing to Install Manually

After you have installed and connected the cluster hardware and the installation server, you are ready to manually install the Foundation Services on the cluster.

For more information, see the following sections:

Overview of the Manual Installation Process

TABLE 4-1 Tasks for Manually Installing and Configuring the Software

Task	Refer To
Prepare the installation environment.	Chapter 4
Manually install the Solaris Operating System and the Foundation Services on each master-eligible node.	Chapter 5
If you have diskless nodes, install the software for the diskless nodes on a shared partition of the disk of one master-eligible node. OR	Chapter 6
If you have dataless nodes in your cluster, install the Solaris Operating System and the Foundation Services on the local disk of these nodes.	Chapter 7

Connecting the Installation Server

The installation server must be connected to the cluster through a switch.

▼ To Connect the Installation Server to the Cluster Network

1. **Connect the installation server's second interface, *NIC1*, to the Ethernet switch connecting the *NIC0* interfaces of the nodes.**

   For an illustration of how to connect the various components of a cluster, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

2. **Log in to the installation server as superuser.**

3. **Create the file `/etc/hostname.`*cluster-network-interface-name* (`hme0` in this procedure) on the installation server:**

```
# touch /etc/hostname.hme0
```

4. **Edit the `/etc/hostname.hme0` file to add the host name of the installation server, for example, `installation-server-cluster`.**
5. **Choose an IP address for the network interface that is connected to the cluster, for example, `10.250.1.100`.**
6. **Edit the `/etc/hosts` file on the installation server to add the IP address that you chose in Step 5**
7. **Set the netmask of the cluster network in the `/etc/netmasks` file:**

```
10.250.1.0     255.255.255.0
```

▼ To Connect the Installation Server to the Public Network

- **Add the public host name and IP address of the installation server to the `/etc/hosts` file on your NIS server:**

```
192.168.12.253installation-server-public
```

Note – Do not add the IP address of the network interface that is connected to the cluster to the NIS server.

Preparing the Installation Environment

Before you manually install the software on the cluster, you must create the Solaris distribution on the installation server and prepare the installation server for manual installation.

▼ To Create a Solaris Distribution on the Installation Server

To install the Solaris Operating System on the cluster, create a Solaris distribution on the installation server. The Solaris distribution is used to install the Solaris Operating System on the cluster nodes. If you are installing more than one Solaris distribution on the cluster, perform the steps in the procedure for each Solaris distribution.

1. **Make sure that you have at least 1.5 Gbytes of free disk space on the installation server.**
2. **Log in as superuser on the installation server.**
3. **Create a directory for the Solaris distribution:**

```
# mkdir Solaris-distribution-dir
```

where *Solaris-distribution-dir* is the directory where the distribution is to be stored on the installation server.

4. **Change to the directory where the** `setup_install_server` **command is located:**

```
# cd Solaris-dir/Solaris_x/Tools
```

- *Solaris-dir* is the directory that contains the Solaris installation software. This directory could be on a CD-ROM or in an NFS-shared directory.
- *x* is `8` or `9` depending on the Solaris version you want to install.

5. **Run the** `setup_install_server` **command:**

```
# ./setup_install_server Solaris-distribution-dir
```

For more information about the `setup_install_server` command, see the appropriate documentation:

- *Solaris 8 Advanced Installation Guide* and the **setup_install_server**`(1M)` man page
- *Solaris 9 Installation Guide* and the **setup_install_server**`(1M)` man page
- *Solaris 10 Release and Installation Collection* and the **setup_install_server**`(1M)` man page

▼ To Prepare the Installation Server

Before you begin the installation process, make sure that the installation server is configured correctly.

1. **Configure the installation server as described in the** *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide***.**

2. **If you are planning to install remotely from another system, open a shell window to connect to the installation server.**

3. **Confirm that the Solaris software packages that contain Perl 5.0 are installed on the installation server.**

   Use the `pkginfo` command to check for the `SUNWpl5u`, `SUNWpl5p`, and `SUNWpl5m` Perl packages.

4. **Delete any entries for your cluster nodes in the following files:**

   - `/etc/hosts`
   - `/etc/ethers`, if the file exists
   - `/etc/bootparams`, if the file exists

5. **Disable the installation server as a router by creating an `/etc/notrouter` file:**

   ```
   # touch /etc/notrouter
   ```

   If a system running the Solaris Operating System has two network interfaces, the system is configured as a router by default. However, for security reasons, a Foundation Services cluster network must not be routed.

6. **Modify the `/etc/nsswitch.conf` file on the installation server so that `files` is positioned before `nis` in the `hosts`, `ethers`, and `bootparams` entries:**

   ```
   hosts: files nis
   ethers: files nis
   bootparams: files nis
   ```

7. **Connect to the console of each cluster node.**

Choosing a Cluster Network

In the following chapters, you install and configure the Solaris Operating System and the Foundation Services on nodes of the cluster. One of the Foundation Services you can install and configure is the Carrier Grade Transport Protocol (CGTP). The CGTP enables a redundant network for your cluster.

You can choose not to install the CGTP if you want to configure a single network link for your cluster. In this case, if the network link fails, there is no backup network, and you might lose information.

For a complete description of the CGTP, see Carrier Grade Transport Protocol in the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

CHAPTER 5

Installing the Software on the Master-Eligible Nodes

After you have set up the installation environment, you are ready to manually install the Solaris Operating System and the Foundation Services manually on the master-eligible nodes of the cluster. The master-eligible nodes take on the roles of *master node* and *vice-master node* in the cluster. For more information about the types of nodes, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

To manually install and configure the Foundation Services on the master-eligible nodes of your cluster, see the following sections:

Note – Do not use the `nhcmmstat` or `scmadm` tools to monitor the cluster during the installation procedure. Use these tools only after the installation and configuration procedures have been completed on all nodes.

Defining Disk Partitions on the Master-Eligible Nodes

The master-eligible nodes store current data for all nodes in the cluster, whether the cluster has diskless nodes or dataless nodes. One master-eligible node is to be the master node, while the other master-eligible node is to be the vice-master node. The vice-master node takes over the role of master in case the master node fails or is taken offline for maintenance. Therefore, the disks of both these nodes must have exactly the same partitions. Create the disk partitions of the master-eligible node according to the needs of your cluster. For example, the disks of the master-eligible nodes must be configured differently if diskless nodes are part of the cluster.

The following table lists the space requirements for example disk partitions of master-eligible nodes in a cluster with diskless nodes.

TABLE 5-1 Example Disk Partitions of Master-Eligible Nodes for IP Replication

Disk Partition	File System Name	Description	Example Size
0	`/`	The root file system, boot partition, and volume management software. This partition must be mounted with the `logging` option.	2 Gbytes minimum
1	`/swap`	Minimum size when physical memory is less than 1 Gbyte.	1 Gbyte
2	`overlap`	Entire disk.	Size of entire disk
3	`/export`	Exported file system reserved for diskless nodes. This partition must be mounted with the `logging` option. This partition is further partitioned if diskless nodes are added to the cluster.	1 Gbyte + 100 Mbytes per diskless node
4	`/SUNWcgha/local`	This partition is reserved for NFS status files, services, and configuration files. This partition must be mounted with the `logging` option.	2 Gbytes
5	Reserved for Reliable NFS internal use	Bitmap partition reserved for the `nhcrfsd` daemon. This partition is associated with the `/export` file system.	See TABLE 5-3
6	Reserved for Reliable NFS internal use	Bitmap partition reserved for the `nhcrfsd` daemon. This partition is associated with the `/SUNWcgha/local` file system.	See TABLE 5-3
7	`/mypartition`	For any additional applications.	The remaining space

TABLE 5-2 Example Disk Partitions of Master-Eligible Nodes for Shared Disk

Disk Partition	File System Name	Description	Example Size
0	/	Data partition for diskless Solaris images	2 Gbytes minimum
1	/swap	Data partition for middleware data and binaries	1 Gbyte
2	overlap	Entire disk.	Size of entire disk
7		SVM replica	20 MBytes

For replication, create a bitmap partition for each partition containing an exported, replicated file system on the master-eligible nodes. The bitmap partition must be at least the following size.

```
1 Kbyte + 4 Kbytes per Gbyte of data in the associated data partition
```

In this example, the bitmaps are created on partitions 5 and 6. The bitmap partition sizes can be as shown in the following table.

TABLE 5-3 Example Bitmap Partitions

File System Name	Bitmap Partition	File System (Mbytes)	Bitmap File (Kbytes)	Bitmap Size (Block)
/export	/dev/rdsk/c0t0d0s5	2000	9216	18
/SUNWcgha/local	/dev/rdsk/c0t0d0s6	1512	7072	14

For information, see the *Sun StorEdge Availability Suite 3.1 Remote Mirror Software Installation Guide* in the Sun StorEdge™ Availability Suite 3.1 documentation set.

Note – In a cluster without diskless nodes, the /export file system and the associated bitmap partition are not required.

Installing the Solaris Operating System on the Master-Eligible Nodes

To install the Solaris Operating System on each master-eligible node, use the Solaris JumpStart tool on the installation server. The Solaris JumpStart tool requires the Solaris distribution to be on the installation server. For information about creating a Solaris distribution, see "Preparing the Installation Environment" on page 39.

▼ To Install the Solaris Operating System on the Master-Eligible Nodes

1. **Log in to the installation server as superuser.**
2. **Create the Solaris JumpStart environment on the installation server by using the appropriate document for the Solaris release:**
   - *Solaris 8 Advanced Installation Guide*
   - *Solaris 9 Installation Guide*

   You can access these documents on `http://docs.sun.com`.
3. **In the `/etc/hosts` file, add the names and IP addresses of the master-eligible nodes.**
4. **Share the *Solaris-distribution-dir* and *Jumpstart-dir* directories by adding these lines to the `/etc/dfs/dfstab` file:**

   ```
   share -F nfs -o ro,anon=0 Solaris-distribution-dir
   share -F nfs -o ro,anon=0 Jumpstart-dir
   ```

   - *Solaris-distribution* is the directory that contains the Solaris distribution.
   - *Jumpstart-dir* is the directory that contains the Solaris JumpStart files.
5. **Share the directories that are defined in the `/etc/dfs/dfstab` file:**

   ```
   # shareall
   ```

6. **Change to the directory where the `add_install_client` command is located:**

   ```
   # cd Solaris-dir/Solaris_x/Tools
   ```

   - *Solaris-dir* is the directory that contains the Solaris installation software. This directory could be on a CD-ROM or in an NFS-shared directory.
   - *x* is `8` or `9` depending on the Solaris version installed.
7. **Run the `add_install_client` command for each master-eligible node.**

   For information, see the **add_install_client**`(1M)` man page.
8. **Connect to the console of each master-eligible node.**

9. **Boot each master-eligible node with the appropriate command using a network boot.**

   If you are unsure of the appropriate command, refer to the hardware documentation for your platform. The common command for SPARC systems is shown in the following example:

```
ok> boot net - install
```

   If the installation server is connected to the second Ethernet interface, type:

```
ok> boot net2 - install
```

   This command installs the Solaris Operating System on the master-eligible nodes.

Setting Up the Master-Eligible Nodes

To prepare the master-eligible nodes for the installation of the Foundation Services, you must configure the master-eligible nodes. You must also mount the installation server directory that contains the Foundation Services distribution.

▼ To Configure the Master-Eligible Nodes

1. **Log in to a master-eligible node as superuser.**
2. **Create** `/etc/notrouter` **file:**

```
# touch /etc/notrouter
```

3. **Modify the** `/etc/default/login` **file so that you can connect to a node from a remote system as superuser:**

```
# mv /etc/default/login /etc/default/login.orig
# chmod 644 /etc/default/login.orig
# sed '1,$s/^CONSOLE/#CONSOLE/' /etc/default/login.orig >
/etc/default/login
# chmod 444 /etc/default/login
```

4. **Disable power management:**

```
# touch /noautoshutdown
```

5. **Modify the `.rhosts` file according to the security policy for your cluster:**

```
# touch /.rhosts
# cp /.rhosts /.rhosts.orig
# echo "+ root" > /.rhosts
# chmod 444 /.rhosts
```

6. **Set the boot parameters:**

```
# /usr/sbin/eeprom local-mac-address?=true
# /usr/sbin/eeprom auto-boot?=true
# /usr/sbin/eeprom diag-switch?=false
```

7. **If you are using the Network Time Protocol (NTP) to run an external clock, configure the master-eligible node as an NTP server.**

   This procedure is described in the Solaris documentation.

8. **If your master-eligible node has an IDE disk, edit the `/usr/kernel/drv/sdbc.conf` file.**

   Change the value of the `sdbc_max_fbas` parameter from `1024` to `256`.

9. **Create the `data/etc` and `data/var/dhcp` directories in the `/SUNWcgha/local/export/` file system on the master-eligible node:**

```
# mkdir -p /SUNWcgha/local/export/data/etc
# mkdir -p /SUNWcgha/local/export/data/var/dhcp
```

   - `/SUNWcgha/local/export/data/etc` directory is required for the Cluster Membership Manager (CMM).
   - `/SUNWcgha/local/export/data/var/dhcp` directory is required for the Reliable Boot Service.

10. **Repeat Step 1 through Step 9 on the second master-eligible node.**

▼ To Mount an Installation Server Directory on the Master-Eligible Nodes

1. **Log in to the installation server as superuser.**
2. **Check that the `mountd` and `nfsd` daemons are running on the installation server.**

   For example, use the `ps` command:

```
# ps -ef | grep mountd
root   184    1  0   Aug 03 ?       0:01 /usr/lib/autofs/automountd
root   290     1  0   Aug 03 ?        0:00 /usr/lib/nfs/mountd
root  2978  2974  0 17:40:34 pts/2    0:00 grep mountd
# ps -ef | grep nfsd
root   292     1  0   Aug 03 ?        0:00 /usr/lib/nfs/nfsd -a 16
root  2980  2974  0 17:40:50 pts/2    0:00 grep nfsd
#
```

   If a process ID is not returned for the `mountd` and `nfsd` daemons, start the NFS daemons:

```
# /etc/init.d/nfs.server start
```

3. **Share the directory containing the distributions for the Foundation Services and the Solaris Operating System by adding the following lines to the `/etc/dfs/dfstab` file:**

```
share -F nfs -o ro,anon=0 software-distribution-dir
```

   where *software-distribution-dir* is the directory that contains the Foundation Services packages and Solaris patches.

4. **Share the directories that are defined in the `/etc/dfs/dfstab` file:**

```
# shareall
```

5. **Log in to the a master-eligible node as superuser.**

6. **Create the mount point directories `Solaris` and `NetraHASuite` on the master-eligible node:**

```
# mkdir /NetraHASuite
# mkdir /Solaris
```

7. **Mount the Foundation Services and Solaris distribution directories on the installation server:**

```
# mount -F nfs \
installation-server-IP-address:/software-distribution-dir  \
/Product/NetraHASuite_2.1.2/FoundationServices/Solaris_x/sparc  \
/NetraHASuite
# mount -F nfs \
installation-server-IP-address:/Solaris-distribution-dir  \
/Solaris
```

- *installation-server-IP-address* is the IP address of the cluster network interface that is connected to the installation server.
- *x* is the Solaris version.
- *software-distribution-dir* is the directory that contains the Foundation Services packages.
- *Solaris-distribution-dir* is the directory that contains the Solaris distribution.

8. **Repeat Step 5 through Step 7 on the other master-eligible node.**

▼ To Install Solaris Patches

After you have completed the Solaris installation,you must install the Solaris patches delivered in the Foundation Services distribution. See the *Netra High Availability Suite Foundation Services 2.1 7/05 README* for the list of patches.

Note – Some of these patches are required for CGTP. If you do not plan to install CGTP, do not install the CGTP patches. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

---

1. **Log in to each master-eligible node as superuser.**
2. **Install the necessary Solaris patches on each master-eligible node:**

```
# patchadd -M /NetraHASuite/Patches/ patch-number
```

Installing the Man Pages on the Master-Eligible Nodes

▼ To Install the Man Pages on the Master-Eligible Nodes

1. **Log in to a master-eligible node as superuser.**
2. **Add the man page package:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhman
```

The man pages are installed in the `/opt/SUNWcgha/man` directory. To access the man pages, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Reference Manual*.

3. **Repeat Step 1 and Step 2 on the other master-eligible node.**

Installing the Foundation Services on the Master-Eligible Nodes

The following procedures explain how to install the Foundation Services on the master-eligible nodes:

▼ To Install the nhadm Tool

The nhadm tool is a cluster administration tool that can verify that the installation was completed correctly. You can run this tool when your cluster is up and running.

- **As superuser, install the nhadm tool package on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhadm
```

▼ To Install the Carrier Grade Transport Protocol

CGTP enables a redundant network for your cluster.

Note – If you do not require CGTP, do not install the CGTP packages. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

---

1. **Before you install the CGTP packages, make sure that you have installed the Solaris patches for CGTP.**

   See "To Install Solaris Patches" on page 50.

2. **As superuser, install the following CGTP packages on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhtpx SUNWnhtux
```

   where *x* is 8 or 9 depending on the version of the Solaris Operating System you install.

▼ To Install the Node State Manager

- **As superuser, install the Node State Manager packages on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhnsa SUNWnhnsb
```

Note – During the installation of the Node State Manager packages, the `/etc/opt/SUNWcgha/not_configured` file is created automatically. This file enables you to reboot a cluster node during the installation process without starting the Foundation Services.

For more information about the Node State Manager, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Install the External Address Manager

1. **Become superuser.**
2. **Type the following command:**

```
# pkgadd -d /NetraHASuite/Packages/SUNWnheaa SUNWnheab
```

For information on configuring the EAM, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Install the Cluster Membership Manager

- **As superuser, install the following CMM packages on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhcdt SUNWnhhb \
SUNWnhcmd SUNWnhcma SUNWnhcmb
```

Note – During the installation of the CMM packages, the `/etc/opt/SUNWcgha/not_configured` file is created automatically. This file enables you to reboot a cluster node during the installation process without starting the Foundation Services.

For instructions on configuring the CMM, see "Configuring the Foundation Services on the Master-Eligible Nodes" on page 62.

For information about the CMM, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Install the Reliable NFS When Using IP-Based Replication

Install the Reliable NFS packages to enable the Reliable NFS service and data-replication features of Foundation Services. For a description of the Reliable NFS service, see "File Sharing and Data Replication" in *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*. The Reliable NFS feature is enabled by the StorEdge Network Data Replicator (SNDR), which is provided with the Reliable NFS packages.

Note – SNDR is supplied for use only with the Foundation Services. Any use of this product other than on a Foundation Services cluster is not supported.

---

1. **As superuser, install the following Reliable NFS and SNDR packages on a master-eligible node in the following order:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWscmr \
SUNWscmu SUNWspsvr SUNWspsvu SUNWrdcr SUNWrdcu SUNWnhfsa SUNWnhfsb
```

Note – During the installation of the SNDR package `SUNWscmu`, you might be asked to specify a database configuration location. You can choose to use the SNDR directory that is automatically created. This directory is of the format `/sndr`*xy* where *x.y* is the version of the SNDR release.

---

2. **Repeat Step 1 on the second master-eligible node.**

3. **Install the SNDR patches on each master-eligible node.**

   See the *Netra High Availability Suite Foundation Services 2.1 7/05 README* for a list of SNDR patches.

4. **Edit the `/usr/kernel/drv/rdc.conf` file on each master-eligible node to change the value of the `rdc_bitmap_mode` parameter.**

   To have changes to the bitmaps written on the disk at each update, change the value of the `rdc_bitmap_mode` parameter to 1.

   To have changes to the bitmaps stored in memory at each update, change the value of the `rdc_bitmap_mode` parameter to 2. In this case, changes are written on the disk when the node is shut down. However, if both master-eligible nodes fail, both disks must be synchronized.

   For example: `rdc_bitmap_mode=2`.

▼ To Install the Reliable NFS When Using Shared Disk

Install the Reliable NFS packages to enable the Reliable NFS service and disk mirroring features of Foundation Services. For a description of the Reliable NFS service, see "File Sharing and Data Replication" in *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

1. **As superuser, install the following Reliable NFS packages on a master-eligible node in the following order:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhfsa SUNWnhfsb
```

2. **Repeat Step 1 on the second master-eligible node.**

▼ To Install the Node Management Agent

Install the Node Management Agent (NMA) packages to gather statistics on Reliable NFS, CGTP, and CMM. For a description of the NMA, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

The NMA consists of four packages. One NMA package is installed on both master-eligible nodes. Three packages are NFS-mounted as shared middleware software on the *first master-eligible node*. The first master-eligible node is the node that is booted first after you complete installing and configuring all the services on the master-eligible nodes.

The NMA requires the Java™ DMK packages, `SUNWjsnmp` and `SUNWjdrt`, to run. For information about installing the entire Java DMK software, see the *Java Dynamic Management Kit 5.0 Installation Guide*.

The following table describes the packages that are required on each type of node.

Package	Description	Installed On
`SUNWjsnmp`	Java DMK 5.0 Simple Network Management Protocol (SNMP) manager API classes	Both master-eligible nodes
`SUNWjdrt`	Java DMK 5.0 dynamic management runtime classes	First master-eligible node
`SUNWnhmas`	NMA configuration and startup script	Both master-eligible nodes

Package	Description	Installed On
SUNWnhmaj	NMA Java classes	First master-eligible node
SUNWnhmal	NMA JNI libraries	First master-eligible node
SUNWnhmad	NMA Javadoc files	First master-eligible node

Follow this procedure to install and configure the NMA.

1. **As superuser, install the following NMA package and Java DMK package on both master-eligible nodes:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhmas SUNWjsnmp
```

Note – If you plan to use shared disks, do not advance to Step 2 until the metadevice used for shared disks has been created. See Step 2 in "To Set Up File Systems on the Master-Eligible Nodes" on page 73.

2. **On the first master-eligible node, install the following shared Java DMK package and NMA packages:**

```
# pkgadd -d /NetraHASuite/Packages/ \
-M -R /SUNWcgha/local/export/services/ha_2.1.2 \
 SUNWjdrt SUNWnhmaj SUNWnhmal SUNWnhmad
```

The packages are installed with a predefined root path in the `/SUNWcgha/local/export/services/ha_2.1.2` directory.

Note – Ignore error messages related to packages that have not been installed. Always answer `Y` to continue the installation.

3. **To configure the NMA, see the** *Netra High Availability Suite Foundation Services 2.1 7/05 NMA Programming Guide***.**

▼ To Install the Daemon Monitor

- **As superuser, install the following Daemon Monitor packages on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhpma SUNWnhpmb \
SUNWnhpms SUNWnhpmn SUNWnhpmm
```

For a description of the Daemon Monitor, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Install the Watchdog Timer

Install and configure the Watchdog Timer provided with the Foundation Services *only* if you are using Netra servers that have hardware watchdogs at the Lights Out Management (LOM) level. For a list of the types of watchdogs for different Netra servers, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

Note – If you are using Netra servers with hardware watchdogs at the OBP level, do *not* install the Watchdog Timer provided with the Foundation Services. These hardware watchdogs are monitored by the server's software.

---

1. **Before installing the Watchdog Timer, do the following:**
   - Check that the `SUNWnhcdt` package is installed on each master-eligible node. For more information, see "To Install the Cluster Membership Manager" on page 53.
   - Check that the following LOM driver packages are installed:
     - `SUNWlomr`
     - `SUNWlomu`
2. **As superuser, install the Watchdog Timer package on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhwdt
```

The Watchdog Timer can be configured differently on each node, depending on your needs. See "Configuring the `nhfs.conf` File" on page 63.

Configuring the Master-Eligible Node Addresses

Before assigning IP addresses to the network interfaces of the master-eligible nodes, see "Cluster Addressing and Networking" in the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

In the Foundation Services, three IP addresses must be configured for each master-eligible node:

- An IP address for the first physical interface, *NIC0*, corresponding to the first network interface. This interface could be `hme0`.
- An IP address for the second physical interface, *NIC1*, corresponding to the second network interface. This interface could be `hme1`.
- An IP address for the virtual physical interface, `cgtp0`

  The virtual physical interface should not be configured on a physical interface. The configuration is done automatically when you configure Reliable NFS. For more information about the `cgtp0` interface, see the **cgtp** `(7D)` man page.

The IP addresses can be IPv4 addresses of any class with the following structure:

network_id . *host_id*

When you configure the IP addresses, make sure that the node ID, *nodeid*, is the decimal equivalent of *host_id*. You define the *nodeid* in the `cluster_nodes_table` file and the `nhfs.conf` file. For more information, see "Configuring the Foundation Services on the Master-Eligible Nodes" on page 62.

The following procedures explain how to create and configure IP addresses for master-eligible nodes.

- "To Create the IP Addresses for the Network Interfaces" on page 59
- "To Update the Network Files" on page 59
- "To Configure External IP Addresses" on page 60

Examples in these procedures use IPv4 Class C addresses.

▼ To Create the IP Addresses for the Network Interfaces

1. **Log in to each master-eligible node as superuser.**
2. **In the `/etc/hosts` file on each master-eligible node, add the three IP addresses, followed by the name of each interface:**

```
10.250.1.10     netraMEN1-nic0
10.250.2.10     netraMEN1-nic1
10.250.3.10     netraMEN1-cgtp

10.250.1.20     netraMEN2-nic0
10.250.2.20     netraMEN2-nic1
10.250.3.20     netraMEN2-cgtp

10.250.1.1      master-nic0
10.250.2.1      master-nic1
10.250.3.1      master-cgtp
```

In the rest of this book, the node `netraMEN1` is the first master-eligible node. The first master-eligible node is the node that is booted first after you complete installing the Foundation Services. The node `netraMEN2` is the *second master-eligible node* that is booted after the first master-eligible node has completed booting.

▼ To Update the Network Files

In the `/etc` directory on each master-eligible node, you must create a `hostname` file for each of the three interfaces. In addition, update the `nodename` and `netmasks` files.

1. **Create or update the file `/etc/hostname.`*NIC0* for the *NIC0* interface.**

   This file must contain the name of the master-eligible node on the first interface, for example, `netraMEN1-nic0`.

2. **Create or update the file `/etc/hostname.`*NIC1* for the *NIC1* interface.**

   This file must contain the name of the master-eligible node on the second interface, for example, `netraMEN1-nic1`.

3. **Create or update the file `/etc/hostname.cgtp0` for the `cgtp0` interface.**

   This file must contain the name of the master-eligible node on the `cgtp0` interface, for example, `netraMEN1-cgtp`.

4. **Update the** `/etc/nodename` **file with the IP address of the master-eligible node.**
   - If you have installed CGTP, add the name set on the CGTP interface, for example, `netraMEN1-cgtp`.
   - If you have not installed CGTP, add the name set on the *NIC0* interface, for example, `netraMEN1-nic0`.
5. **Create a** `/etc/netmasks` **file with a netmask of** `255.255.255.0` **for all subnetworks in the cluster.**

▼ To Configure External IP Addresses

To configure external IP addresses for a master-eligible node, the node must have an extra physical network interface or logical network interface. An extra physical network interface is an unused interface on an existing Ethernet card or a supplemental Ethernet card, for example, `hme2`. A logical network interface is an interface that is configured on an existing Ethernet card, for example, `hme1:101`.

- **Configure an external IP address for the extra network interface based on your public network policy.**

▼ To Configure an External Floating Adress Using a Single Link

1. **Add, if required, the hostname associated with the external floating address in** `/etc/host` **on each master-eligible node.**

```
129.253.1.13     ext-float
```

2. **Add, if required, the associated netmask for the subnetwork in** `/etc/netmasks` **on each master-eligible node.**

```
129.253.1.0     255.255.255.0
```

3. **Create or update the file** `/etc/hostname.`*interface* **for the interface supporting the external floating address on each master-eligible node.**

   If the file does not exist, create the following lines (the file must contain at least two lines for the arguments to be taken into account):

```
ext-float netmask + broadcast +
down
```

   If the file already exists, add the following line:

```
addif ext-float netmask + broadcast + down
```

4. **Configure the external floating address parameter in the** `nhfs.conf` **file on each master-eligible node.**

   For more information, see the **nhfs.conf**`(4)` man page.

▼ To Configure an External Floating Address Using Redundant Links Managed by IPMP

To configure the external floating address, the node must have two network interfaces not already used for a CGTP network. Using a different VLAN can be considered if no network interfaces are available.

Each interface must be configured with a special IP address used for monitoring. The external floating address must be configured in one of them, and all of these IP addresses must be part of the same subnetwork.

1. **Add, if required, the hostname associated to test IP addresses and the external floating address in** `/etc/host` **on each master-eligible node.**

   IP addresses for testing must be different on each node.

```
129.253.1.11     test-ipmp-1
129.253.1.12     test-ipmp-2
129.253.1.30     ipmp-float
```

2. **Add, if required, the associated netmask for the subnetwork in** `/etc/netmasks` **on each master-eligible node.**

```
129.253.1.0     255.255.255.0
```

3. **Create or update the file** `/etc/hostname.`*interface* **for the first interface on each master-eligible node.**

   The file must contain the definition of the test IP address for this interface and the external floating address in this format:

   test IP address #1 netmask + broadcast + -failover deprecated group *name* up addif *floating address* netmask + broadcast + failover down

   For example:

```
test-ipmp-1 netmask + broadcast + -failover deprecated group
ipmp-group up addif ipmp-float netmask + broadcast + failover down
```

4. **Create or update the file** `/etc/hostname.`*interface* **for the second interface on each master-eligible node.**

   The file must contain the definition of the test IP address for this interface in this format:

   test IP address #1 netmask + broadcast + -failover deprecated group *name* up

   For instance:

```
test-ipmp-2 netmask + broadcast + -failover deprecated group
ipmp-group up
```

5. **Configure the external floating address parameters (floating address and IPMP group to be monitored) in the** `nhfs.conf` **file on each master-eligible node.**

   For more information, see the **nhfs.conf**`(4)` man page.

Configuring the Foundation Services on the Master-Eligible Nodes

Configure the services that are installed on the master-eligible nodes by modifying the `nhfs.conf` and the `cluster_nodes_table` files on each master-eligible node in the cluster. Master-eligible nodes have read-write access to these files. Diskless nodes or dataless nodes in the cluster have read-only access to these files.

- `nhfs.conf`

  This file contains configurable parameters for each node and for the Foundation Services. This file must be configured on each node in the cluster.

- `cluster_nodes_table`

This file contains information about nodes in the cluster, such as *nodeid* and *domainid*. This file is used to elect the master node in the cluster. Therefore, this file must contain the most recent information about the nodes in the cluster.

There is one line in the table for each peer node. When the cluster is running, the table is updated by the `nhcmmd` daemon on the master node. The file is copied to the vice-master node every time the file is updated. The `cluster_nodes_table` must be located on a local partition that is not exported. For information about the `nhcmmd` daemon, see the **nhcmmd**`(1M)` man page.

Configuring the `nhfs.conf` File

The following procedures describe how to configure the `nhfs.conf` file.

- "To Configure the `nhfs.conf` File Properties" on page 63
- "To Create the Floating Address Triplet Assigned to the Master Role" on page 64
- "To Configure a Direct Link Between the Master-Eligible Nodes" on page 64

For more information, including parameter descriptions, see the **nhfs.conf.4** man page.

▼ To Configure the `nhfs.conf` File Properties

The `nhfs.conf` file enables you to configure the node after you have installed the Foundation Services on the node. This file provides parameters for configuring the node, CMM, Reliable NFS, the direct link between the master-eligible nodes, the Node State Manager, the Watchdog Timer, and daemon scheduling.

1. **As superuser, copy the template `/etc/opt/SUNWcgha/nhfs.conf.template` file:**

```
# cp /etc/opt/SUNWcgha/nhfs.conf.template \
 /etc/opt/SUNWcgha/nhfs.conf
```

2. **For each property that you want to change, uncomment the associated parameter (delete the comment mark at the beginning of the line).**

3. **Modify the value of each parameter that you want to change.**

   For descriptions of each parameter, see the **nhfs.conf**`(4)` man page.

   If you have not installed the CGTP patches and packages, do the following:

   - Disable the `Node.NIC1` and `Node.NICCGTP` parameters.

     To disable these parameters, add a comment mark (#) at the beginning of the line containing the parameter if this mark is not already present.

   - Configure the `Node.UseCGTP` and the `Node.NIC0` parameters:

- `Node.UseCGTP=False`
- `Node.NIC0=`*interface-name*

  where *interface-name* is the name of the *NIC0* interface, for example, `hme0`, `qfe0`, or `eri0`.

▼ To Create the Floating Address Triplet Assigned to the Master Role

The *floating address triplet* is a triplet of three logical addresses active on the node holding the master role. When the cluster is started, the floating address triplet is activated on the master node. In the event of a switchover or a failover, these addresses are activated on the new master node. Simultaneously, the floating address triplet is deactivated automatically on the old master node, that is, the new vice-master node.

- **To create the floating address triplet, you must define the master ID in the `nhfs.conf` file.**

  The floating address triplet is calculated from the master ID, the netmask, and the network interface addresses.

  For more information about the floating address triplet of the master node, see "Cluster Addressing and Networking" in *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Configure a Direct Link Between the Master-Eligible Nodes

You can configure a direct link between the master-eligible nodes to prevent a split brain cluster. A split brain cluster is a cluster that has two master nodes because the network between the master node and the vice-master node has failed.

1. **Connect the serial ports of the master-eligible nodes.**

   For an illustration of the connection between the master-eligible nodes, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

2. **Configure the direct link parameters.**

   For more information, see the **nhfs.conf**`(4)` man page.

Creating the `cluster_nodes_table` File

The `cluster_nodes_table` file contains the configuration data for each node in the cluster. Create this file on each master-eligible node. Once the cluster is running, this file is accessed by all nodes in the cluster. Therefore, the `cluster_nodes_table` on both master-eligible nodes must be exactly the same.

▼ To Create the `cluster_nodes_table` File

1. **Log in to a master-eligible node as superuser.**
2. **Copy the template file from `/etc/opt/SUNWcgha/cluster_nodes_table.template` to `/etc/opt/SUNWcgha/cluster_nodes_table`.**

   You can save the `cluster_nodes_table` file in a directory other than the `/etc/opt/SUNWcgha` directory. By default, the `cluster_nodes_table` file is located in the `/etc/opt/SUNWcgha` directory.
3. **Edit the `cluster_nodes_table` file to add a line for each node in the cluster.**

   For more information, see the **cluster_nodes_table**`(4)` man page.
4. **Edit the `nhfs.conf` file to specify the directory that contains the `cluster_nodes_table` file:**

   ```
   CMM.LocalConfig.Dir=/etc/opt/SUNWcgha
   ```

   For more information, see the **nhfs.conf**`(4)` man page.
5. **Log in to the other master-eligible node as superuser.**
6. **Copy the `/etc/opt/SUNWcgha/cluster_nodes_table` file from the first master-eligible node to the same directory on the second master-eligible node.**

   If you saved the `cluster_nodes_table` file in a directory other than `/etc/opt/SUNWcgha`, copy the file to that *other directory* on the second master-eligible node. The `cluster_nodes_table` file must be available in the same directory on both master-eligible nodes.
7. **Repeat Step 4 on the second master-eligible node.**

Note – When there is a change in the attribute of a node, the `cluster_nodes_table` file is updated by the `nhcmmd` daemon on each master-eligible node. If a switchover or failover occurs, the diskless nodes or dataless nodes in the cluster access the `cluster_nodes_table` file on the new master node. Only master-eligible nodes can write information to the `cluster_nodes_table` file.

Configuring Solaris Volume Manager With Reliable NFS and Shared Disk

▼ To Configure Solaris Volume Manager for Use with Reliable NFS and a Shared Disk

This procedure uses the following values for its code examples:

- `c0t0d0` is the system disk
- `c1t8d0` is the primary shared disk
- `c1t9d0` is the secondary shared disk used to mirror the primary one

Detailed information about SVM and how to set up a shared disk can be found in the *Solaris Volume Manager Administration Guide*.

1. **On the first master-eligible node, change the node name with the name of the host associated to the CGTP interface:**

```
# uname -S netraMEN1-cgtp
```

2. **Repeat Step 1 for the second master-eligible node:**

```
# uname -S netraMEN2-cgtp
```

3. **On the first master-eligible node, restart the `rpcbind` daemon to make it use the new node name:**

```
# pkill -x -u 0 rpcbind
# /usr/sbin/rpcbind -w
```

4. **Repeat Step 3 on the second master-eligible node.**

5. **Create the database replicas for the dedicated root disk slice on each master-eligible node:**

```
# metadb -a -c 3 -f /dev/rdsk/c0t0d0s7
```

6. **Repeat Step 9 for the second master-eligible node:**

```
# cat /etc/nodename
netraMEN2-cgtp
```

7. **(Optional) If you plan to use CGTP, configure a temporary network interface on the first private network and make it match the name and IP address of the CGTP interface on the first master-eligible node:**

```
# ifconfig hme0:111 plumb
# ifconfig hme0:111 10.250.3.10 netmask + broadcast + up
Setting netmask of hme0:111 to 255.255.255.0
```

8. **(Optional) If you plan to use CGTP, repeat Step 7 for the second master-eligible node:**

```
# ifconfig hme0:111 plumb
# ifconfig hme0:111 10.250.3.11 netmask + broadcast + up
Setting netmask of hme0:111 to 255.255.255.0
```

9. **On the first master-eligible node, verify that the `/etc/nodename` file matches the name of the CGTP interface (or the name of the private network interface, if CGTP is not used) :**

```
# cat /etc/nodename
netraMEN1-cgtp
```

Note – The rest of the procedure only applies to the first master-eligible node.

10. **Create the SVM diskset that manages the shared disks:**

```
# metaset -s nhas_diskset -a -h netraMEN1-cgtp netraMEN2-cgtp
```

11. **Remove any possible existing SCSI3-PGR keys from the shared disks.**

    In the following example, there was no key lying on the disks):

```
# /opt/SUNWcgha/sbin/nhscsitool /dev/rdsk/c1t8d0s2
Performing a SCSI bus reset ... done.
There are no keys on disk '/dev/rdsk/c1t8d0s2'.
# /opt/SUNWcgha/sbin/nhscsitool /dev/rdsk/c1t9d0s2
Performing a SCSI bus reset ... done.
There are no keys on disk '/dev/rdsk/c1t9d0s2'.
```

12. **Add the names of the shared disks to the previously created diskset:**

```
# metaset -s nhas_diskset -a /dev/rdsk/c1t8d0 /dev/rdsk/c1t9d0
```

Note – This step will reformat the shared disks, and all existing data on the shared disks will be lost.

13. **Verify that the SVM configuration is set up correctly:**

```
# metaset
Set name = nhas_diskset, Set number = 1
Host                Owner
   netraMEN1-cgtp     Yes
   netraMEN2-cgtp
Drive    Dbase
c1t8d0   Yes
c1t9d0   Yes
```

Note – If you do not plan to install diskless nodes, jump to Step 18.

14. **Retrieve disk geometry information using the `prtvtoc` command.**

    A known problem in the diskless management tool, `smosservice`, prevents the creation of the diskless environment on a metadevice. To avoid this problem, mount the `/export` directory on a physical partition during the diskless environment creation.

    To support access to the `/export` via a metadevice without preventing its access on a physical partition, the disk must be re-partitioned in a particular way after it has been inserted into a diskset. This re-partitioning preserves data already stored by SVM, since there is no formatting of created partitions.

    TABLE 5-4 gives an example of the prtvtoc command output after inserting a disk into a diskset.

TABLE 5-4 Example Output From `prtvtoc` Command

```
# prtvtoc /dev/rdsk/c1t8d0s0
* /dev/rdsk/c1t8d0s0 partition map
*
* Dimensions:
*     512 bytes/sector
*     107 sectors/track
*      27 tracks/cylinder
*    2889 sectors/cylinder
*   24622 cylinders
*   24620 accessible cylinders
*
* Flags:
*   1: unmountable
*  10: read-only
*
*                          First      Sector    Last
* Partition  Tag  Flags    Sector     Count     Sector  Mount Directory
       0      4    00        8667  71118513  71127179
       7      4    01           0      8667      8666
```

15. **Create the data file using the `fmthard` command.**

    The `fmthard` command (see its man page for more information) is used to create physical partitions. It requires you to input a data file describing the partitions to be created. There is one entry per partition, using the following format:

    ```
    slice # tag flag starting sector size in sectors
    ```

    starting sector and *size in sectors* values must be rounded to a cylinder boundary and must be computed as explained below.

    - *starting sector* = *starting sector* of the previous slice + *size in sectors* of the previous slice

- *size in sectors* = the required partition size in bytes divided by *bytes per sector*, the result being rounded to *sectors per cylinder* (upper value)

Three particular slices must be created:

- Slice 7 containing the meta-database (also called metadb). This slice must be created the same size as that created by SVM to overlap the existing one (to preserve data).
- A slice to support `/export` (diskless environment)
- A slice to support `/SUNWcgha/local` (shared NHAS packages and files)

Other slices can be added depending on your application requirements. TABLE 5-5 gives an example for partitioning::

TABLE 5-5 Example Slices for Physical Partitions

Slice Number	Usage	Size in MBytes
0	`/export`	4096
1	`/SUNWcgha/local`	2048
7	`metadb`	Not Applicable

The following slice constraints must be respected:

- Slice 7 (`metadb`) is the first slice of the disk starting at sector # 0, with the size *size of slice 7* with tag 4 (user partition) and flag 0x01: (unmountable)
- Slice 2 maps the whole disk: *size in bytes = accessible cylinders* sectors per cylinder * bytes per sector* with tag 5 (backup) and flag 0x01 (unmountable)
- Other slices use tag 0 (unassigned) and flag 0x00 (mountable in R/W)

An example of computing for slice 0 (located after slice 7) :

- starting sector = (0 + 8667) = 8667
- size in bytes = (4096 * 1024 ^ 2) = 4294967296
- size in sectors = 4294967296 / 512 = 8388608
- size in sector roumded to cylinder boundaries (2889) = 8389656

These values would display the following content in the data file (`datafile.txt`):

```
7 4 01        0     8667
0 0 00     8667  8389656
1 0 00  8398323  4194828
2 5 01        0 71127180
```

Note that this example leaves some unallocated spaces on the disk that can be used for user-specific partitions.

16. **Re-partition the disk.**

    Execute the following commands for the primary and for the secundary disk:

```
# fmthard -s datafile.txt /dev/rdsk/c1t8d0s2
# fmthard -s datafile.txt /dev/rdsk/c1t9d0s2
```

17. **Create the metadevices for partition mapping and mirroring.**

    Create the metadevices on the primary disk:

```
# metainit -s nhas_diskset d11 1 1 /dev/rdsk/c1t8d0s0
# metainit -s nhas_diskset d12 1 1 /dev/rdsk/c1t8d0s1
```

    Create the metadevices on the secondary disk:

```
# metainit -s nhas_diskset d21 1 1 /dev/rdsk/c1t9d0s0
# metainit -s nhas_diskset d22 1 1 /dev/rdsk/c1t9d0s1
```

    Create the mirror sets:

```
# metainit -s nhas_diskset d1 -m d11
# metattach -s nhas_diskset d1 d21
# metainit -s nhas_diskset d2 -m d12
# metattach -s nhas_diskset d2 d22
```

Note – This ends the section specific to the configuration for diskless installation. To complete diskless installation, jump to Step 20.

---

18. **Create your specific SVM RAID configuration (refer to the** *Solaris Volume Manager Administration Guide* **for information on specific configurations).**

    In the following example, the two disks form a mirror called `d0`:

```
# metainit -s nhas_diskset d18 1 1 /dev/rdsk/c1t8d0s0
# metainit -s nhas_diskset d19 1 1 /dev/rdsk/c1t9d0s0
# metainit -s nhas_diskset d0 -m d18
# metattach -s nhas_diskset d0 d19
```

19. **Create soft partitions to host the shared data.**

    These soft partitions are the file systems managed by Reliable NFS. In the following example, `d1` and `d2` are managed by Reliable NFS.

```
# metainit -s nhas_diskset d1 -p d0 2g
# metainit -s nhas_diskset d2 -p d0 2g
```

    The devices managed by Reliable NFS are now accessible through `/dev/md/nhas_diskset/dsk/d1` and `/dev/md/nhas_diskset/dsk/d2`.

20. **Create the file systems on the soft partitions:**

```
# newfs /dev/md/nhas_diskset/rdsk/d1
# newfs /dev/md/nhas_diskset/rdsk/d2
```

21. **Create the following directories on both master-eligible nodes:**

```
# mkdir /SUNWcgha
# mkdir /SUNWcgha/local
```

22. **Mount the file systems on the metadevice on the first node:**

```
# mount /dev/md/nhas_diskset/dsk/d1 /export
# mount /dev/md/nhas_diskset/dsk/d2 /SUNWcgha/local
```

Setting Up File Systems on the Master-Eligible Nodes

▼ To Set Up File Systems on the Master-Eligible Nodes

1. **Ensure that the following directories exist on the first master-eligible node:**

```
# mkdir /SUNWcgha/local/export
# mkdir /SUNWcgha/local/export/data
# mkdir /SUNWcgha/local/export/services
# mkdir /SUNWcgha/local/export/services/NetraHASuite_version/opt
```

   where *NetraHASuite_version* is the version of the Foundation Services you install, for example, `ha_2.1.2`.

   These directories contain packages and data shared between the master-eligible nodes.

2. **If you are using shared disks, install the shared Java DMK package and NMA packages onto the first master-eligible node as explained in Step 2 of "To Install the Node Management Agent" on page 55.**

3. **Create the following mount points on each master-eligible node:**

```
# mkdir /SUNWcgha/services
# mkdir /SUNWcgha/remote
# mkdir /SUNWcgha/swdb
```

   These directories are used as mount points for the directories that contain shared data.

4. **Add the following lines to the `/etc/vfstab` file on each master-eligible node:**

- If you have configured the CGTP, use the floating IP address for the `cgtp0` interface that is assigned to the master role to define the mount points.

```
master-cgtp:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote  nfs     -       no    rw,hard,fg,intr,noac

master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2/opt  \
-    /SUNWcgha/services   nfs     -   no   rw,hard,fg,intr,noac

master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2 -     \
/SUNWcgha/swdb  nfs    -       no     rw,hard,fg,intr,noac
```

  where `master-cgtp` is the host name associated with the floating address of the `cgtp0` interface of the master node. For more information, see "To Create the Floating Address Triplet Assigned to the Master Role" on page 64.

- If you have not configured the CGTP, use the floating IP address for the *NIC0* interface that is assigned to the master role.

```
master-nic0:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote  nfs     -       no    rw,hard,fg,intr,noac

master-nic0:/SUNWcgha/local/export/services/ha_2.1.2/opt  \
-    /SUNWcgha/services   nfs     -   no   rw,hard,fg,intr,noac

master-nic0:/SUNWcgha/local/export/services/ha_2.1.2 -     \
/SUNWcgha/swdb  nfs    -       no     rw,hard,fg,intr,noac
```

  where `master-nic0` is the host name associated with the floating address of the *NIC0* interface of the master node. For more information, see "To Create the Floating Address Triplet Assigned to the Master Role" on page 64.

Note – The `noac` mount option suppresses data and attribute caching. Use the `noac` option only if the impact on performance is acceptable.

---

5. **Check the following in the `/etc/vfstab` file:**

   - The `mount at boot` field is set to `no` for all RNFS-managed partitions.

     Example for SNDR:

```
/dev/dsk/c0t0d0s1 /dev/rdsk/c0t0d0s1 /SUNWcgha/local ufs 2 no
logging
```

Example for SVM:

```
/dev/md/nhas_diskset/dsk/d1 /dev/md/nhas_diskset/rdsk/dl
/SUNWcgha/local ufs 2 no logging
```

- The root file system (`/`) has the `logging` option.

```
/dev/dsk/c0t0d0s0 /dev/rdsk/c0t0d0s0  /  ufs  1 logging
```

Note – Only partitions identified in the `nhfs.conf` file can be managed by RNFS. For more information about the `nhfs.conf` file, see "Configuring the `nhfs.conf` File" on page 63.

---

6. **(Only applicable to SNDR) Create the file systems on the replicated partitions:**

```
# newfs /dev/rdsk/c0t0d0s3
# newfs /dev/rdsk/c0t0d0s4
```

▼ To Verify File Systems Managed by Reliable NFS

The Reliable NFS daemon, `nhcrfsd`, is installed on each master-eligible node. To determine which partitions are managed by this daemon, do the following:

- **Check the `RNFS.Slice` parameters of the `/etc/opt/SUNWcgha/nhfs.conf` file.**
  - For SNDR:

```
# grep -i RNFS.slice /etc/opt/SUNWcgha/nhfs.conf
RNFS.Slice.0=/dev/rdsk/c0t0d0s3 /dev/rdsk/c0t0d0s5
/dev/rdsk/c0t0d0s3 /dev/rdsk/c0t0d0s5 1
```

This means that slice `/dev/rdsk/c0t0d0s3` is being replicated and slice `/dev/rdsk/c0t0d0s5` is the corresponding bitmap partition.

- For SVM:

```
# grep -i RNFS.slice /etc/opt/SUNWcgha/nhfs.conf
RNFS.Slice.0=/dev/md/nhas_diskset/rdsk/d1 1
```

This means that soft partition `d1` of diskset `nhas_diskset` is being managed by Reliable NFS.

Starting the Master-Eligible Nodes

▼ To Delete the `not_configured` File

The `/etc/opt/SUNWcgha/not_configured` file was installed automatically when you installed the CMM packages. This file enables you to reboot a cluster node during the installation process without starting the Foundation Services.

- **After you have installed the Foundation Services packages on each master-eligible node, delete the `not_configured` file on each master-eligible node.**

▼ To Boot the Master-Eligible Nodes

1. **Unmount the shared file system, `/NetraHASuite`, on each master-eligible node by using the `umount` command.**

   See the **umount**`(1M)` man page and "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

2. **Reboot the first master-eligible node, which becomes the master node:**

```
# init 6
```

3. **After the first master-eligible node has completed rebooting, reboot the second master-eligible node:**

```
# init 6
```

This node becomes the vice-master node. To check the role of each node in the cluster, see the **nhcmmrole**(1M) man page.

4. **Create the** INST_RELEASE **file to allow patching of shared packages:**

```
# /opt/SUNWcgha/sbin/nhadm confshare
```

▼ To Verify the Cluster Configuration

Use the nhadm tool to verify that the master-eligible nodes have been configured correctly.

1. **Log in to the master-eligible node as superuser.**
2. **Run the** nhadm **tool to validate the configuration:**

```
# nhadm check starting
```

If all checks pass the validation, the installation of the Foundation Services was successful. See the **nhadm**(1M) man page.

Configuring a Floating External Address

A *floating external address* is a logical address assigned to an interface that is used to connect the master node to an external network. The External Address Manager (EAM) uses the Cluster Membership Manager (CMM) notifications to determine when a node takes on or loses the master role. When notified that a node has become the master node, the EAM configures the floating external addresses on one of the node's external interfaces. When notified that a node has lost the master role, the EAM unconfigures the floating external addresses.

The EAM can be installed when you first install the software on the cluster or after you have completed the installation process and have a running cluster. The following procedure describes how to install the EAM on a running cluster.

At the same time, the floating external addresses can be managed by *IP Network Multipathing* (IPMP). When a node has two or more NICs connected to the external network, IPMP will failover the floating external addresses from one NIC to the other if the interface they are configured on fails. Additionally, EAM can be configured to monitor the status of those NICs and trigger a switch-over when all NICs in a monitored group have failed.

For more information on IPMP, see Solaris' *System Administration Guide: IP Services*.

Note – Both IPv4 and IPv6 addresses are now supported. Only IPv4 addresses are used in the examples below.

▼ To Configure a Floating External Address

1. **Log in to the vice-master node as superuser.**
2. **Create a file named** `not_configured` **in the** `/etc/opt/SUNWcgha` **directory.**

```
# touch /etc/opt/SUNWcgha/not_configured
```

   If the node is rebooted during this procedure, the node does not start the Foundation Services.

3. **Reboot the vice-master node.**
4. **Install the EAM packages,** `SUNWnheaa` **and** `SUNWnheab` **on the vice-master node:**

```
# pkgadd -d /software-distribution-dir/Product/NetraHASuite_2.1.2/
 FoundationServices/Solarisx/sparc/Packages/ SUNWnheaa SUNWnheab
```

   where *software-distribution-dir* is the directory that contains the Foundation Services packages.

5. **Edit the** `/etc/opt/SUNWcgha/nhfs.conf` **file to define the EAM parameters.**

   An example entry to configure the EAM is as follows:

```
Node.External.FloatingAdress.0=192.168.12.39
```

   One floating external addresses is declared. When the node changes its role, the address is configured `UP` or `DOWN` accordingly. For more details on `nhfs.conf` parameters, see the **nhfs.conf**`(4)` man page.

6. **Create the interface in the standard Solaris way in `DOWN` state:**

```
# cat >> /etc/hostname.hme0
addif 192.168.12.39 netmask + broadcast + down ^D
```

   The interface `hme0` is configured with the floating external address in `DOWN` state. This interface must be connected to the public network.

7. **Repeat Step 1 through Step 6 on the master node.**
8. **On both the master node and the vice-master node, delete the `/etc/opt/SUNWcgha/not_configured` file.**
9. **Reboot both the master node and the vice-master node.**
10. **Log in to the master node.**

11. **Run the `ifconfig` command on the master node:**

```
# ifconfig -a

lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 1
        inet 127.0.0.1 netmask ff000000
hme0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 2
        inet 10.25.1.26 netmask ffffff00 broadcast 10.25.1.255
        ether 8:0:20:fa:3f:70
hme0:1: flags=9040843<UP,BROADCAST,RUNNING,MULTICAST,IPv4,NOFAILOVER> mtu 1500
index 2
        inet 192.168.12.39 netmask ffffff00 broadcast 192.168.12.255
hme0:2: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 2
       inet 10.25.1.1 netmask ffffff00 broadcast 10.25.1.255
hme1: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 3
        inet 10.25.2.26 netmask ffffff00 broadcast 10.25.2.255
        ether 8:0:20:fa:3f:71
hme1:1: flags=
9040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 3
        inet 10.25.2.1 netmask ffffff00 broadcast 10.25.2.255
cgtp0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 4
        inet 10.25.3.26 netmask ffffff00 broadcast 10.25.3.255
        ether 0:0:0:0:0:0
cgtp0:1: flags=
9040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 4
        inet 10.25.3.1 netmask ffffff00 broadcast 10.25.3.255
```

In this output, you can see the entry for the `hme0:1` interface with the floating external address `192.168.12.39` in state `UP`.

12. **Run the** `ifconfig` **command on the vice-master node:**

```
# ifconfig -a

lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 1
        inet 127.0.0.1 netmask ff000000
hme0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 2
        inet 10.25.1.26 netmask ffffff00 broadcast 10.25.1.255
        ether 8:0:20:fa:3f:70
hme0:1: flags=9040842<BROADCAST,RUNNING,MULTICAST,IPv4,NOFAILOVER> mtu 1500
index 2
        inet 192.168.12.39 netmask ffffff00 broadcast 192.168.12.255
hme0:2: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 2
       inet 10.25.1.1 netmask ffffff00 broadcast 10.25.1.255
hme1: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 3
        inet 10.25.2.26 netmask ffffff00 broadcast 10.25.2.255
        ether 8:0:20:fa:3f:71
hme1:1: flags=
9040842<BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 3
        inet 10.25.2.1 netmask ffffff00 broadcast 10.25.2.255
cgtp0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 4
        inet 10.25.3.26 netmask ffffff00 broadcast 10.25.3.255
        ether 0:0:0:0:0:0
cgtp0:1: flags=
9040842<BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 4
        inet 10.25.3.1 netmask ffffff00 broadcast 10.25.3.255
```

In this output, the entry for the hme0:1 interface with the floating external address 192.168.12.39 is also configured, but as it is in DOWN state it is not working.

13. **Trigger a switchover.**

```
# /opt/SUNWcgha/sbin/nhcmmstat -c so
```

14. **Run the** `ifconfig` **command on the new master node.**

```
# ifconfig -a

lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 1
         inet 127.0.0.1 netmask ff000000
hme0: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
```

```
index 2
         inet 10.25.1.27 netmask ffffff00 broadcast 10.25.1.255
         ether 8:0:20:b8:d3:f6
hme0:1: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 2
         inet 192.168.12.39 netmask ffffff00 broadcast 192.168.12.255
hme0:2: flags=
9040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 2
       inet 10.25.1.1 netmask ffffff00 broadcast 10.25.1.255
hme1: flags=1040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4> mtu 1500
index 3
         inet 10.25.2.27 netmask ffffff00 broadcast 10.25.2.255
         ether 8:0:20:b8:d3:f7
hme1:1: flags=
9040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu 1500
index 3
         inet 10.25.2.1 netmask ffffff00 broadcast 10.25.2.255
cgtp0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 4
         inet 10.25.3.27 netmask ffffff00 broadcast 10.25.3.255
         ether 0:0:0:0:0:0
cgtp0:1: flags=
9040843<UP,BROADCAST,RUNNING,MULTICAST,DEPRECATED,IPv4,NOFAILOVER> mtu
1500 index 4
         inet 10.25.3.1 netmask ffffff00 broadcast 10.25.3.255
```

15. **From a remote system, ping the master node floating address.**

```
% ping -s 192.168.12.39
```

For information on how to configure IPMP, refer to Solaris' *System Administration Guide: IP Services*.

CHAPTER 6

Installing the Software for Diskless Nodes

When you have installed and configured the master-eligible nodes of the cluster, you can add diskless nodes and dataless nodes to the cluster.

This chapter pertains to diskless nodes. To add dataless nodes to your cluster, see Chapter 7.

Information about installing software for diskless nodes is provided in the following sections:

Preparing to Install a Diskless Node

Before installing and configuring the software for a diskless node, check that the node is connected to the cluster and that there is enough disk space on the master-eligible nodes.

▼ To Connect a Diskless Node to the Cluster

- **To connect a diskless node to a cluster, connect the two network interfaces of the diskless node to the two switches of the cluster.**

  For details on how to connect the diskless node to other nodes in the cluster, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

▼ To Check Disk Space on the Master Node

- **Check that an exported file system is configured for the diskless node on a shared partition of the master node.**

  The number of diskless nodes in a cluster depends on your hardware configuration and the disk space that is available in your shared file system. For each diskless node, there must be a mounted file system on the master node with a capacity of 100 Mbytes. The file system for diskless nodes is in the `/export` directory. For example disk partitions for a master-eligible node, see "Defining Disk Partitions on the Master-Eligible Nodes" on page 44.

Note – Each diskless node must be configured with sufficient physical memory so that swapping is not required. Swapping to a file system across NFS has a serious impact on performance.

Installing the Solaris Operating System for Diskless Nodes on the Master Node

Install the Solaris Operating System for diskless nodes by using the `smosservice` command on the master node. You run this command only the first time you add a diskless node to a cluster to install the common Solaris services for all diskless nodes. The common Solaris services for the diskless node is installed in the directory `/export/exec` on the master node. You must also install the following packages: `SMEvplr.u`, `SUNWsiox.u` , `SUNWkvm.u`, `SMEvplu.u`. Install `SMEvplr.u` and `SUNWsiox.u` on the root file system for the diskless nodes. Install `SUNWkvm.u` and `SMEvplu.u` in the `/usr` directory for each diskless node.

For every additional diskless node, you only need to create the root file system for the new node by using the `smdiskless` command. The root file system is installed in the `/export/root/`*diskless-node-name* directory for each diskless node.

To install the Solaris Operating System for the diskless nodes, see the following procedures.

- "To Install the Common Solaris Services for Diskless Nodes on the Master Node" on page 85
- "To Install the `SUNWkvm.u` and `SMEvplu.u` Solaris Packages" on page 86
- "To Create a Root File System for a Diskless Node on the Master Node" on page 87
- "To Install the `SMEvplr.u` and `SUNWsiox.u` Solaris Packages for Diskless Nodes" on page 88
- "To Configure the Trivial File Transfer Protocol on the Master-Eligible Nodes" on page 88
- "To Install Solaris Patches" on page 89

▼ To Install the Common Solaris Services for Diskless Nodes on the Master Node

1. **Ensure that the mount points to the software distributions have been configured.**

   For more information, see "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

2. **Log in to the master node as superuser.**

3. **Start the Solaris Management Console.**

```
# smc
# ps -ef | grep smc
    root   474   473   0   Jul 29 ?        0:00
/usr/sadm/lib/smc/bin/smcboot
    root   473     1   0   Jul 29 ?        0:00
/usr/sadm/lib/smc/bin/smcboot
```

   For more information, see the **smc**`(1M)` man page.

4. **Run the** `smosservice` **command:**

```
# /usr/sadm/bin/smosservice add -p root-password -- \
-x mediapath=Solaris-distribution-dir \
-x platform=Solaris-platform \
-x cluster=Solaris-cluster \
-x locale=locale
```

   - *root-password* is the superuser password. By default, this password is `sunrules`.

- *Solaris-distribution-dir* is the mounted directory on the master node that contains the Solaris distribution.
- *Solaris-platform* is the Solaris platform, for example, `sparc.sun4u.Solaris_9`.
- *Solaris-cluster* is the Solaris cluster to install, for example, `SUNWCuser`.
- *locale* is the locale to install. For U.S. English, the value is `en_US`.

For example, to install the Solaris services for diskless nodes, type:

```
# /usr/sadm/bin/smosservice add -p sunrules -- \
-x mediapath=/Solaris9-Distribution \
-x platform=sparc.sun4u.Solaris_9 \
-x cluster=SUNWCuser \
-x locale=en_US
```

The common Solaris services for all diskless nodes are installed in the `/export/exec` directory on the master node.

For more information, see the **smosservice**`(1M)` man page.

▼ To Install the `SUNWkvm.u` and `SMEvplu.u` Solaris Packages

Note – Ignore error messages related to packages that have not been installed. Always answer `Y` to continue the installation.

---

1. **Ensure that the mount points to the software distributions have been configured.**

   For more information, see "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

2. **Log in to the master node as superuser.**

3. **Install the `SUNWkvm.u` package:**

   ```
   # pkgadd -R /export/Solaris_x/usr_sparc.all SUNWkvm.u
   ```

4. **Install the `SMEvplu.u` package:**

   ```
   # pkgadd -R /export/Solaris_x/usr_sparc.all SMEvplu.u
   ```

▼ To Create a Root File System for a Diskless Node on the Master Node

After the common Solaris services for the diskless nodes are installed, use the `smdiskless` command on the master node to create a root file system for each diskless node in the cluster. You must create the root file system for each diskless node in the cluster.

1. **Log in to the master node as superuser.**
2. **Create an entry in `/etc/hosts` for *diskless-node-name* on the first node.**
3. **Create the root file system for each diskless node:**

```
# /usr/sadm/bin/smdiskless add -p root-password -- \
-i IP-address-NIC0 \
-e Ethernet-address \
-n diskless-node-name \
-x os=Solaris-platform \
-x locale=locale
```

- *root-password* is the root password; by default this password is sunrules.
- *IP-address-NIC0* is the IP address of the diskless node on the *NIC0* interface, for example, `10.250.1.30`.
- *Ethernet-address* is the Ethernet address of the diskless node, for example, `08:00:20:01:02:03`.
- *diskless-node-name* is the name of the diskless node, for example, `netraDISKLESS1`.
- *Solaris-platform* is the Solaris platform, for example, `sparc.sun4u.Solaris_8` or `sparc.sun4u.Solaris_9`.
- *locale* is the language. For U.S. English, the value is `en_US`.

For example, to add a new diskless node that is named `netraDISKLESS1` that runs Solaris 9 on a Sun4U™ machine, type:

```
# /usr/sadm/bin/smdiskless add -p sunrules -- -i 10.250.1.20  \
-e 08:00:20:01:02:03 -n netraDISKLESS1 \
-x os=sparc.sun4u.Solaris_9 -x locale=en_US
```

The root file system for the diskless node is created in the `/export/root/netraDISKLESS1` directory.

For more information, see the **smdiskless**`(1M)` man page.

▼ To Install the SMEvplr.u and SUNWsiox.u Solaris Packages for Diskless Nodes

1. **Ensure that the mount points to the software distributions have been configured.**

   For more information, see "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

2. **Log in to the master node as superuser.**

3. **Install the `SMEvplr.u` package for each diskless node:**

```
# pkgadd -R /export/root/<diskless-node-name> -d /mnt SMEvplr.u
```

4. **Install the `SUNWsiox.u` package:**

```
# pkgadd -R /export/root/<diskless-nodename> -d /mnt SUNWsiox.u
```

▼ To Configure the Trivial File Transfer Protocol on the Master-Eligible Nodes

The `smdiskless` command creates the directory `/tftpboot` on the master node. This directory contains the boot image for each diskless node. Create the same directory on the vice-master node. Then, after a switchover, the new master node can boot the diskless nodes.

1. **Log in to the master node as superuser.**

2. **Modify the `/etc/inetd.conf` file to configure the Trivial File Transfer Protocol (TFTP).**

   Uncomment the `tftp` line, by deleting the comment mark at the beginning of the line, for example:

```
# tftp    dgram   udp6     wait    root
/usr/sbin/in.tftpd      in.tftpd -s /tftpboot
```

   For more information, see the **inetd.conf**`(4)` man page.

3. **Copy the `/tftpboot` directory to the vice-master node:**

```
# find /tftpboot | cpio -omB | rsh vice-master-cgtp0-address cpio -idumvB
```

4. **Log in to the vice-master node.**

5. **Repeat Step 2 on the vice-master node.**

▼ To Install Solaris Patches

In the root directory for each diskless node on the master node, install the necessary Solaris patches. The *Netra High Availability Suite Foundation Services 2.1 7/05 README* contains the list of Solaris patches that you must install. The contents of this list depends on the version of the Solaris Operating System you installed.

Note – Some of these patches are required for CGTP. If you do not plan to install CGTP, do not install the CGTP patches. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

---

1. **Log in to the master node as superuser.**

2. **Check that the directory containing the Foundation Services software distribution on the installation server is mounted on the master node:**

```
# mount
...
/NetraHASuite on 10.250.1.100:/software-distribution-dir \
remote/read/write/setuid/dev=3ec0004 on Tue Sep 24 17:06:09 2002
#
```

   - `10.250.1.100` is the IP address of the installation server network interface that is connected to the cluster.
   - *software-distribution-dir* is the directory that contains the Foundation Services product for the hardware architecture.

   If the directory is not mounted, mount the directory as described in "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

3. **Install the Solaris services patches for the diskless nodes on the master node:**

```
# patchadd -S Solaris_x /NetraHASuite/Patches/patch-number
```

where *x* is `8` or `9` depending on the Solaris version installed.

4. **Apply the patches for each diskless node:**

```
# patchadd -R /export/root/diskless-node-name \
/NetraHASuite/Patches/patch-number
```

Installing the DHCP and the Reliable Boot Service

The Reliable Boot Service ensures continuous availability of the DHCP server in a cluster. In the event of a failover of the master node, the vice-master node takes over from the master node. In the event of the failure of a diskless node, the Reliable Boot Service enables the diskless node to reboot automatically. This service also reassigns IP addresses to diskless nodes. For more information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

The Reliable Boot Service is included in Foundation Services packages `SUNWnhrbs` and `SUNWnhrbb`. These packages contain a DHCP public module. These packages also contain template files for the DHCP service configuration file, the network containers, and `dhcptab` containers.

▼ To Install the DHCP and the Reliable Boot Service

1. **Log in to each master-eligible node as superuser.**

2. **Check that the Solaris DHCP packages are installed on the master-eligible nodes.**

   The DHCP is delivered in the `SUNWdhcm`, `SUNWdhcsr`, and `SUNWdhcsu` packages.

```
# pkginfo SUNWdhcm SUNWdhcsr SUNWdhcsu
```

   If not already installed, install the Solaris DHCP packages on each master-eligible node:

```
# pkgadd -d Solaris-distribution-dir SUNWdhcm SUNWdhcsr SUNWdhcsu
```

3. **Install the `SUNWnhrbs` and `SUNWnhrbb` Reliable Boot Service packages on each master-eligible node:**

```
# pkgadd -d /NetraHASuite/Packages/ SUNWnhrbs SUNWnhrbb
```

Configuring the DHCP for a Diskless Node

To configure the DHCP for a diskless node, create the DHCP configuration table and network table for the node using the `dhcpconfig`, `dhtadm`, and `pntadm` commands. For more information about these commands and files, see the **dhcpconfig**`(1M)`, **dhtadm**`(1M)`, and **pntadm**`(1M)` man pages.

▼ To Configure the DHCP for a Diskless Node

1. **Log in to the master node as superuser.**
2. **Configure the DHCP server:**

```
# dhcpconfig -D -r SUNWnhrbs -p /SUNWcgha/remote/var/dhcp -n
```

3. **Modify the** `/etc/inet/dhcpsvc.conf` **file:**

```
DAEMON_ENABLED=TRUE
RUN_MODE=server
RESOURCE=SUNWnhrbs
PATH=/SUNWcgha/remote/var/dhcp
CONVER=1
INTERFACES=hme0,hme1
OFFER_CACHE_TIMEOUT=30
```

- `DAEMON_ENABLED` enables the DHCP daemon when set to `TRUE`.
- `RUN_MODE` selects the daemon run mode.
- `RESOURCE` enables you to add the Reliable Boot Service module, `SUNWnhrbs`, to the DHCP.
- `PATH` enables you to specify the path to the DHCP configuration file. This path must be in a shared file system.
- `CONVER` is the integer that specifies the DHCP container version. Do not modify this parameter.
- `INTERFACES` enables you to specify the network interfaces on the node, for example, `hme0` and `hme1`.

  If you are configuring a single network link for your cluster (that is, you do not plan to install the CGTP), specify only the first network interface, for example, `hme0`.
- `OFFER_CACHE_TIMEOUT` enables you to specify the number of seconds before `OFFER` cache timeouts occur, for example, 30.

For more information, see the **dhcpsvc.conf**`(4)` man page.

4. **Create the DHCP configuration table:**

```
# dhtadm -C
```

5. **Modify the DHCP configuration table:**

```
# dhtadm -A -s SbootFIL -d 'Vendor=vendor-string,7,ASCII,1,0'
# dhtadm -A -s SswapPTH -d 'Vendor=vendor-string,6,ASCII,1,0'
# dhtadm -A -s SswapIP4 -d 'Vendor=vendor-string,5,IP,1,0'
# dhtadm -A -s SrootPTH -d 'Vendor=vendor-string,4,ASCII,1,0'
# dhtadm -A -s SrootNM -d 'Vendor=vendor-string,3,ASCII,1,0'
# dhtadm -A -s SrootIP4 -d 'Vendor=vendor-string,2,IP,1,0'
# dhtadm -A -s SrootOpt -d 'Vendor=vendor-string,1,ASCII,1,0'
# dhtadm -A -s NhCgtpAddr -d 'Site,128,IP,1,1'
# dhtadm -A -s NhNic0Addr -d 'Site,129,IP,1,1'
```

```
# dhtadm -A -s NhNic1Addr -d 'Site,130,IP,1,1'
# dhtadm -A -m subnet1 -d \
':Broadcst=broadcast1:MTU=1500:Router=router1:Subnet=255.255.255.0:'
# dhtadm -A -m subnet2 -d \
':Broadcst=broadcast2:MTU=1500:Router=router2:Subnet=255.255.255.0:'
# dhtadm -A -m Common -d \
':BootSrvA=floating-master-address:\
SrootIP4=floating-master-address:\
SswapIP4=floating-master-address:\
BootSrvN=floating-master-address:SrootNM=floating-master-address:'
```

Note – If you are not planning to use CGTP (that is, you plan to configure a single network link for your cluster 0, do not configure the `NhCgtpAddr` macro.

- *vendor-string* is an ASCII string that identifies the client class names that are supported by the DHCP. Specify multiple client class names separated by spaces, for example:

```
'SUNW.UltraSPARC-IIi-cEngine SUNW.UltraSPARC-IIi-Netract \
SUNW.UltraSPARCengine_CP-60,7,ASCII,1,0'
```

- *subnet1* is the *NIC0* subnet, for example, `10.250.1.0`.
- *subnet2* is the *NIC1* subnet, for example, `10.250.2.0`.
- *broadcast1* is the broadcast address of the *NIC0* subnet, for example, `10.250.1.255`.
- *broadcast2* is the broadcast address of the *NIC1* subnet, for example, `10.250.2.255`.
- *router1* is the router address of the *NIC0* subnet, for example, `10.250.1.1`.
- *router2* is the router address of the *NIC1* subnet, for example, `10.250.2.1`.
- *floating-master-address* is the floating IP address assigned to the CGTP interface of the current master node. For example, `10.250.3.1`. For more information, see "Configuring the Master-Eligible Node Addresses" on page 58.

  If you are not planning to use the CGTP (that is, you plan to configure a single network link for your cluster), use the IP address assigned to one of the *NICs* on the current master node, for example, `10.250.1.1`.

For more information about the DHCP options, see the **dhtadm**`(1M)` man page.

6. **Create the DHCP network table:**

```
# pntadm -C subnet1
# pntadm -C subnet2
```

Configuring the DHCP Boot Policy for Diskless Nodes

Configure a DHCP boot policy for the diskless nodes in the cluster by updating the DHCP configuration table and the DHCP network table. The boot policy is a way to assign IP addresses to a diskless node when the node is booted.

Diskless nodes can have a dynamic, static, or client ID boot policy. For more information about the DHCP boot policies, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

TABLE 6-1 Boot Policies for Diskless Nodes

Boot Policy	Description
DHCP dynamic boot policy	IP address is dynamically assigned from a pool of IP addresses when the diskless node is booted. See "To Configure the DHCP Dynamic Boot Policy" on page 94.
DHCP static boot policy	IP address is statically assigned based on the Ethernet address of the diskless node. See "To Configure the DHCP Static Boot Policy" on page 96.
DHCP client ID boot policy	IP address is generated from the node's client ID. See "To Configure the DHCP Client ID Boot Policy" on page 98.

Note – If you are not planning to use the CGTP (that is, you plan to configure a single network link for your cluster), configure the DHCP only for the *NIC0* interface. In addition, do not configure the `NhCgtpAddr` macro for the `cgtp0` interface.

▼ To Configure the DHCP Dynamic Boot Policy

1. **Log in to the master node as superuser.**
2. **Update the DHCP configuration table for the *NIC0* interface of the diskless node:**

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC0* IP address of the node.
- *local-cgtp-addr, local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.
- *subnet* is the *NIC0* subnet.

For a diskless node, `netraDISKLESS1`, with the *NIC0* IP address `10.250.1.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.1.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.1.0:'
```

3. Update the DHCP network table for the *NIC0* interface of the diskless node:

```
# pntadm -A IP-address -f PERMANENT -m macro-name subnet
```

- *IP-address* is the *NIC0* IP address of the node.
- *macro-name* is the *NIC0* IP address of the node.
- *subnet* is the *NIC0* subnet.

For the diskless node with the *NIC0* IP address `10.250.1.30`, type:

```
# pntadm -A 10.250.1.30 -f PERMANENT -m 10.250.1.30 10.250.1.0
```

4. Update the DHCP configuration table for the *NIC1* interface of the diskless node:

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC1* IP address of the node.
- *local-cgtp-addr, local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.

- *subnet* is the *NIC1* subnet.

For the diskless node, `netraDISKLESS1`, with the *NIC1* IP address `10.250.2.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.2.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.2.0:'
```

5. **Update the DHCP network table for the *NIC1* interface of the diskless node:**

```
# pntadm -A IP-address -f PERMANENT -m macro-name subnet
```

- *IP-address* is the *NIC1* IP address of the node.
- *macro-name* is the *NIC1* IP address of the node.
- *subnet* is the *NIC1* subnet.

For the diskless node with the *NIC1* IP address `10.250.2.30`, type:

```
# pntadm -A 10.250.2.30 -f PERMANENT -m 10.250.2.30 10.250.2.0
```

▼ To Configure the DHCP Static Boot Policy

1. **Log in to the master node as superuser.**
2. **Update the DHCP configuration table for the *NIC0* interface of the diskless node:**

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC0* IP address of the node.
- *local-cgtp-addr*, *local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.

- *subnet* is the *NIC0* subnet.

For a diskless node, `netraDISKLESS1`, with the *NIC0* IP address `10.250.1.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.1.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.1.0:'
```

3. **Update the DHCP container for the *NIC0* interface of the diskless node.**

```
# pntadm -A IP-address \
-i Ethernet-address \
-f PERMANENT+MANUAL -m macro-name subnet
```

- *IP-address* is the *NIC0* IP address of the node.
- *Ethernet-address* of the board of the node. The letters of the address must be in uppercase.
- *macro-name* is the *NIC1* IP address of the node.
- *subnet* is the *NIC0* subnet.

For the diskless node with the *NIC0* IP address `10.250.1.30` and Ethernet address `01080020F9B360`, type:

```
# pntadm -A 10.250.1.30 -i 01080020F9B360 -f PERMANENT+MANUAL \
-m 10.250.1.30 10.250.1.0
```

4. **Update the DHCP configuration table for the *NIC1* interface of the diskless node:**

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC1* IP address of the node.
- *local-cgtp-addr*, *local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.

- *subnet* is the *NIC1* subnet.

For the diskless node, `netraDISKLESS1`, with the *NIC1* IP address `10.250.2.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.2.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.2.0:'
```

5. **Update the DHCP container for the *NIC1* interface of the diskless node:**

```
# pntadm -A IP-address \
-i Ethernet-address \
-f PERMANENT+MANUAL -m macro-name subnet
```

- *IP-address* is the *NIC1* IP address of the node.
- *Ethernet-address* of the board of the node.
- *macro-name* is the *NIC1* IP address of the node.
- *subnet* is the *NIC1* subnet.

For the diskless node with the *NIC1* IP address `10.250.2.30` and Ethernet address `01080020F9B361`, type:

```
# pntadm -A 10.250.2.30 -i 01080020F9B361 \
-f PERMANENT+MANUAL -m 10.250.2.30 10.250.2.0
```

▼ To Configure the DHCP Client ID Boot Policy

This procedure can only be performed on nodes with CompactPCI technology. For information specific to the hardware you are using, see the corresponding hardware documentation.

1. **Create or retrieve the client ID for the diskless node.**

   a. **Log in to the diskless node as superuser.**

   b. **Get the `ok` prompt.**

c. Check for the client ID of the diskless node:

```
ok> printenv dhcp-clientid
```

If a client ID is not configured, configure it:

```
ok> setenv dhcp-clientid client-id-name
```

where *client-id-name* is an ASCII string. In this procedure, `test` is used as an example client ID.

d. Convert the ASCII string to hexadecimal.

For example, if `test` is your client ID, the hexadecimal equivalent is `74 65 73 74`.

2. **Log in to the master node.**

3. **Declare the diskless node's client ID in the** `/export/root/`*diskless-node-name*`/etc/default/dhcpagent` **file.**

For example, if the hexadecimal equivalent of your client ID is `74 65 73 74` on a Netra CT 810 machine, add the following line to the `dhcpagent` file:

```
CLIENT_ID=0x74657374
```

For information about the format of the `CLIENT_ID` on the hardware you are using, see the corresponding hardware documentation.

4. **Update the DHCP configuration table for the** *NIC0* **interface of the diskless node:**

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC0* IP address of the node.
- *local-cgtp-addr*, *local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.

- *subnet* is the *NIC0* subnet.

For a diskless node, `netraDISKLESS1`, with the *NIC0* IP address `10.250.1.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.1.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.1.0:'
```

5. **Update the DHCP network table for the *NIC0* interface of the diskless node:**

```
# pntadm -A IP-address -i diskless-node-clientID \
-f PERMANENT+MANUAL -m macro-name subnet
```

- *IP-address* is the *NIC0* IP address of the node.
- *diskless-node-clientID* is the hexadecimal equivalent of the client ID.
- *macro-name* is the *NIC0* IP address of the node.
- *subnet* is the subnet of the *NIC0* interface.

For a Netra CT 810 diskless node with the *NIC0* IP address `10.250.1.30` and client ID `74657374`, type:

```
# pntadm -A 10.250.1.30 -i 74657374 \
-f PERMANENT+MANUAL -m 10.250.1.30 10.250.1.0
```

For information about the format of the `CLIENT_ID` on the hardware you are using, see the corresponding hardware documentation.

6. **Update the DHCP configuration table for the *NIC1* interface of the diskless node:**

```
# dhtadm -A -m macro-name -d \
':NhCgtpAddr=local-cgtp-addr:NhNic0Addr=local-nic0-addr:NhNic1Addr=
local-nic1-addr:Include=Common:BootFile=inetboot.sun4u.os:\
SrootPTH=/export/root/diskless-node-name:\
SswapPTH=/export/swap/diskless-node-name:Include=subnet:'
```

- *macro-name* is the *NIC1* IP address of the node.
- *local-cgtp-addr, local-nic0-addr*, and *local-nic1-addr* are respectively the IP addresses of the `cgtp0`, `nic0`, and `nic1` interfaces of the node.
- *os* is the operating system. Specify `Solaris_8` or `Solaris_9` depending on the Solaris version you installed.
- *diskless-node-name* is the name of the node.

- *subnet* is the *NIC1* subnet.

For the diskless node, `netraDISKLESS1`, with the *NIC1* IP address `10.250.2.30` and Solaris 9, type:

```
# dhtadm -A -m 10.250.2.30 -d \
':NhCgtpAddr=10.250.3.30:NhNic0Addr=10.250.1.30:NhNic1Addr=
10.250.2.30:Include=Common:BootFile=inetboot.sun4u.Solaris 9:\
SrootPTH=/export/root/netraDISKLESS1:\
SswapPTH=/export/swap/netraDISKLESS1:Include=10.250.2.0:'
```

7. Update the DHCP container for the *NIC1* interface of the diskless node.

```
# pntadm -A IP-address -i diskless-node-clientID \
-f PERMANENT+MANUAL -m macro-name subnet
```

- *IP-address* is the *NIC1* IP address of the node.
- *diskless-node-clientID* is the hexadecimal equivalent of the client ID.
- *macro-name* is the *NIC1* IP address of the node.
- *subnet* is the *NIC1* subnet.

For the diskless node with *NIC1* IP address `10.250.2.30` and client ID `74657374`, type:

```
# pntadm -A 10.250.2.30 -i 74657374 \
-f PERMANENT+MANUAL -m 10.250.2.30 10.250.2.0
```

For information about the format of the `CLIENT_ID` on the hardware you are using, see the corresponding hardware documentation.

Installing the Foundation Services on a Diskless Node

The packages that are installed in the partitions for diskless nodes are a subset of the Foundation Services packages already installed on the master-eligible nodes. The following Foundation Services must be installed for each diskless node.

TABLE 6-2 Foundation Services Packages for Diskless Nodes

Package Name	Package Description
SUNWnhadm	Cluster administration tool
SUNWnhhb	Probe heartbeat module
SUNWnhcmd	CMM developer package (.h and .so files)
SUNWnhcma	CMM binaries
SUNWnhcmb	CMM binaries
SUNWnhcdt	Trace library
SUNWnhtp8 or SUNWnhtp9	CGTP kernel drivers and modules
SUNWnhtu8 or SUNWnhtu9	CGTP user-space components, configuration scripts, and files
SUNWnhmas	NMA configuration and startup script
SUNWnhsafclm	SAF CLM Service API
SUNWnhpma	Daemon monitor /opt file system
SUNWnhpmb	Daemon monitor root file system
SUNWnhpms	Daemon monitor scripts
SUNWnhpmm	Daemon monitor driver
SUNWjsnmp	Java DMK 5.0 SNMP manager API classes
SUNWnhwdt	Watchdog Timer

▼ To Install the Foundation Services Packages

1. **Log in to the master node as superuser.**

2. **Install the Foundation Services packages.**

   For example, to install the Foundation Services packages and the Java DMK package on Solaris 9, run the following command:

```
# pkgadd -R /export/root/diskless-node-name -d /NetraHASuite/Packages \
SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhhb SUNWnhcdt SUNWnhcmd
SUNWnhcma \
SUNWnhcmb SUNWnhpma SUNWnhpmb SUNWnhpmn SUNWnhpms SUNWnhpmm \
SUNWnhmas SUNWjdrt
```

   In the preceding command, you also install the Java DMK 5.0 runtime classes in the root directory of each diskless node.

   CGTP enables a redundant network for your cluster.

Note – If you do not require CGTP, do not install the CGTP packages. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

---

3. **Install the Java DMK SNMP manager API classes package in the shared `/usr` directory for the diskless nodes:**

```
# pkgadd -R /export/Solaris_x/usr_sparc_all/ \
-d /NetraHASuite/Packages SUNWjsnmp
```

   where *x* is `8` or `9` depending on the Solaris version installed.

4. **Install the Watchdog Timer packages appropriate to your hardware.**

   a. **Refer to your hardware guides for the correct package names and installation for your configuration.**

   b. **To enable the Watchdog Timer, modify the `nhfs.conf` file.**

      For instruction on how to configure the Watchdog Timer, see the **nhfs.conf**`(4)` man page. The Watchdog Timer can be configured differently on each node according to your requirements.

Configuring the Foundation Services for a Diskless Node

To configure the Foundation Services for a diskless node, see the following procedures:

▼ To Update the Network Files for the Diskless Node

1. **Log in to the master node as superuser.**

2. **Create the** `/export/root/`*diskless-node-name*`/etc/hostname.`*NIC0*, `/export/root/`*diskless-node-name*`/etc/hostname.`*NIC1*, `/export/root/`*diskless-node-name*`/etc/dhcp.`*NIC0*, **and** `/export/root/`*diskless-node-name*`/etc/dhcp.`*NIC1* **files.**

   where *diskless-node-name* is the hostname of the diskless node.

```
# touch /export/root/diskless-node-name/etc/hostname.NIC0
# touch /export/root/diskless-node-name/etc/hostname.NIC1
# touch /export/root/diskless-node-name/etc/dhcp.NIC0
# touch /export/root/diskless-node-name/etc/dhcp.NIC1
```

   For example, if you are using a CP2160 board, create the files:

```
/export/root/diskless-node-name/etc/hostname.eri0
/export/root/diskless-node-name/etc/hostname.eri1
/export/root/diskless-node-name/etc/dhcp.eri0
/export/root/diskless-node-name/etc/dhcp.eri1
```

Note – All four files must remain empty.

3. **Create the** `/export/root/`*diskless-node-name*`/etc/hosts` **file.**

4. **Edit the** `/export/root/`*diskless-node-name*`/etc/hosts` **file to include the IP addresses and node names for all the network interfaces of all the nodes.**

   The interfaces are the *NIC0*, *NIC1*, and `cgtp0` interfaces.

```
127.0.0.1       localhost
10.250.1.10     netraMEN1-nic0
10.250.2.10     netraMEN1-nic1
10.250.3.10     netraMEN1-cgtp

10.250.1.20     netraMEN2-nic0
10.250.2.20     netraMEN2-nic1
10.250.3.20     netraMEN2-cgtp

10.250.1.30     netraDISKLESS1-nic0
10.250.2.30     netraDISKLESS1-nic1
10.250.3.30     netraDISKLESS1-cgtp

10.250.1.1      master-nic0
10.250.2.1      master-nic1
10.250.3.1      master-cgtp
```

5. **Create the** `/export/root/`*diskless-node-name*`/etc/nodename` **file.**

6. **Edit the** `/export/root/`*diskless-node-name*`/etc/nodename` **file to include the node name that is associated with the IP address of one of the network interfaces.**

   For example, add the node name associated with the IP address of the `cgtp0` interface, that is, `netraDISKLESS1-cgtp`.

7. **Create the** `/export/root/`*diskless-node-name*`/etc/netmasks` **file.**

8. **Edit the** `/export/root/`*diskless-node-name*`/etc/netmasks` **file to include a line for each subnet on the cluster:**

```
10.250.1.0    255.255.255.0
10.250.2.0    255.255.255.0
10.250.3.0    255.255.255.0
```

▼ To Configure External IP Addresses

To configure external IP addresses for a diskless node, the node must have an extra physical network interface or logical network interface. A physical network interface is an unused interface on an existing Ethernet card or a supplemental HME Ethernet card or QFE Ethernet card, for example, `hme2`. A logical network interface is an interface that is configured on an existing Ethernet card, for example, `hme1:101`.

- **Configure an external IP address for the extra network interface based on your public network policy.**

▼ To Disable the Router Feature

Because the cluster network is not routable, you must disable the diskless node as a router.

1. **Log in to the master node as superuser.**
2. **Create the `notrouter` file:**

```
# touch /export/root/diskless-node-name/etc/notrouter
```

For a description of the advantages of using a private cluster network, see the "Cluster Addressing and Networking" in *Netra High Availability Suite Foundation Services 2.1 7/05 Overview*.

▼ To Set Up File Systems for a Diskless Node

To set up file systems for a diskless node, create the mount points `/SUNWcgha/remote`, `SUNWcgha/services`, and `/SUNWcgha/swdb`. Add the NFS mount points for the directories that contain middleware data and services on the master node. Update the `/etc/vfstab` file in the root directory for the diskless node. Then, these file systems are exported from the master node through the NFS, and are automatically mounted for the diskless nodes at boot time.

TABLE 6-3 explains the file systems that are exported on the master node and the corresponding mount points for the diskless nodes. For information about how to export these file systems on the master node, see "To Set Up File Systems on the Master-Eligible Nodes" on page 73.

TABLE 6-3 Exported File Systems and Mount Points

Description	Exported Mount Point on the Master Node	Mount Point for Diskless Nodes
Root file systems	`/export/root/`*diskless-node-name*	`/`
Foundation Services data used locally	`/SUNWcgha/local`	Not exported
Foundation Services exported data	`/SUNWcgha/local/export/data`	`/SUNWcgha/remote`
Foundation Services exported data	`/SUNWcgha/local/export/services/ha_2.1.2/opt`	`/SUNWcgha/services`
Foundation Services exported data	`/SUNWcgha/local/export/services/ha_2.1.2`	`/SUNWcgha/swdb`

All file systems that you mount using NFS must be mounted with the options `fg`, `hard`, and `intr`. You can also set the `noac` mount option, which suppresses data and attribute caching. Use the `noac` option only if the impact on performance is acceptable.

1. **Log in to the master node as superuser.**
2. **Edit the entries in the** `/export/root/`*diskless-node-name*`/etc/vfstab` **file.**
   - If you have configured the CGTP, replace the host name of the master node with the host name associated with the floating IP address for the `cgtp0` interface that is assigned to the master role, for example, `master-cgtp`.

     For more information, see "To Create the Floating Address Triplet Assigned to the Master Role" on page 64.
   - If you have not configured the CGTP, replace the host name of the master node with the host name associated with the floating IP address for the *NIC0* interface that is assigned to the master role, for example, `master-nic0`.
3. **Define the mount points** `/SUNWcgha/remote`**,** `SUNWcgha/services`**, and** `/SUNWcgha/swdb`**.**

- If you have configured the CGTP, use the floating IP address for the `cgtp0` interface that is assigned to the master role to define the mount points:

```
master-cgtp:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote        nfs     -       yes     \
rw,hard,fg,intr
master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2/opt    \
-       /SUNWcgha/services      nfs     -       yes     \
rw,hard,fg,intr
master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2 -      \
/SUNWcgha/swdb  nfs     -       yes     rw,hard,fg,intr
```

- If you have not configured the CGTP, use the floating IP address for the *NIC0* interface that is assigned to the master role.

```
master-nic0:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote        nfs     -       yes     \
rw,hard,fg,intr
master-nic0:/SUNWcgha/local/export/services/ha_2.1.2/opt    \
-       /SUNWcgha/services      nfs     -       yes     \
rw,hard,fg,intr
master-nic0:/SUNWcgha/local/export/servicesha_2.1.2 -      \
/SUNWcgha/swdb  nfs     -       yes     rw,hard,fg,intr
```

Note – Do not use IP addresses in the `/etc/vfstab` file for the diskless nodes. Instead, use logical host names. Otherwise, the `pkgadd -R` command fails and returns the following message: "WARNING: cannot install to or verify on master_ip>"

---

4. **In the diskless node directory** `/export/root/`*diskless-node-name*, **create the mount points:**

```
# mkdir -p SUNWcgha/remote
# mkdir -p SUNWcgha/services
# mkdir -p SUNWcgha/swdb
```

5. **Repeat Step 2 and Step 4 for all diskless nodes.**

▼ To Create the `nhfs.conf` File for a Diskless Node

Each node in the cluster has a cluster configuration file, `nhfs.conf`. Create this file for the new diskless node by performing the following procedure.

1. **Log in to the master node as superuser.**
2. **Create the `nhfs.conf` file for the diskless node:**

```
# cp /etc/opt/SUNWcgha/nhfs.conf.template \
/export/root/diskless-node-name/etc/opt/SUNWcgha/nhfs.conf
```

3. **Configure the `/export/root/`*diskless-node-name*`/etc/opt/SUNWcgha/nhfs.conf` file.**

   An example file for a diskless node on a cluster with the domain ID `250`, with network interfaces `eri0`, `eri1`, and `cgtp0` would be as follows:

```
Node.NodeId=30
Node.NIC0=eri0
Node.NIC1=eri1
Node.NICCGTP=cgtp0
Node.UseCGTP=True
Node.Type=Diskless
Node.DomainId=250
CMM.IsEligible=False
CMM.LocalConfig.Dir=/etc/opt/SUNWcgha
```

   For more information, see the **nhfs.conf**`(4)` man page.

   If you have not installed the CGTP patches and packages, do the following:

   - Disable the `Node.NIC1` and `Node.NICCGTP` parameters.

     To disable these parameters, add a comment mark (#) at the beginning of the line containing the parameter if this mark is not already present.

   - Configure the `Node.UseCGTP` and the `Node.NIC0` parameters:
     - `Node.UseCGTP=False`
     - `Node.NIC0=`*interface-name*

       where *interface-name* is the name of the *NIC0* interface, for example, `hme0`, `qfe0`, or `eri0`.

4. **Repeat Step 2 and Step 3 for all diskless nodes.**

Integrating a Diskless Node Into the Cluster

You must update the `/etc/hosts` file on each peer node in the cluster to include the IP addresses of the diskless node. You must also update the `nhfs.conf` file and the `cluster_nodes_table` file on the master-eligible nodes to include the diskless node. See the following procedures.

▼ To Update the `/etc/hosts` File on Each Peer Node

To declare the diskless node to all peer nodes in the cluster, perform the following procedure:

1. **Log in to the master node as superuser.**
2. **Edit the `/etc/hosts` file to add the following lines:**

```
IP-address-NIC0  nic0-diskless-node-name
IP-address-NIC1  nic1-diskless-node-name
IP-address-cgtp0  cgtp0-diskless-node-name
```

   Now, the master node can "see" the three network interfaces of the new diskless node.

3. **Log in to the vice-master node as superuser.**
4. **Repeat Step 2.**

   Now, the vice-master node can "see" the three network interfaces of the new diskless node.

5. **Log in to a diskless or dataless node that is part of the cluster, if one already exists.**
6. **Repeat Step 2.**

   Now, the diskless node can "see" the three network interfaces of the new diskless node.

7. **Repeat Step 5 and Step 6 on all other diskless or dataless nodes that are already part of the cluster.**

▼ To Add the Diskless Node to the `cluster_nodes_table` File

Update the cluster node table file, `cluster_nodes_table`, and the cluster configuration file, `nhfs.conf`, with the addressing information for the new diskless node.

1. **Log in to the master node as superuser.**
2. **Using the following format, edit the `/etc/opt/SUNWcgha/cluster_nodes_table` file to add an entry for the diskless node:**

```
#NodeId      Domain_id  Name               Attributes
nodeid        domainid   diskless-node-name    -
```

The *nodeid* that you define in the `cluster_nodes_table` file must be the decimal representation of the host part of the node's IP address. For more information, see the **cluster_nodes_table**`(4)` man page.

3. **Create the `cluster_nodes_table` file on the master node disk:**

```
# /opt/SUNWcgha/sbin/nhcmmstat -c reload
```

4. **Repeat Step 2 for each diskless node you are adding to the cluster.**

▼ To Update the Shared Directory Configuration

Specify the shared directory configuration in the `nhfs.conf` file on the master node and the vice-master node. Ensure that there is no existing shared directory configuration already specified in the `/etc/dfs/dfstab` file.

1. **Log in to the master node as superuser.**

2. **Edit the `/etc/opt/SUNWcgha/nhfs.conf` file to add the following:**

```
Rnfs.Share.0=share -F nfs -o rw=nic0-diskless-node-name: \
nic1-diskless-node-name:cgtp0-diskless-node-name, \
root=nic0-diskless-node-name:nic1-diskless-node-name: \
cgtp-diskless-node-name  /export/swap/diskless-node-name

Rnfs.Share.1=share -F nfs -o rw=nic0-diskless-node-name: \
nic1-diskless-node-name:cgtp0-diskless-node-name, \
root=nic0-diskless-node-name:nic1-diskless-node-name: \
cgtp0-diskless-node-name  /export/root/diskless-node-name
```

3. **Update the `RNFS.Share.0` parameter that is used to share the `/SUNWcgha/local/export` directory to include the *cgtp0-diskless-node-name* of the diskless node.**
4. **Log in to the vice-master node.**
5. **Repeat Step 2 and Step 3 on the vice-master node.**
6. **On the master node, edit the `/etc/dfs/dfstab` file to remove all uncommented lines.**

Starting the Cluster

To integrate the new diskless node into the cluster, delete the `not_configured` file and reboot the master-eligible nodes. When the Solaris Operating System and the Foundation Services have been booted onto the diskless nodes, verify the new configuration before the cluster is restarted.

▼ To Delete the `not_configured` File

The `/export/root/`*diskless-node-name*`/etc/opt/SUNWcgha/not_configured` file is automatically created during the installation of the CMM packages for the diskless node. This file enables you to reboot a cluster node during the installation and configuration process without starting the Foundation Services.

- **After you complete the installation and configuration procedures, but before starting the cluster, delete this file for the diskless node.**

▼ To Boot a Diskless Node

1. **Log in to the master node as superuser.**
2. **Reboot the master node:**

```
# init 6
```

3. **After the master node has completed booting, log in to the vice-master node as superuser.**
4. **Reboot the vice-master node:**

```
# init 6
```

5. **After the vice-master node has completed booting, get the `ok` prompt on the diskless node:**

```
# halt
# Control-C
telnet> send brk
Type 'go' to resume
ok>
```

6. **Set your OpenBoot PROM parameters as follows:**

```
ok> setenv local-mac-address? true
ok> setenv auto-boot-retry? true
ok> setenv diag-switch? false
ok> setenv boot-device net:dhcp,,,,,5 net2:dhcp,,,,,5
```

Note – If you are going to use *client_id* on a Netra CT diskless node, set the `Boot_Devices` environment variable. For more information, see the *Netra CT Server System Administration Guide*.

---

7. **Reboot the diskless node:**

```
ok> boot
```

▼ To Verify the Cluster Configuration

Use the `nhadm` tool to verify that the diskless nodes have been configured correctly and are integrated into the cluster.

1. **Log in to the diskless node as superuser.**
2. **Run the `nhadm` tool to validate the configuration:**

```
# nhadm check
```

If all checks pass the validation, the installation of the Foundation Services software was successful. For more information, see the **nhadm**`(1M)` man page.

CHAPTER 7

Installing the Software on the Dataless Nodes

After you have installed and configured the master-eligible nodes, you can add diskless nodes and dataless nodes to the cluster.

To add a dataless node to the cluster, see the following sections:

Preparing to Install a Dataless Node

Perform the following procedures before installing and configuring a dataless node:

▼ To Connect a Dataless Node to the Cluster

- **To connect a dataless node to a cluster, connect the two Ethernet interfaces of the dataless node to the two switches of the cluster. Connect** *NIC0* **to switch 1 and** *NIC1* **to switch 2.**

  For more information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

Note – The packages and patches that you install on the dataless node might differ depending on the type of hardware you use on the dataless node. For information about the specific patches and packages required for your hardware configuration, see the *Netra High Availability Suite Foundation Services 2.1 7/05 README*.

▼ To Define Disk Partitions on a Dataless Node

- **Create the disk partitions of the dataless node according to the requirements of your cluster.**

  TABLE 7-1 provides the space requirements for example disk partitions of a dataless node in a cluster.

TABLE 7-1 Disk Partition Space Requirements for a Dataless Node

Disk Partition	File System Name	Description	Example Size
0	/	The root file system, boot partition, and volume management software. This partition must be mounted with the `logging` option.	2 Gbytes
1	`/swap`	Minimum size when physical memory is less than 1 Gbyte.	1 Gbyte
2	`overlap`	Entire disk.	Size of entire disk
3	`/mypartition`	For any additional applications.	The remaining space

Installing the Solaris Operating System on a Dataless Node

To install the Solaris Operating System on a dataless node, use the Solaris JumpStart tool. The Solaris JumpStart tool requires the Solaris distribution to be on the installation server. For information about creating a Solaris distribution, see "Preparing the Installation Environment" on page 39.

▼ To Install the Solaris Operating System on a Dataless Node

1. **Log in to the installation server as superuser.**
2. **If not already created, create the Solaris JumpStart environment on the installation server by using the appropriate document for the Solaris release:**
   - *Solaris 8 Advanced Installation Guide*
   - *Solaris 9 Installation Guide*

   At the end of this process, you have a *Jumpstart-dir* directory that contains the Solaris JumpStart files that are needed to install the Solaris Operating System on the node.
3. **In the** `/etc/hosts` **file, add the name and IP addresses of the dataless node.**
4. **In the** `/etc/ethers` **file, add the Ethernet address of the dataless node's network interface that is connected to the same switch as the installation server, for example,** *NIC0***.**
5. **Share the** *Solaris-distribution-dir* **and** *Jumpstart-dir* **directories by adding these lines to the** `/etc/dfs/dfstab` **file:**

   ```
   share -F nfs -o rw Solaris-distribution-dir
   share -F nfs -o rw Jumpstart-dir
   ```

   - *Solaris-distribution-dir* is the directory that contains the Solaris distribution.
   - *Jumpstart-dir* is the directory that contains the Solaris JumpStart files.
6. **Change to the directory where the** `add_install_client` **command is located:**

   ```
   # cd Solaris-dir/Solaris_x/Tools
   ```

   - *Solaris-dir* is the directory that contains the Solaris installation software. This directory could be on a CD-ROM or in an NFS-shared directory.
   - *x* is `8` or `9` depending on the version of the Solaris Operating System you install.
7. **Run the** `add_install_client` **command for each dataless node:**

   ```
   # ./add_install_client -i IP-address \
   -e Ethernet-address \
   -s iserver:Solaris-distribution-dir \
   -c iserver:Jumpstart-dir \
   -p iserver:sysidcfg-dir \
   -n name-service host-name platform-group
   ```

- *IP-address* is the IP address of the dataless node.
- *Ethernet-address* is the Ethernet address of the dataless node.
- *iserver* is the IP address of the installation server for the cluster
- *Solaris-distribution-dir* is the directory that contains the Solaris distribution.
- *Jumpstart-dir* is the directory that contains the Solaris JumpStart files.
- *sysidcfg-dir* is the directory that contains the `sysidcfg` file. This directory is a subdirectory of the *Jumpstart-dir* directory.
- *name-service* is the naming service you would like to use, for example, NIS or NIS+.
- *host-name* is the name of the dataless node.
- *platform-group* is the hardware platform of the dataless node, for example, `sun4u`.

For more details, see the **add_install_client** `(1M)` man page.

8. **Connect to the console of the dataless node.**

9. **At the `ok` prompt, boot the dataless node by using the `net` device alias:**

```
ok> boot net - install
```

If the installation server is connected to the second Ethernet interface, type:

```
ok> boot net2 - install
```

This command installs the Solaris Operating System on the dataless node.

▼ To Install Solaris Patches

After you have completed the Solaris installation, install the necessary Solaris patches. The *Netra High Availability Suite Foundation Services 2.1 7/05 README* contains the list of Solaris patches that you must install, depending on the version of Solaris you installed.

Note – Some of these patches are required for CGTP. If you do not plan to install CGTP, do not install the CGTP patches. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

---

1. **Log in to the dataless node as superuser.**

2. **Mount the directory from the installation server that contains the Solaris patches.**

   See "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.

3. **Install the patches on the dataless node:**

```
# patchadd -M /NetraHASuite/Patches/ patch-name
```

Installing the Foundation Services on a Dataless Node

After the Solaris Operating System has been installed on the dataless node, install the Foundation Services on the dataless node.

The set of services to be installed on the dataless node is a subset of the Foundation Services installed on the master-eligible nodes. Install the packages that are listed as needed for dataless nodes in TABLE 7-2.

TABLE 7-2 Foundation Services Packages for Dataless Nodes

Package Name	Package Description
SUNWnhadm	Cluster administration tool
SUNWnhhb	Probe heartbeat module
SUNWnhcmd	CMM developer package (.h and .so files)
SUNWnhcma	CMM binaries
SUNWnhcmb	CMM binaries
SUNWnhcdt	Trace library
SUNWnhtp8 or SUNWnhtp9	CGTP kernel drivers and modules
SUNWnhtu8 or SUNWnhtu9	CGTP user-space components, configuration scripts, and files
SUNWnhmas	NMA configuration and startup script
SUNWnhsafclm	SAF CLM Service API
SUNWnhpma	Daemon monitor /opt file system
SUNWnhpmb	Daemon monitor root file system
SUNWnhpms	Daemon monitor scripts
SUNWnhpmm	Daemon monitor driver
SUNWjsnmp	Java DMK 5.0 SNMP manager API classes

TABLE 7-2 Foundation Services Packages for Dataless Nodes *(Continued)*

Package Name	Package Description
SUNWlomr	LOM package required if you install the Watchdog Timer
SUNWlomu	LOM package required if you install the Watchdog Timer
SUNWnhwdt	Watchdog Timer

▼ To Install the Foundation Services

1. **Mount the installation server directory on the dataless node as described in "To Mount an Installation Server Directory on the Master-Eligible Nodes" on page 49.**
2. **Install the packages by using the `pkgadd` command:**

```
# pkgadd -d /NetraHASuite/Packages/ package-name
```

where `/NetraHASuite/Packages` is the installation server directory that is mounted on the dataless node.

CGTP enables a redundant network for your cluster.

Note – If you do not require CGTP, do not install the CGTP packages. For more information about the impact of not installing CGTP, see "Choosing a Cluster Network" on page 42.

Configuring the Foundation Services on a Dataless Node

The following procedures explain how to configure the Foundation Services on a dataless node.

▼ To Configure a Dataless Node

1. **Create a `/etc/notrouter` file:**

```
# touch /etc/notrouter
```

   Because the cluster network is not routable, the dataless nodes must be disabled as routers.

2. **Modify the `/etc/default/login` file so you can connect to the node from a remote system as superuser:**

```
# mv /etc/default/login /etc/default/login.orig
# chmod 644 /etc/default/login.orig
# sed '1,$s/^CONSOLE/#CONSOLE/' /etc/default/login.orig >
/etc/default/login
# chmod 444 /etc/default/login
```

3. **Disable power management:**

```
# touch /noautoshutdown
```

4. **Modify the `.rhosts` file according to the security policy for your cluster:**

```
# cp /.rhosts /.rhosts.orig
# echo "+ root" > /.rhosts
# chmod 444 /.rhosts
```

5. **Set the boot parameters:**

```
# /usr/sbin/eeprom local-mac-address?=true
# /usr/sbin/eeprom auto-boot?=true
# /usr/sbin/eeprom diag-switch?=false
```

6. **If using the Network Time Protocol (NTP) to run an external clock, configure the dataless node as an NTP server.**

   This procedure is described in the Solaris documentation.

▼ To Configure an External IP Address

To configure external IP addresses for a dataless node, the node must have an extra physical network interface or logical network interface. A physical network interface is an unused interface on an existing Ethernet card or a supplemental HME or QFE Ethernet card, for example, `hme2`. A logical network interface is an interface configured on an existing Ethernet card, for example, `hme1:101`.

- **Configure an external IP address for the extra network interface based on your public network policy.**

▼ To Update the Network Files on a Dataless Node

1. **Log in to the dataless node as superuser.**

   As for the master-eligible nodes, three IP addresses are configured for each dataless node:

   - The IP address for the first network interface, *NIC0*
   - The IP address for the second network interface, *NIC1*
   - The IP address for the virtual network interface, `cgtp0`

   The IP addresses can be IPv4 addresses of any class. However, the *nodeid* that you later define in the `cluster_nodes_table` file and the `nhfs.conf` file must be a decimal representation of the host part of the node's IP address. For information about the files, see "To Create the `nhfs.conf` File for a Dataless Node" on page 123 and "To Update the Cluster Node Table" on page 127.

2. **Create or update the file `/etc/hostname.`*NIC0* for the *NIC0* interface.**

   This file must contain the cluster network name of the dataless node on the second interface, for example, `netraDATALESS1-nic0`.

3. **Create or update the file `/etc/hostname.`*NIC1* for the *NIC1* interface.**

   This file must contain the cluster network name of the master-eligible node on the second interface, for example, `netraDATALESS1-nic1`.

4. **Create or update the file `/etc/hostname.cgtp0` for the `cgtp0` interface.**

   This file must contain the cluster network name of the dataless node on the `cgtp0` interface, for example, `netraDATALESS1-cgtp`.

5. **In the `/etc/hosts` file, add the IP address and node name for the *NIC0*, *NIC01*, and `cgtp0` network interfaces of all the nodes in the cluster:**

```
127.0.0.1    localhost
10.250.1.10 netraMEN1
10.250.2.10 netraMEN1-nic1
10.250.3.10 netraMEN1-cgtp
```

```
10.250.1.20 netraMEN2
10.250.2.20 netraMEN2-nic1
10.250.3.20 netraMEN2-cgtp

10.250.1.30 netraDATALESS1-nic0 loghost
netraDATALESS1.localdomain
10.250.2.30 netraDATALESS1-nic1 netraDATALESS1-nic1.localdomain
10.250.3.30 netraDATALESS1-cgtp netraDATALESS1-cgtp.localdomain

10.250.1.1 master
10.250.2.1 master-nic1
10.250.3.1 master-cgtp
```

6. **Update the** `/etc/nodename` **file with the name corresponding to the address of one of the network interfaces, for example,** `netraDATALESS1-cgtp`**.**

7. **Create the** `/etc/netmasks` **file by adding one line for each subnet on the cluster:**

```
10.250.1.0    255.255.255.0
10.250.2.0    255.255.255.0
10.250.3.0    255.255.255.0
```

▼ To Create the `nhfs.conf` File for a Dataless Node

1. **Log in to the dataless node as superuser.**

2. **Create the** `nhfs.conf` **file for the dataless node:**

```
# cp /etc/opt/SUNWcgha/nhfs.conf.template
/etc/opt/SUNWcgha/nhfs.conf
```

3. **Edit the `nhfs.conf` file to suit your cluster configuration.**

   An example file for a dataless node on a cluster with the domain ID `250`, with network interfaces `eri0`, `eri1`, and `cgtp0` would be as follows:

```
Node.NodeId=40
Node.NIC0=eri0
Node.NIC1=eri1
Node.NICCGTP=cgtp0
Node.UseCGTP=True
Node.Type=Dataless
Node.DomainId=250
CMM.IsEligible=False
CMM.LocalConfig.Dir=/etc/opt/SUNWcgha
```

   Choose a unique *nodeid* and unique node name for the dataless node. To view the *nodeid* of each node already in the cluster, see the `/etc/opt/SUNWcgha/cluster_nodes_table` file on the master node. For more information, see the **nhfs.conf** `(4)` man page.

   If you have not installed the CGTP patches and packages, do the following:

   - Disable the `Node.NIC1` and `Node.NICCGTP` parameters.

     To disable these parameters, add a comment mark (#) at the beginning of the line containing the parameter if this mark is not already present.

   - Configure the `Node.UseCGTP` and the `Node.NIC0` parameters:
     - `Node.UseCGTP=False`
     - `Node.NIC0=`*interface-name*

       where *interface-name* is the name of the *NIC0* interface, for example, `hme0`, `qfe0`, or `eri0`.

   To enable the Watchdog Timer, you must modify the `nhfs.conf` file. The Watchdog Timer can be configured differently on each node according to your requirements. For more information, see the **nhfs.conf** `(4)` man page.

▼ To Set Up File Systems for a Dataless Node

Update the `/etc/vfstab` file in the dataless node's root directory to add the NFS mount points for master node directories that contain middleware data and services.

1. **Log in to a dataless node as superuser.**
2. **Edit the entries in the `/etc/vfstab` file.**

- If you have configured the CGTP, replace the host name of the master node with the host name associated with the floating IP address for the `cgtp0` interface that is assigned to the master role, for example, `master-cgtp`.
- If you have not configured the CGTP, replace the host name of the master node with the host name associated with the floating IP address for the *NIC0* interface that is assigned to the master role, for example, `master-nic0`.

For more information about floating addresses of the master nodes, see "To Create the Floating Address Triplet Assigned to the Master Role" on page 64.

3. **Define the mount points** `/SUNWcgha/remote`**,** `SUNWcgha/services`**, and** `/SUNWcgha/swdb`**:**

   - If you have configured the CGTP, use the floating IP address for the `cgtp0` interface that is assigned to the master role to define the mount points:

```
master-cgtp:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote        nfs     -       yes     rw,hard,fg,intr

master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2/opt -     \
/SUNWcgha/services      nfs     -       yes     rw,hard,fg,intr

master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2 -     \
/SUNWcgha/swdb  nfs     -       yes     rw,hard,fg,intr
```

   - If you have not configured the CGTP, use the floating IP address for the *NIC0* interface that is assigned to the master role:

```
master-nic0:/SUNWcgha/local/export/data -       \
/SUNWcgha/remote        nfs     -       yes     rw,hard,fg,intr

master-nic0:/SUNWcgha/local/export/services/ha_2.1.2/opt - \
/SUNWcgha/services      nfs     -       yes     rw,hard,fg,intr

master-nic0:/SUNWcgha/local/export/services/ha_2.1.2 -     \
/SUNWcgha/swdb  nfs     -       yes     rw,hard,fg,intr
```

All file systems that you mount by using NFS must be mounted with the options `fg`, `hard`, and `intr`. You can also set the `noac` mount option, which suppresses data and attribute caching. Use the `noac` option only if the impact on performance is acceptable.

Note – Do not use IP addresses in the `/etc/vfstab` file for the dataless node. Instead, use logical host names. Otherwise, the `pkgadd -R` command fails and return the following message:

```
WARNING: cannot install to or verify on master_ip>
```

4. **Create the mount points `/SUNWcgha/remote`, `/SUNWcgha/services`, and `/SUNWcgha/swdb`:**

```
# mkdir -p SUNWcgha/remote
# mkdir -p SUNWcgha/services
# mkdir -p SUNWcgha/swdb
```

5. **Repeat Step 1 through Step 4 for all dataless nodes in the cluster.**

Integrating a Dataless Node Into the Cluster

The following procedures explain how to integrate a dataless node into the cluster:

▼ To Update the `/etc/hosts` Files on Each Peer Node

1. **Log in to the master node as superuser.**
2. **Edit the `/etc/hosts` file to add the following lines:**

```
IP-address-NIC0  nic0-dataless-node-name
IP-address-NIC1  nic1-dataless-node-name
IP-address-cgtp0  cgtp0-dataless-node-name
```

This modification enables the master node to "see" the network interfaces of the dataless node.

3. **Log in to the vice-master node as superuser.**
4. **Repeat Step 2.**

   This modification enables the vice-master node to "see" the three network interfaces of the dataless node.
5. **Log in to a dataless node that is part of the cluster, if a dataless node already exists.**
6. **Repeat Step 2.**

   This modification enables the dataless node to "see" the three network interfaces of the dataless node.
7. **Repeat Step 5 and Step 6 on all other diskless and dataless nodes that are already part of the cluster.**

▼ To Update the Cluster Node Table

1. **Log in to the master node as superuser.**
2. **Edit the `cluster_nodes_table` file on the master node with the node information for a dataless node:**

```
#NodeId Domain_id Name Attributes
nodeid domainid dataless-node-name -
```

   The nodeid that you define in the `cluster_nodes_table` file must be the decimal representation of the host part of the node's IP address. For more information about the `cluster_nodes_table` file, see the **cluster_nodes_table**`(4)` man page.
3. **Create the cluster_nodes_table file on the master node disk:**

```
# /opt/SUNWcgha/sbin/nhcmmstat -c reload
```

4. **Repeat Step 2 for each dataless node you are adding to the cluster.**

Starting the Cluster

To integrate the dataless node into the cluster, delete the `not_configured` file and reboot all the nodes. After the nodes have completed booting, verify the configuration before the cluster is restarted.

▼ To Delete the `not_configured` File

During the installation of the CMM packages, the `/etc/opt/SUNWcgha/not_configured` file is automatically created. This file enables you to reboot a cluster node during the installation and configuration process without starting the Foundation Services.

- **After you have completed installing and configuring the software on the dataless node, delete this file before starting the cluster.**

▼ To Start the Cluster

1. **As superuser, reboot the master node:**

```
# init 6
```

2. **After the master node has completed rebooting, reboot the vice-master node as superuser:**

```
# init 6
```

3. **After the vice-master node has completed rebooting, boot the master-ineligible nodes as superuser:**

```
# init 6
```

▼ To Verify the Cluster Configuration

Use the `nhadm` tool to verify that the dataless nodes have been configured correctly and are integrated into the cluster.

1. **Log in to the dataless node as superuser.**
2. **Run the `nhadm` tool to validate the configuration:**

```
# nhadm check starting
```

If all checks pass the validation, the installation of the Foundation Services was successful. For more information, see the **nhadm**`(1M)` man page.

CHAPTER 8

Adding a Diskless or Dataless Node to a Cluster

This chapter describes two different methods for adding a non-master-eligible node to a cluster:

Adding a Diskless or Dataless Node to a Cluster Originally Created Using the `nhinstall` Tool

There are two ways that you can add a diskless node or a dataless node to a cluster that was originally created using the `nhinstall` tool:

Adding a Diskless Node or a Dataless Node By Using the `nhinstall` Tool

To add a node to the cluster, you must first determine whether the cluster has predefined nodes. A predefined node is a node that you defined when you originally created the cluster, but this node was not physically connected to the cluster. For instructions on how to check whether your cluster has predefined nodes, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Cluster Administration Guide*.

If your cluster does not have predefined nodes and you want to add new diskless nodes or dataless nodes to the cluster, you can use the `nhinstall add` command to do so.

▼ To Add a Predefined Diskless Node or Dataless Node to the Cluster

1. **Verify that the hardware of the new node is supported for your cluster configuration.**

   For information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

2. **Verify that after adding the node, your cluster has a recommended configuration.**

   For information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

3. **Physically connect the node to the cluster.**

   For information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

4. **If the node is a diskless node, configure the OBP parameters:**

```
ok> setenv local-mac-address ? true
ok> setenv auto-boot-retry? true
ok> setenv diag-switch? false
ok> setenv boot-device net:dhcp,,,,,5 net2:dhcp,,,,,5
```

Note – If you are going to use *client_id* on a Netra CT diskless node, set the `Boot_Devices` environment variable. For more information, see the *Netra CT Server System Administration Guide*.

---

5. **Boot the node:**

```
# init 6
```

▼ To Add a New Diskless Node or Dataless Node to the Cluster

1. **Confirm that the cluster was originally created using the `nhinstall` tool.**

   For information, see *Netra High Availability Suite Foundation Services 2.1 7/05 Cluster Administration Guide*.

2. **Log in to the master node as superuser.**

3. **If the node you are adding to the cluster is a diskless node, verify that there is a Solaris environment for diskless nodes.**

   The Solaris environment for diskless nodes exists if there is a directory called `/export/`*os*, where *os* is `Solaris_8` or `Solaris_9`.

   If the Solaris environment does not exist for diskless nodes, install it as described in Chapter 6.

4. **Verify that the Foundation Services are running:**

```
# /opt/SUNWcgha/sbin/nhcmmstat -c all
```

   This command returns the status of all nodes in the cluster.

5. **Confirm that the `cluster_definition.conf`, `env_installation.conf`, and `addon.conf` files are present on the installation server, and that they conform to the original installation.**

6. **On the installation server, edit the** `cluster_definition.conf` **file to define the node that you want to add.**

   For example, on a cluster containing two master-eligible nodes, `MEN=10` and `MEN=20`, add a diskless node, `DISKLESS=30`.

```
MEN=10 08:00:20:f9:c5:54 - node10
MEN=20 08:00:20:f9:a8:12 - node20
DISKLESS=30 - - node30
```

   For a cluster containing two master-eligible nodes, `MEN=10` and `MEN=20`, add a dataless node, `DATALESS=30`.

```
MEN=10 08:00:20:f9:c5:54 - node10
MEN=20 08:00:20:f9:a8:12 - node20
DATALESS=30 08:00:20:f9:c3:ae - node30
```

   To add more than one node, define each node that you want to add.

   If you add a new node or nodes to your cluster, make sure that configuration of your cluster confirms with the recommended configurations. For information about cluster configurations, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

   Ensure that the node ID of the new node is unique and does not already exist in the `cluster_nodes_table` file on the master node.

   When you have a running cluster, do not edit any other parameters in the `cluster_definition.conf` file. For information, see the **cluster_definition.conf**`(4)` man page.

7. **Remove the temporary installation files on the installation server before you add a new node to the cluster:**

```
# nhinstall -r config-file-directory reset
```

8. **On the installation server, add the new node:**

```
# nhinstall -r config-file-directory add nodeid30 [ nodeid40 ...]
```

where *nodeid30* is the node ID of the first new diskless node that you want to add.

To add more than one node, specify the node ID of each new node [*nodeid40 nodeid50* ...].

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

Note – Do not add more nodes to the `cluster_definition.conf` file than you are going to add to the cluster with the `nhinstall add` command.

---

9. **Connect the Ethernet interfaces (*NIC0* and *NIC1*) of the new node to the switches.**

10. **Access the console of the new node and get the `ok` prompt:**

```
# Control-]
telnet> send brk
Type  'go' to resume
ok>
```

11. **If the new node is a diskless node, configure the OBP parameters:**

```
ok> setenv local-mac-address? true
ok> setenv auto-boot-retry? true
ok> setenv boot-device net:dhcp,,,,,5 net2:dhcp,,,,,5
ok> setenv diag-switch? false
```

Note – If you are going to use *client_id* on a Netra CT diskless node, set the `Boot_Devices` environment variable. For more information, see the *Netra CT Server System Administration Guide*.

---

12. **Boot the new node:**

```
ok> boot
```

13. **Become superuser.**

14. **Verify that the node is configured correctly:**

```
# nhadm check
```

Manually Adding a Diskless Node or a Dataless Node

If your cluster was originally created using the `nhinstall` tool, you can add a diskless node or a dataless node using manual installation procedures.

To manually add a diskless node to a cluster, see Chapter 6. To manually add a dataless node to a cluster, see Chapter 7. When you complete the procedures described in these chapters, your cluster configuration should be identical to that of a cluster created using the `nhinstall` tool.

Adding a Diskless or Dataless Node to a Manually Created Cluster

This section describes how to add a diskless or dataless node to a cluster that was originally created manually.

▼ To Add a Diskless or Dataless Node

1. **Verify that the hardware of the new node is supported.**

   For information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

2. **Verify that after adding the node, your cluster configuration will be supported.**

   For information, see the *Netra High Availability Suite Foundation Services 2.1 7/05 Hardware Guide*.

3. **Verify that the new node has a unique node ID and name.**

   For a list of IDs and names of the nodes in the cluster, see the `cluster_nodes_table` file on the master node.

4. **Verify which packages and patches are to be installed.**

   For information about the patches and packages required for your hardware configuration, see *Netra High Availability Suite Foundation Services 2.1 7/05 README*.

5. **Verify that the master node and vice-master node are running the Foundation Services.**

   The configuration information is written to the master node and replicated to the vice-master node.

   a. **Log in to the master node as superuser.**

   b. **Verify that the Foundation Services are running:**

```
# /opt/SUNWcgha/sbin/nhcmmstat -c all
```

   This command returns the status of all nodes in the cluster.

6. **Add the node:**

   - To add a diskless node, use the procedure in Chapter 6.
   - To add a dataless node, use the procedure in Chapter 7.

7. **Update the network topology map to include the new node.**

   For information, see "Examining the Cluster Networking Configuration" in *Netra High Availability Suite Foundation Services 2.1 7/05 Cluster Administration Guide*.

CHAPTER 9

Upgrading the Cluster

To successfully upgrade the cluster, the procedures described in this chapter assume the following:

- You have a cluster that is running the Foundation Services 2.1.
- You do not change the hardware configuration.
- You do not change the software configuration, that is, the version of the Solaris Operating System, the volume management configuration, or the boot policy.
- You do not change the cluster addressing model of the cluster.

If these assumptions are correct, see the following sections to start upgrading your cluster:

- "Preparing the Installation Server" on page 139"
- "Rolling Upgrade for a Cluster From Netra HA Suite 2.1 6/03 to 2.1 7/05" on page 141"

If these assumptions cannot be fulfilled, reinstall the cluster. For instructions, see one of the following:

- To reinstall using the `nhinstall` tool, see Chapter 2 and Chapter 3.
- To reinstall manually, see Chapter 4 through Chapter 7.

Preparing the Installation Server

▼ To Prepare the Installation Server

1. **Log in to your installation server as superuser.**

2. **Check that the installation server is connected to the cluster network.**

   For more information, see "To Connect the Installation Server to the Cluster Network" on page 38.

3. **Check that the `mountd` and `nfsd` daemons are running on the installation server.**

   For example, use the `ps` command:

```
# ps -ef | grep mountd
root 184 1 0 Aug 03 ? 0:01 /usr/lib/autofs/automountd
root 290 1 0 Aug 03 ? 0:00 /usr/lib/nfs/mountd
root 2978 2974 0 17:40:34 pts/2 0:00 grep mountd
#
# ps -ef | grep nfsd
root 292 1 0 Aug 03 ? 0:00 /usr/lib/nfs/nfsd -a 16
root 2980 2974 0 17:40:50 pts/2 0:00 grep nfsd
#
```

   If a process ID is not returned for the `mountd` and `nfsd` daemons, start the NFS daemons:

```
# /usr/etc/inid.d/nfs.server start
```

4. **Add the following line to the `/etc/dfs/dfstab` file to share the directory containing the software distributions for the Foundation Services 2.1 7/05 release and the Solaris Operating System:**

```
share -F nfs -o ro,anon=0 software-distribution-dir
share -F nfs -o ro,anon=0 Solaris-distribution-dir
```

   - *software-distribution-dir* is the directory that contains the Foundation Services 2.1 7/05 packages.
   - *Solaris-distribution-dir* is the directory that contains the Solaris distribution.

5. **Share the directories defined in the `/etc/dfs/dfstab` file:**

```
# shareall
```

6. **Log into every cluster node as superuser and create the mount point directory NetraHASuite:**

```
# mkdir /NetraHASuite
```

Rolling Upgrade for a Cluster From Netra HA Suite 2.1 6/03 to 2.1 7/05

The upgrade is done one node at a time, so that the cluster never stops providing service.

▼ To Upgrade the Cluster

The following steps describe the whole procedure. They are described in more detail below.

1. **Upgrade the diskless nodes one by one, as described in "To Upgrade a Diskless Node" on page 142.**

   The rest of the nodes go on providing services.

2. **Upgrade the dataless nodes one by one, as described in "To Upgrade a Dataless Node" on page 146.**

   The rest of the nodes go on providing services.

3. **If you use a serial cable, unplug it.**

   A new protocol was implemented which is incompatible with the old one.

4. **Update one master eligible node, as described in "To Upgrade a Master-Eligible Node" on page 150.**

5. **Update the other master eligible node, as described in "To Upgrade a Master-Eligible Node" on page 150.**

6. **If you use a serial cable, plug it in again.**

7. **Wait for the synchronization to finish.**

   Use the following command to see the synchronization status, and wait until it reads `READY`:

   ```
   # /opt/SUNWcgha/sbin/nhcmmstat -c master
   ```

8. **If you use the Node Management Agent, upgrade it as described in "To Upgrade the Node Management Agent" on page 158.**

▼ To Upgrade a Diskless Node

This procedure is to be executed on every diskless node, one by one.

1. **Log in to the node as superuser.**

2. **List the installed packages**:

TABLE 9-1 Installed Packages List

```
# /opt/SUNWcgha/sbin/nhadm check installation

OS and Software checking

 64-bit kernel mode                          OK
 OS release                                  OK

Local packages

 Package SUNWnhtp9                           OK
 Package SUNWnhtu9                           OK
 Package SUNWnhadm                           OK
 Package SUNWnhcdt                           OK
 Package SUNWnhcmd                           OK
 Package SUNWnhcma                           OK
 Package SUNWnhcmb                           OK
 Package SUNWnhpma                           OK
 Package SUNWnhpmb                           OK
 Package SUNWnhpmn                           OK
 Package SUNWnhpms                           OK
 Package SUNWnhmas                           OK
 Package SUNWnhsms                           OK

Shared packages (on /SUNWcgha/swdb)

 Package SUNWjdrt                            OK
 Package SUNWnhmaj                           OK
 Package SUNWnhmal                           OK
 Package SUNWnhmad                           OK

Patches
Can take a long time ...

 Patch 112233-03                             OK
 Patch 112902-06                             OK
 Patch 112904-01                             OK
 Patch 112917-01                             OK
 Patch 112918-01                             OK
 Patch 112919-01                             OK
 INST_RELEASE file for shared packages       OK
```

Keep the list of packages under the "Local Packages" title. This is the list of packages installed in the node.

3. **Stop the node.**

```
# sync
# uadmin 1 0
```

4. **Log in to the master node as superuser.**

5. **Mount the Netra HA Suite 2.1 7/05 distribution on** `/NetraHASuite`**.**

```
# mount -F nfs installation-server-IP-address:/software-distribution-dir\
/NetraHASuite
```

installation-server-IP-address is the IP address of the cluster network interface that is connected to the installation server.

software-distribution-dir is the directory that contains the Foundation Services 2.1 7/05 packages.

6. **Remove the old local packages.**

The following command is an example: that includes all possible affected packages. Some of them might not be installed in your system. Do not try to remove packages that are not installed. To know which packages are actually installed, use the list generated in Step 2. The packages that must be removed are those listed both in the example and in the list generated in Step 2. Be careful to replace the *diskless-node-name* tag with the name of the current node.

```
# pkgrm -R /export/root/diskless-node-name \
SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma SUNWnhcmb \
SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb SUNWnhpmm SUNWnhpmn \
SUNWnhpms SUNWnhmas
```

7. **Install the new packages.**

   Install only the packages you had already installed for the previous version of the software. For this list of packages, refer to the list generated in Step 2. The following command should be considered an example.

   Be careful to replace the *version* tag in the path with the Solaris version you are using, and the *diskless-node-name* tag with the name of the current node.

```
# pkgadd -M -R /export/root/diskless-node-name \
-d /NetraHASuite/Product/NetraHASuite_2.1.2/\
FoundationServices/Solaris_version/sparc/Packages \
SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma \
SUNWnhcmb SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb \
SUNWnhpmm SUNWnhpmn SUNWnhpms SUNWnhmas
```

   Do not worry about dependencies on Solaris packages. They are already installed but momentarily inaccessible.

8. **Update the Minimal Configuration File:**

```
/export/root/diskless-node-name/etc/opt/SUNWcgha/target.conf
```

   being sure to replace *diskless-node-name* with the correct value. Add the line `VERSION : 2` at the beginning of the file. The file should now look like this:

```
VERSION : 2
domain_id: 1                    # Cluster domain_id
attributes : -                  # Local nodes attributes
election : 0                    # Election round number
role : NONE                     # Previous role
```

9. **Configure the Boot Process.**

Note – Skip this step if you use Netra HA Suite 2.1 6/03 Patch 3, 4 or 5.

   Replace *NIC0* and *NIC1* with the actual names of the interfaces mentioned in the file `/etc/opt/SUNWcgha/nhfs.conf`:

```
Node.Nic0=hme0
Node.Nic1=hme1
```

a. Empty the following files by deleting all text in them:

```
/export/root/diskless-node-name/etc/hostname.NIC0
/export/root/diskless-node-name/etc/hostname.NIC1
```

Be sure to replace *diskless-node-name* with the correct value.

b. Create the following empty files:

```
/etc/dhcp.NIC0
/etc/dhcp.NIC1
```

10. Rejoin the cluster.

a. Remove the `not_configured` file so that Netra HA Suite starts when the node is booted.

```
# rm /export/root/diskless-node-name/etc/opt/\
SUNWcgha/not_configured
```

b. Boot the diskless node from the OpenBoot prompt:

```
ok> boot
```

11. Check the node.

Once the node has booted, log in to the node as superuser and run the following command to verify that everything went well. If not, check that all previous steps were executed correctly:

```
# /opt/SUNWcgha/sbin/nhadm check
```

▼ To Upgrade a Dataless Node

This procedure is to be executed on every dataless node, one by one.

1. Log in to the node as superuser.

2. **List the installed packages:**

```
# /opt/SUNWcgha/sbin/nhadm check installation
```

Output similar to the following is produced:

TABLE 9-2 Installed Packages List

```
# /opt/SUNWcgha/sbin/nhadm check installation

OS and Software checking

 64-bit kernel mode                        OK
 OS release                                OK

Local packages

 Package SUNWnhtp9                         OK
 Package SUNWnhtu9                         OK
 Package SUNWnhadm                         OK
 Package SUNWnhcdt                         OK
 Package SUNWnhcmd                         OK
 Package SUNWnhcma                         OK
 Package SUNWnhcmb                         OK
 Package SUNWnhpma                         OK
 Package SUNWnhpmb                         OK
 Package SUNWnhpmn                         OK
 Package SUNWnhpms                         OK
 Package SUNWnhmas                         OK
 Package SUNWnhsms                         OK

Shared packages (on /SUNWcgha/swdb)

 Package SUNWjdrt                          OK
 Package SUNWnhmaj                         OK
 Package SUNWnhmal                         OK
 Package SUNWnhmad                         OK

Patches
Can take a long time ...

 Patch 112233-03                           OK
 Patch 112902-06                           OK
 Patch 112904-01                           OK
 Patch 112917-01                           OK
```

TABLE 9-2 *(Continued)*Installed Packages List

```
Patch 112918-01                              OK
Patch 112919-01                              OK
INST_RELEASE file for shared packages        OK
```

Keep the list of packages under the "Local Packages" title. This is the list of packages installed in the node.

3. **Take the node out of the cluster.**

   To work around BugID 6269249, "Dataless nodes cannot boot when the `not_configured` file is present", edit the `/etc/vfstab` file and set the flag `mount at boot` to `no` for all the lines beginning with `master-cgtp:`

   Create the `not_configured` file and reboot:

```
# touch /etc/opt/SUNWcgha/not_configured
# sync
# uadmin 1 1
```

4. **Once the node has booted, log in as superuser.**

5. **Mount the Netra HA Suite 2.1 7/05 distribution on** `/NetraHASuite`**.**

```
# mount -F nfs installation-server-IP-address:/software-distribution-dir\
/NetraHASuite
```

   installation-server-IP-address is the IP address of the cluster network interface that is connected to the installation server.

   software-distribution-dir is the directory that contains the Foundation Services 2.1 7/05 packages.

6. **Remove the old local packages.**

   The following command is an example: that includes all possible affected packages. Some of them might not be installed in your system. Do not try to remove packages that are not installed. To know which packages are actually installed, use the list generated in Step 2. The packages that must be removed are those listed both in the example and in the list generated in Step 2. Be careful to replace the *diskless-node-name* tag with the name of the current node.

```
# pkgrm SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma \
SUNWnhcmb SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb SUNWnhpmm \
SUNWnhpmn SUNWnhpms SUNWnhmas
```

7. **Install the new packages.**

   Install only the packages you had already installed for the previous version of the software. For this list of packages, refer to the list generated in Step 2. The following command should be considered an example.

   Be careful to replace the *version* tag in the path with the Solaris version you are using.

```
# pkgadd -M -d /NetraHASuite/Product/NetraHASuite_2.1.2/\
FoundationServices/Solaris_version/sparc/Packages \
SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma \
SUNWnhcmb SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb \
SUNWnhpmm SUNWnhpmn SUNWnhpms SUNWnhmas
```

8. **Update the Minimal Configuration File:**

```
/etc/opt/SUNWcgha/target.conf
```

   Add the line `VERSION : 2` at the beginning of the file. The file should now look like this:

```
VERSION : 2
domain_id: 1                    # Cluster domain_id
attributes : -                  # Local nodes attributes
election : 0                    # Election round number
role : NONE                     # Previous role
```

9. **Update the hostname files.**

   The files to be updated are:

```
/etc/hostname.NIC0
/etc/hostname.NIC1
/etc/hostname.cgtp0
```

   Replace *NIC0* and *NIC1* with the actual names of the interfaces mentioned in the file `/etc/opt/SUNWcgha/nhfs.conf`.

   There is only one line in the files with the node name. Add the following text to this line :

```
netmask + broadcast + -failover up
```

10. **Configure the External Addresses.**

Note – If you do not have an external address configured, skip this step.

The configuration can be found in a file named `/etc/hostname.`*NICX*`:`*Y* where *X* and *Y* are numbers. This contains the external node name.

a. **Edit the file** `/etc/hostname.`*NICX* **(which you might have updated in the previous steps) and add the following line:**

```
addif external node name netmask + broadcast + -failover up
```

For example:

```
netraDataless2-cgtp netmask + broadcast + -failover up
addif extNode2 netmask + broadcast + -failover up
```

b. **Delete the file** `/etc/hostname.`*NICX:Y*.

11. **Rejoin the Cluster.**

Undo the workaround done in Step 3. In the `/etc/vfstab` file, reset the flag `mount at boot` to `yes` for all the lines beginning with `master-cgtp:`.

Remove the `not_configured` file and reboot the node:

```
# rm /etc/opt/SUNWcgha/not_configured
# sync
# reboot
```

12. **Check the node.**

Once the node has booted, log in to the node as superuser and run the following command to verify that everything went well. If not, check that all previous steps were executed correctly:

```
# /opt/SUNWcgha/sbin/nhadm check
```

▼ To Upgrade a Master-Eligible Node

1. **Log in to the node as superuser.**

2. Unplug the serial cable if it is the first MEN that you upgrade.

3. **List the installed packages:**

```
# /opt/SUNWcgha/sbin/nhadm check installation
```

Output similar to the following is produced:

TABLE 9-3 Installed Packages List

```
OS and Software checking

 64-bit kernel mode                     OK
 OS release                             OK

Local packages

 Package SUNWnhtp9                      OK
 Package SUNWnhtu9                      OK
 Package SUNWnhadm                      OK
 Package SUNWnhcdt                      OK
 Package SUNWnhcmd                      OK
 Package SUNWnhcma                      OK
 Package SUNWnhcmb                      OK
 Package SUNWscmr                       OK
 Package SUNWscmu                       OK
 Package SUNWspsvr                      OK
 Package SUNWspsvu                      OK
 Package SUNWrdcr                       OK
 Package SUNWrdcu                       OK
 Package SUNWnhfsa                      OK
 Package SUNWnhfsb                      OK
 Package SUNWnhpma                      OK
 Package SUNWnhpmb                      OK
 Package SUNWnhpmn                      OK
 Package SUNWnhpms                      OK
 Package SUNWnhnsa                      OK
 Package SUNWnhnsb                      OK
 Package SUNWj3rt                       OK
 Package SUNWnhmas                      OK
 Package SUNWjsnmp                      OK
 Package SUNWnhrbb                      OK
 Package SUNWnhrbs                      OK
 Package SUNWnhsms                      OK

Shared packages (on /SUNWcgha/swdb)
```

TABLE 9-3 *(Continued)*Installed Packages List

```
 Package SUNWjdrt                          OK
 Package SUNWnhmaj                         OK
 Package SUNWnhmal                         OK
 Package SUNWnhmad                         OK

Patches
Can take a long time ...

 Patch 112233-03                           OK
 Patch 112902-06                           OK
 Patch 112904-01                           OK
 Patch 112917-01                           OK
 Patch 112918-01                           OK
 Patch 112919-01                           OK
 INST_RELEASE file for shared packages     OK
```

Take note of the list of packages under the "Local Packages" title. This is the list of packages installed in the node. Also take note of the list of patches installed on the node. You will need these lists of packages and patches in later steps.

4. **Be sure the node is not the master node.**

   To know the role of the node, type:

```
# /opt/SUNWcgha/sbin/nhcmmrole -v
nhcmmrole: current role MASTER
```

   If the node is master, trigger a switchover:

```
# /opt/SUNWcgha/sbin/nhcmmstat -c so
```

5. **Prevent Netra HA Suite from launching and reboot.**

```
# touch /etc/opt/SUNWcgha/not_configured
# sync
# uadmin 1 1
```

6. **Mount the Netra HA Suite 2.1 7/05 distribution on** `/NetraHASuite`**.**

```
# mount -F nfs installation-server-IP-address:\
/software-distribution-dir/NetraHAS2.1 /NetraHASuite
```

installation-server-IP-address is the IP address of the cluster network interface that is connected to the installation server.

software-distribution-dir is the directory that contains the Foundation Services 2.1 7/05 packages.

7. **Remove the old local packages.**

The following command is an example: do not try to remove packages that are not installed. To know which packages are actually installed, use the list generated in Step 3.

```
# pkgrm SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma \
SUNWnhcmb SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb SUNWnhpmm \
SUNWnhpmn SUNWnhpms SUNWnhmas SUNWscmr SUNWscmu SUNWspsvr \
SUNWspsvu SUNWrdcr SUNWrdcu SUNWnhfsa SUNWnhfsb SUNWnhnsa \
SUNWnhnsb SUNWjsnmp SUNWnhrbb SUNWnhrbs
```

8. **Install the new packages.**

Install only the packages you had already installed for the previous version of the software. For this list of packages, refer to the list generated in Step 3. The following command should be considered an example.

Be careful to replace the *version* tag in the path with the Solaris version you are using.

```
# pkgadd -M -d /NetraHASuite/Product/NetraHASuite_2.1.2/\
FoundationServices/Solaris_version/sparc/Packages \
SUNWnhadm SUNWnhtp9 SUNWnhtu9 SUNWnhcdt SUNWnhcma \
SUNWnhcmb SUNWnhcmd SUNWnhhb SUNWnhpma SUNWnhpmb \
SUNWnhpmm SUNWnhpmn SUNWnhpms SUNWnhmas SUNWscmr \
SUNWscmu SUNWspsvr SUNWspsvu SUNWrdcr SUNWrdcu \
SUNWnhfsa SUNWnhfsb SUNWnhnsa SUNWnhnsb SUNWnhmas \
SUNWjsnmp SUNWnhrbb SUNWnhrbs SUNWnheaa SUNWnheab
```

The new packages (only needed if you use a floating external address) are `SUNWnhea` and `SUNWnheab`.

If you used NSM only to manage the external address, then it is no longer needed. You can skip installation of packages `SUNWnhnsa` and `SUNWnhnsb` because NSM is no longer responsible for this task.

9. **Update the patches.**

Note – If you use Netra HA Suite 2.1 6/03 Patch 2 or later, you can skip this step.

---

a. **Remove the obsolete patches (check if they are installed in the list generated in Step 3):**

```
# patchrm 113054-04
# patchrm 113055-01
# patchrm 113057-03
```

b. **Install the new patches:**

```
# patchadd -M /NetraHASuite/Product/NetraHASuite_2.1.2/\
FoundationServices/Solaris_version/sparc/Patches/ 116710-01
```

Be careful to replace the *version* tag in the path by the Solaris version you are using. The list of patches is found in the *Netra High Availability Suite Foundation Services 2.1 7/05 README*.

10. **Update the Minimal Configuration File:**

```
/etc/opt/SUNWcgha/target.conf
```

Add the line `VERSION : 2` at the beginning of the file. The file should now look like this:

```
VERSION : 2
domain_id: 1                    # Cluster domain_id
attributes : -                  # Local nodes attributes
election : 26                   # Election round number
role : VICEMASTER               # Previous role
```

11. Update the Node Table.

Update the `/etc/opt/SUNWcgha/cluster_nodes_table` file by adding the line `VERSION 2` at the very beginning.

The file should now look like this:

```
VERSION 2
#NodeId Domain_id       Name    Attributes
30      1      netraMEN1       -
31      1      netraMEN2       -
32      1      netraDiskless1  -
33      1      netraDataless2  -
```

12. Update the hostname files.

The files to be updated are:

```
/etc/hostname.NIC0
/etc/hostname.NIC1
/etc/hostname.cgtp0
```

Replace *NIC0* and *NIC1* with the actual names of the interfaces mentioned in the file `/etc/opt/SUNWcgha/nhfs.conf`.

There is only one line in the files with the node name. Add the following text to this line :

```
netmask + broadcast + -failover up
```

13. Configure the External Addresses.

Note – If you do not have an external address configured, skip this step.

The configuration can be found in a file named `/etc/hostname.`*NICX*`:`*Y* where *X* and *Y* are numbers. This contains the external node name.

a. Edit the file `/etc/hostname.`*NICX* **(which you might have updated in the previous steps) and add the following line:**

```
addif external node name netmask + broadcast + -failover up
```

For example:

```
netraMEN1-cgtp netmask + broadcast + -failover up
addif extMEN1 netmask + broadcast + -failover up
```

b. Delete the file `/etc/hostname.`*NICX:Y*.

14. Configure the External Floating Address.

Note – If you do not have an external floating address configured, skip the rest of this step.

---

a. Get the physical interface and floating IP address from the file `/etc/opt/SUNWcgha/nhfs.conf`**:**

```
NSM.External.Master.Address=floating address
NSM.External.Master.Nic=hmeX:Y
```

b. Edit the file `/etc/hostname.`*NICX* **(which you might have already updated in the previous steps) and add the following line:**

```
addif external node name netmask + broadcast + failover down
```

For example:

```
netraMEN1-cgtp netmask + broadcast + -failover up
addif extMEN1 netmask + broadcast + -failover up
addif extFloat netmask + broadcast + failover down
```

15. **Update the** `/etc/opt/SUNWcgha/nhfs.conf` **file.**

    If you only used NSM to manage the external address, you can remove all the properties beginning with `NSM`. If NSM is used for other purposes, then only remove the properties beginning with `NSM.External`.

    If you use an external floating address, add the following property:

    ```
    Node.External.FloatingAddress.0=floating address
    ```

    The value of *floating address* is the same as the previous step.

16. **Rejoin the Cluster.**

    Remove the `not_configured` file and reboot the node.:

    ```
    # rm /etc/opt/SUNWcgha/not_configured
    # sync
    # reboot
    ```

17. **Check the node.**

    Once the node has booted, log in to the node as superuser and run the following command to verify that everything went well. If not, check that all previous steps were executed correctly:

    ```
    # /opt/SUNWcgha/sbin/nhadm check
    ```

18. **Plug the serial cable in again if both MENs are already upgraded.**

▼ To Upgrade the Node Management Agent

You can skip this procedure if you do not use the Node Management Agent.

1. **Log in to the master node as superuser.**

2. **Mount the Netra HA Suite 2.1 7/05 distribution on** `/NetraHASuite`**.**

```
# mount -F nfs installation-server-IP-address:\
/software-distribution-dir/NetraHAS2.1 /NetraHASuite
```

installation-server-IP-address is the IP address of the cluster network interface that is connected to the installation server.

software-distribution-dir is the directory that contains the Foundation Services 2.1 7/05 packages.

3. **Configure the package installation.**

To tell `pkgadd` how and where to install the packages, create the file `/tmp/admin` with the following contents:

```
mail=
instance=unique
partial=nocheck
runlevel=quit
idepend=nocheck
rdepend=nocheck
space=quit
setuid=nocheck
conflict=nocheck
action=nocheck
basedir=/
```

The text must begin in the first column.

4. **Install the packages.**

Use the following commands to install the needed packages. Please note that from version 2.1.2 each installation of the NMA has its own JDMK package.

Be careful to replace the *version* tag in the path by the Solaris version you are using.

```
# pkgadd -a /tmp/admin -M -R /SUNWcgha/local/export/\
services/ha_2.1.2 -d /NetraHASuite/Product/\
NetraHASuite_2.1.2/FoundationServices/Solaris_version/\
sparc/Packages SUNWnhmaj SUNWnhmal SUNWnhmad
# pkgadd -M -R /SUNWcgha/local/export/services/ha_2.1.2 \
-d /NetraHASuite/Product/NetraHASuite_2.1.2/\
FoundationServices/Solaris_version/sparc/Packages \
SUNWjdrt
```

5. **Create the** `INST_RELEASE` **file.**

   To be able to patch NMA or JDMK (if ever needed), you need to create the `INST_RELEASE` file.

```
# mkdir -p /SUNWcgha/local/export/services/ha_2.1.2/\
var/sadm/system/admin
# cp /SUNWcgha/local/export/services/var/sadm/system/\
admin/INST_RELEASE /SUNWcgha/local/export/services/\
ha_2.1.2/var/sadm/system/admin
```

6. **Update all other nodes.**

   This step must be repeated in every cluster node except the current master. Update one node at a time, executing substeps a-d before moving on to the next node.

   a. **Log in to the node as superuser.**

   b. **Take the node out of the cluster:**

```
# sync
# uadmin 1 0
```

   c. **Boot the Diskfull Node in Single-User Mode.**

Note – Skip this step on diskless nodes.

   From Open Boot Monitor, boot the node in single-user mode:

```
ok> boot -s
```

   Log in to the node.

d. Modify the `/etc/vfstab` file.

For MEN and dataless nodes, edit the local file `/etc/vfstab`. For diskless nodes, edit the file `/export/root/`*diskless-node-name*`/etc/vfstab` located on the master node.

Look for the old NFS "devices":

```
master-cgtp:/SUNWcgha/local/export/services/ha_v1/opt
master-cgtp:/SUNWcgha/local/export/services
```

and replace them with:

```
master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2/opt
master-cgtp:/SUNWcgha/local/export/services/ha_2.1.2
```

e. Reboot the node.

On diskfull nodes use the following commands:

```
# sync
# reboot
```

On diskless nodes, waiting at OBP, use this command:

```
ok> boot
```

Wait until the node has rebooted before continuing with another node.

7. **On the master node, trigger a switch-over.**

   Wait until the two MEN are synchronized. Use the following command to know the synchronization status:

```
# /opt/SUNWcgha/sbin/nhcmmstat -c master
```

   Lots of information is provided by this command. One of the lines shows the needed information. Wait until the synchronization state reads `READY`. Trigger a switch-over:

```
# /opt/SUNWcgha/sbin/nhcmmstat -c so
```

   and verify that the node became vice-master:

```
# /opt/SUNWcgha/sbin/nhcmmrole -v
nhcmmrole: current role VICE_MASTER
```

8. **Repeat Step 6 on the new vice-master node (the old master).**
9. **Log in to the new master node.**
10. **Remove the old packages:**

```
# pkgrm -R /SUNWcgha/local/export/services \
SUNWjdrt SUNWnhmaj SUNWnhmal SUNWnhmad
# rm -rf /SUNWcgha/local/export/services/var
# rm -rf /SUNWcgha/local/export/services/ha_v1
```

11. **Check every cluster node.**

    Log in to each cluster node as superuser and run the following command to verify that everything went well. If not, check that all previous steps were executed correctly:

```
# /opt/SUNWcgha/sbin/nhadm check
```

APPENDIX **A**

Installation Directory Structure

The directories that contain the Foundation Services are created on the master-eligible nodes. Most of the Foundation Services software is installed in the `/opt/SUNWcgha` and `/etc/opt/SUNWcgha` directories. However, device drivers in the Foundation Services software are installed in standard Solaris directories, for example, the `/kernel/drv` directory.

The following table summarizes the installation directory structure.

TABLE A-1 Installation Directory Structure

Directory	Description
`/etc`	Files that have read and write permissions, and that are specific to a given node. The `/etc/opt/SUNWcgha` directory is used for configuration files. The `/etc/opt/SUNWcgha/init.d` directory is used for startup scripts.
`/export`	Optional. Subdirectories are created by the `nhinstall` tool during the configuration of diskless nodes. If you install manually, you create the subdirectories for the diskless nodes.
`/opt/SUNWcgha`	Read-only files. These files are not shared.
`/opt/SUNWcgha/lib/locale/`*`$NLS_LANG`*`/LC_MESSAGES`	Message catalog files.
`/SUNWcgha/data`	Shared DHCP configuration data.
`/SUNWcgha/local/export`	The mount point for exported data and executables.
`/SUNWcgha/remote/lib/locale/`*`$NLS_LANG`*`/LC_MESSAGES`	Message catalogs shared across multiple diskless nodes, for example, from middleware applications.

TABLE A-1 Installation Directory Structure *(Continued)*

Directory	Description
`/SUNWcgha/services`	Packages shared by the master-eligible nodes.
`/SUNWcgha/swdb`	Shared package repository.
`/var/opt/SUNWcgha`	Standard log files.
`/var/run/SUNWcgha`	Temporary files that are deleted when the node reboots.
`/var/tmp`	Temporary files that are not deleted when the node reboots.

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