Netra High Availability Suite Foundation Services 2.1 6/03 Hardware Guide

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

Part No: 817–1765–11
September 2004

040813@9495

Contents

Preface 5

1 Planning to Install the Hardware 9
Planning the Installation 9
Installing the Hardware (Task Map) 10

2 Choosing the Cluster Hardware 11
Supported Hardware 11
Example Cluster Configurations 12
Two-Node Cluster 13
Four-Node Cluster With Netra T1 Servers 13
Six-Node Cluster With Netra CT 410 Servers 14
Eight-Node Cluster With Netra CT 810 Servers 14
Twelve-Node Cluster With Netra 20 and Netra 120 Servers 14
Eighteen-Node Cluster With Netra CT 820 Server 15
Considerations for Choosing a Hardware Configuration 15
Types of Disks 16
Types of Hardware Watchdogs 16

3 Installing and Configuring the Cluster Hardware 19
Installing and Configuring Netra Servers 19
Installing CompactPCI Boards 20
Installing and Configuring the Terminal Server 20
▼ To Configure the Cisco 2511 Access Server 21
Installing and Configuring Ethernet Switches 23

▼ To Assign IP Addresses to Cisco 29*x*0 Ethernet Switches 23
▼ To Disable the Spanning Tree Protocol for Cisco 29*x*0 Ethernet Switches 24
Installing and Configuring Supplemental Ethernet Cards for External Access 25

4 Connecting the Installation Hardware and Cluster Hardware 27
Installation Server 27
Connecting the Hardware for Installation 28
Development Host 29

Index 31

Preface

The *Netra High Availability Suite Foundation Services 2.1 6/03 Hardware Guide* enables you to install, configure, and connect the following hardware:

- **Cluster hardware**. The cluster hardware is a collection of peer nodes that are connected by a high-speed redundant local network such as a redundant, switched Ethernet network. The cluster node hardware can include a minimum of two nodes. The Netra™ High Availability (HA) Suite Foundation Services 2.1 6/03 software has been tested on Netra servers that are installed with the Solaris™ operating system.
- **Installation hardware**. The installation hardware consists of servers that are used to install the software on the cluster nodes, for example, the *installation server*.

Who Should Use This Book

This book is for system integrators and operators who install the hardware for the Netra HA Suite Foundation Services.

Before You Read This Book

Read the *Netra High Availability Suite Foundation Services 2.1 6/03 Overview* for an overview of the product. See also the *Netra High Availability Suite Foundation Services 2.1 6/03 Glossary* for terms that are used in the Foundation Services documentation.

How This Book Is Organized

Chapter 1 provides an overview of the processes for installing the cluster hardware.

Chapter 2 lists the supported hardware and describes example hardware configurations that you can use to build your cluster.

Chapter 3 describes how to install and configure the cluster hardware.

Chapter 4 explains how to connect the cluster hardware and the installation hardware and gives the requirements for a development host.

Related Books

You will require some of the following books from the Foundation Services documentation set:

- *Netra High Availability Suite Foundation Services 2.1 6/03 Overview*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Glossary*
- *What's New in Netra High Availability Suite Foundation Services 2.1 6/03*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Quick Start Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Hardware Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Custom Installation Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Cluster Administration Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Troubleshooting Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 CMM Programming Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 NMA Programming Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Reference Manual*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Standalone CGTP Guide*
- *Netra High Availability Suite Foundation Services 2.1 6/03 Release Notes*
- *Netra High Availability Suite Foundation Services 2.1 6/03 README*

Accessing Sun Documentation Online

The docs.sun.com[SM] Web site enables you to access Sun technical documentation online. You can browse the docs.sun.com archive or search for a specific book title or subject. The URL is `http://docs.sun.com`.

Ordering Sun Documentation

Sun Microsystems offers select product documentation in print form. For a list of documents and how to order them, see "Buy printed documentation" at `http://docs.sun.com`.

Typographic Conventions

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

TABLE P–1 Typographic Conventions

Typeface or Symbol	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
AaBbCc123	Command-line placeholder: replace with a real name or value	The command to remove a file is `rm` *filename.*

TABLE P–1 Typographic Conventions *(Continued)*

Typeface or Symbol	Meaning	Example
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. Do *not* save the file. (Emphasis sometimes appears in bold online.)

Shell Prompts in Command Examples

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

TABLE P–2 Shell Prompts

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

CHAPTER 1

Planning to Install the Hardware

Before you install any hardware for your cluster, you must make a few decisions. Decide on the purpose and the hardware configuration of the cluster, and choose the installation method. Include nodes in your cluster plan that you might want to add to the cluster in the future. These decisions can save you time when you begin installing the hardware and software for the cluster.

To plan the process of installing the hardware for your cluster, see these sections:

- "Planning the Installation" on page 9
- "Installing the Hardware (Task Map)" on page 10

Planning the Installation

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

- **Installation using 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. However, the `nhinstall` tool only supports the installation of master-eligible nodes and diskless nodes. You can only install dataless nodes manually.
- **Manual installation.** You can manually install software on a cluster containing master-eligible nodes, diskless nodes, and dataless nodes.

  Manual installation provides more 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.

Installing the Hardware (Task Map)

The following table outlines the tasks for choosing and installing the cluster hardware and the installation hardware:

Task	Description	For Instructions
Choose the installation method.	Choose the method for installing the Foundation Services on the cluster.	*Netra High Availability Suite Foundation Services 2.1 6/03 Overview*
Choose the hardware configuration of your cluster.	Choose the number and type of nodes of the cluster. Try to include nodes that you might want to add to the cluster in the future.	Chapter 2
Install the cluster hardware.	Install the cluster nodes, the Ethernet switches, and the terminal server.	Chapter 3
Install the installation server.	The installation server is required for any installation method you choose.	"Installation Server" on page 27
Install the development host.	If you are planning to develop applications using the Foundation Services API, install a development host.	"Development Host" on page 29
Connect the cluster.	Connect the cluster nodes to the Ethernet switches and the terminal server. Connect the installation server and, if necessary, the development host, to the cluster.	"Connecting the Hardware for Installation" on page 28

CHAPTER 2

Choosing the Cluster Hardware

Plan the installation and configuration of your cluster thoroughly to avoid setbacks and delays. Before you start to install your cluster, define what type of cluster you require. For example, you can install a small cluster to test new applications or existing applications. Choose the size and hardware configuration of your cluster to suit your purpose.

For example hardware configurations for your cluster, see the following sections:

- "Supported Hardware" on page 11
- "Example Cluster Configurations" on page 12
- "Considerations for Choosing a Hardware Configuration" on page 15

Supported Hardware

The following list summarizes the hardware supported with the Foundation Services 2.1 6/03 at the time of publication of this guide:

Servers	Netra T1 105 servers
	Netra T1 AC200 servers
	Netra T1 DC200 servers
	Netra 120 servers
	Netra 20 servers
	Sun Fire™ V210
	Sun Fire V240
	Netra 240 servers

	Netra CT 410 servers
	Netra CT 810 servers
	Netra CT 820 servers
Boards	Netra CP2140 boards with Netra CT 410 and Netra CT 810 servers
	Netra CP2160 boards with Netra CT 410 and Netra CT 810 servers
	Netra CP2300 boards with Netra CT 820 servers
	Netra CP2300 boards with Rapid Development Kit (RDK)
Ethernet Cards	Ethernet 10/100
	1 Gbit
Disks	SCSI disks
	FC-AL disks
	IDE disks
	Sun StorEdge 3310 disk array

Example Cluster Configurations

The example hardware configurations provided in this section are for clusters with different Sun hardware. Each configuration can be used with the SPARC™ Solaris operating system. You can use these example configurations to design your cluster. For information on the versions of the Solaris operating system and other software supported for different Sun hardware, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Release Notes*.

Each cluster must have two master-eligible nodes. You can have a mix of diskless nodes and dataless nodes in a cluster. For definitions of the types of nodes, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Glossary*.

Follow the examples in this section to be sure that the mix of hardware you choose is supported. You can also design a hardware configuration other than those listed below by having master-eligible nodes that are Netra 20, Netra 240, Sun Fire V240, or Sun Fire V210 servers and the master-ineligible nodes are Netra T1 servers. However, there

are limits on the hardware that you can mix in a cluster configuration. For example, you cannot have Netra 20, Netra 240, Sun Fire V240, or Sun Fire V210 servers in a cluster containing Netra CT 410, 810 or 820 servers. For this reason, you are more certain of having a working configuration if you choose one of the example configurations described below.

Two-Node Cluster

Following are examples of hardware configurations for two-node clusters.

Two-Node Cluster With Netra 120 Servers

- Two Netra 120 servers configured as master-eligible nodes
- Two Ethernet switches
- A terminal server to manage the consoles

Two-Node Cluster With Netra 240 Servers

- Two Netra 240 servers configured as master-eligible nodes

  Each server is fitted with Gigabit Ethernet cards to configure the cluster network connection.
- Two Ethernet switches
- A terminal server to manage the consoles

Two-Node Cluster With Netra CP 2300 Boards

- Two Netra CP 2300 boards with the Rapid Development Kit (RDK) configured as master-eligible nodes
- Two Ethernet switches
- A terminal server to manage the consoles

Four-Node Cluster With Netra T1 Servers

Following is an example of a hardware configuration for a four-node cluster:

- Two Netra T1 servers configured as master-eligible nodes
- Two Netra T1 servers configured as diskless nodes

- Two Ethernet switches
- A terminal server to manage the consoles

Six-Node Cluster With Netra CT 410 Servers

Following is an example of a hardware configuration for a six-node cluster:

- Two Netra CT 410 CompactPCI servers, each fitted with the following:
  - One Netra CP2140 system controller board configured as a master-eligible node
  - Two Netra CP2160 satellite processor boards configured as diskless nodes
  - One alarm card
  - One 18-Gbyte or larger disk per server
- Two Ethernet switches
- A terminal server to manage the consoles
- (Optional) Supplemental PMC Ethernet cards on each CP2140 board to configure the external network of the master-eligible nodes

Eight-Node Cluster With Netra CT 810 Servers

Following is an example of a hardware configuration for an eight-node:

- Two Netra CT 810 CompactPCI servers, each fitted with the following:
  - One Netra CP2140 system controller board configured as a master-eligible node
  - Three Netra CP2160 satellite processor boards configured as diskless nodes
  - One alarm card
  - Two 18-Gbyte or larger disks per server
- Two Ethernet switches
- A terminal server to manage the consoles
- (Optional) Supplemental PMC Ethernet cards on each CP2140 board to configure the external network of the master-eligible nodes

Twelve-Node Cluster With Netra 20 and Netra 120 Servers

Following is an example of a hardware configuration for a twelve-node cluster:

- Two Netra 20 servers configured as master-eligible nodes, each fitted with the following:

    - Two Fibre Channel-Arbitrated Loop (FC-AL) disks

      The FC-AL disks must be managed by the volume management feature that is provided in the Solaris operating system. For more information about using FC-AL disks, see "Types of Disks" on page 16
    - Quad-Fast Ethernet (QFE) or Hundred-Megabit Ethernet (HME) cards to configure the cluster network connection
- 10 Netra 120 servers configured as dataless nodes
- Two Ethernet switches
- A terminal server to manage the consoles
- (Optional) Supplemental HME cards or QFE cards for the external network connection

Eighteen-Node Cluster With Netra CT 820 Server

Following is an example of a hardware configuration for an 18-node cluster:

- One Netra CT 820 server fitted with the following:
    - Two Netra CP2300 system controller boards configured as master-eligible nodes
    - Sixteen Netra CP2300 satellite processor boards configured as diskless nodes
    - Two Distributed Management Cards (alarm cards)
    - One Sun StorEdge 3310 disk array
- Two Ethernet switches
- A terminal server to manage the consoles
- (Optional) Supplemental PMC (PCI Mezzanine Card) Ethernet cards on each CP2300 board to configure the external network of the master-eligible nodes

Considerations for Choosing a Hardware Configuration

The Foundation Services run on a range of Netra servers that have different characteristics. The following sections describe some of the implications of choosing one type of Netra server over another type of Netra server as your cluster hardware.

Types of Disks

Foundation Services support SCSI, FC-AL, and IDE disks.

SCSI Disks

Netra T1, Netra 120, and Netra 240 servers contain SCSI disks. The CP2140 boards also contain SCSI disks. CP2300 cards can be used with SunStorEdge 3310 disk arrays.

FC-AL Disks

Netra 20 servers contain FC-AL disks. To use FC-AL disks, you must install the volume management feature of the Solaris operating system for all partitions managed by Sun StorEdge™ Network Data Replicator (SNDR). The disk scanning mechanism of these FC-AL disks does not guarantee that the slot positions of the disks provide unique, reproducible unit numbers when the disks are plugged on FC-AL. To remove this constraint, you must create a disk partition on each master-eligible node to store the volume management metadevice database.

For details on how to install and configure the volume management feature for FC-AL disks while using the `nhinstall` tool, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Custom Installation Guide* and the `cluster_definition.conf`(4) man page.

IDE Disks

The CP2300 boards can accept optional IDE disks. For information about configuring the Foundation Services for IDE disks, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Custom Installation Guide*.

Types of Hardware Watchdogs

There are two types of hardware watchdogs for use with Netra servers and boards:

- Watchdogs located at the Lights-Off Management (LOM) level
- Watchdogs located at the OpenBoot™ PROM (OBP) level

  CompactPCI boards have OBP-level watchdogs. These watchdogs can be enabled by specifying the value `true` for the `watchdog-enable?` parameter at the `ok` prompt. These hardware watchdogs are monitored by the platform's software eliminating the need to use the Foundation Services Watchdog Timer.

The following table lists the type of watchdog that is available on each type of Netra server and board.

TABLE 2–1 Types of Hardware Watchdogs

Servers and Boards	Type of Hardware Watchdog
Netra T1 servers	LOM-level hardware watchdog
Netra 20 servers	LOM-level hardware watchdog
Netra 120 servers	LOM-level hardware watchdog
Netra 240 servers	LOM-level hardware watchdog
CP2140 boards	OBP-level hardware watchdog
CP2160 boards	OBP-level hardware watchdog
CP2300 boards	OBP-level hardware watchdog

Use the Foundation Services Watchdog Timer to monitor the LOMlite 2 hardware watchdogs on the Netra T1, Netra 20, Netra 120, and Netra 240 servers only.

CHAPTER 3

Installing and Configuring the Cluster Hardware

After you have chosen your cluster configuration, install and configure the cluster hardware. For example cluster configurations and supported hardware, see Chapter 2.

For instructions on installing and configuring the cluster hardware, see the following sections:

- "Installing and Configuring Netra Servers" on page 19
- "Installing and Configuring the Terminal Server" on page 20
- "Installing and Configuring Ethernet Switches" on page 23
- "Installing and Configuring Supplemental Ethernet Cards for External Access" on page 25

Note – Wherever possible, URLs are provided to relevant online documentation. Where no URL is provided, see the documentation that is provided with the hardware.

For a list of additional hardware packages and patches to install before installing the Foundation Services, see the *Netra High Availability Suite Foundation Services 2.1 6/03 README*.

To connect the cluster to the installation server, see Chapter 4.

Installing and Configuring Netra Servers

To install the Netra servers, see the documentation provided with the hardware or go to the following web site:

```
http://www.sun.com/products-n-solutions/hardware/docs/Servers
```

Installing CompactPCI Boards

For the Foundation Services, the Netra CT 810 and Netra CT 410 servers can be installed with the following types of boards:

- Netra CP2140 system boards for master-eligible nodes
- Netra CP2160 satellite boards for diskless nodes

The Netra CT 820 servers can be installed with CP2300 boards as master-eligible, diskless, or dataless nodes nodes.

To install one or more of the boards, see the documentation that is provided with the processor or go to this web site:

`http://www.sun.com/products-n-solutions/hardware/docs/CPU_Boards/`

Installing and Configuring the Terminal Server

A *terminal server* is a console access device that connects the console ports of several nodes to a TCP/IP network. The terminal server connects to cluster nodes through an Ethernet connection. The terminal server enables you to connect to the console of a node.

Note – Terminal servers are also called remote terminal servers (RTS), system console servers, or access servers.

For the Foundation Services, each cluster must have one terminal server. You can use any terminal server with your cluster. You can share a terminal server across clusters, where the number of nodes you can have per terminal server depends on the server model. Install your terminal server using the documentation that is provided with your terminal server.

The Foundation Services have been tested on clusters that use terminal servers such as the Cisco 2511 Access Server, the CompactPCI CPC4406, and the PERL CS9000. The examples in this section are for the Cisco 2511 Access Server. The documentation for this terminal server is located at:

`http://cisco.com/univercd/cc/td/doc/product/access`

Configure the Cisco 2511 Access Server as described in the following procedure.

▼ To Configure the Cisco 2511 Access Server

1. **Turn on the power for the Cisco 2511 access server, and connect to it by using a terminal console window.**

   Startup information is displayed in the console window.

```
14336K/2048K bytes of memory.
Processor board ID 21448610, with hardware
revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and
GOSIP compliant.
1 Ethernet/IEEE 802.3 interface(s)
2 Serial network interface(s)
16 terminal line(s)
32K bytes of non-volatile configuration
memory.
8192K bytes of processor board System flash
(Read ONLY)
...
Default settings are in square brackets '[]'.
Would you like to enter the initial
configuration dialog? [yes]:
```

2. **When asked if you want to enter the initial configuration dialog, type `No`.**

```
Would you like to enter the initial configuration dialog? [yes]: No
```

3. **Enter the configuration mode to modify the configuration on the terminal server:**

```
router> enable
```

   When you are in the configuration mode, the prompt changes to `router#`.

4. **Display the `running-config` configuration file for the terminal server:**

```
router# show running-config
```

   The configuration file is displayed.

5. **Copy and paste the entire configuration file into a text editor.**

6. **In the text editor, customize the configuration file for your network.**

   Change the parameters that are marked in italics in the following example:

```
!
version 11.2
no service password-encryption
no service udp-small-servers
no service tcp-small-servers
!
hostname machine-hostname
!
enable password access-password
!
no ip routing
```

```
ip domain-name IP-domain-name
ip name-server IP-name-server
!
interface Ethernet0
ip address IP-address 255.255.255.0
no shutdown
!
interface Serial0
no ip address
no ip route-cache
shutdown
!
ip default-gateway IP-default-gateway
ip classless
ip route 0.0.0.0 0.0.0.0 IP-default-gateway
snmp-server community public RO
snmp-server trap-authentication
snmp-server location snmp-server-location
snmp-server contact contact-email-address
!
line con 0
 transport preferred none
line 1 16
 no exec
 exec-timeout 0 0
 transport preferred none
 transport input all
 stopbits 1
line aux 0
line vty 0 4
 no login
!
```

7. **Enable the configuration file to be modified from the console window:**

   ```
   router# config terminal
   ```

8. **Copy and paste the modified configuration file into the console window.**

9. **Exit the configuration mode:**

   ```
   router(config)# end
   ```

10. **Verify that the configuration file has been modified:**

    ```
    router# show running-config
    ```

    Verify that the output contains the configuration information that you specified in Step 6.

11. **Save the configuration as the startup configuration file:**

    ```
    router# copy running-config startup-config
    ```

12. **Press Return to confirm and to save the changes to the configuration.**

The terminal server, Cisco 2511 Access Server, is now configured to be used by your cluster. A console window to the terminal server on a port can be accessed by using `telnet` as follows:

```
$ telnet terminal-concentrator-hostname 20port-number
```

Installing and Configuring Ethernet Switches

To provide a redundant network, a cluster has two Ethernet switches. The Foundation Services have been validated on Cisco Catalyst 29*x*0 Desktop Switches.

Note – If you use other switches, check that the switches support the following:

- Simple Network Management Protocol (SNMP)
- Management information base (MIB) RFC 1213 and RFC 1493
- Ability to disable Spanning Tree Protocol

The documentation for Cisco Catalyst 29*x*0 Desktop Switches is located at:

`http://www.cisco.com/univercd/cc/td/doc/product/lan`

▼ To Assign IP Addresses to Cisco 29*x*0 Ethernet Switches

Assign IP addresses manually to the Cisco 29*x*0 switches. If IP addresses are not assigned manually, the Dynamic Host Configuration Protocol (DHCP) attempts to assign IP addresses, which might result in errors.

1. **Connect to the console of the switch.**
2. **Type the following series of commands on the console window:**

```
switch1>enable
switch1#config term
Enter configuration commands, one per line.  End with CNTL/Z.
switch1(config)#ip address IP-address 255.255.255.0
switch1(config)#interface VLAN1
switch1(config-if)#hostname switch-hostname
switch1(config)#end
switch1#copy run start
```

```
Destination filename [startup-config]?
```

switch-hostname Is The host name that you assign to the switch.

IP-address Is The IP address that you associate with the host name. This address should be an IP address on your company's network.

3. **Press Return to confirm these commands and that the configuration file is `startup-config`.**

4. **Repeat Step 1 through Step 3 for the other switch to assign the second IP address.**

▼ To Disable the Spanning Tree Protocol for Cisco 29*x*0 Ethernet Switches

The Spanning Tree Protocol (STP) ensures that a loop occurs when you have redundant paths in your network. There should be no loops between the redundant networks in the Foundation Services cluster network because such networks are completely separate. There should be no crossover link between the two redundant switches. Therefore, you must disable the STP.

To disable the STP, see the documentation that is supplied with your Ethernet switch. The STP should also be disabled for any additional virtual local area networks (VLANs) used in your cluster. An example of the commands that you can use are as follows:

1. **Connect to the console of the switch.**

2. **Type the following series of commands on the console window of the switch:**

```
switch1>enable
switch1#config term
Enter configuration commands, one per line.  End with CNTL/Z.
switch1(config)#no spanning-tree vlan 1
switch1(config)#end
switch1#copy run start
Destination filename [startup-config]?
```

3. **Press Return to confirm that the STP has been disabled and that the configuration file is `startup-config`.**

4. **Repeat Step 1 through Step 3 for the other switch to disable the STP.**

Installing and Configuring Supplemental Ethernet Cards for External Access

Supplemental Ethernet interface cards enable you to configure external access to your cluster. These cards are optional.

- For Netra CT 410, Netra CT 810, and Netra CT 820 servers, you can install the supplemental PMC Ethernet cards with the documentation that is provided.
- For Netra 20 servers, you can install an additional HME Ethernet card or QFE Ethernet card. Alternatively, you can configure the unused ports of QFE cards already present on the server.
- For Netra 240 servers, you can install additional Gigabit Ethernet cards.

CHAPTER 4

Connecting the Installation Hardware and Cluster Hardware

For examples on how to connect the installation hardware and cluster hardware for different types of installations, and how to connect the cluster hardware and the development host, see the following sections:

- "Installation Server" on page 27
- "Connecting the Hardware for Installation" on page 28
- "Development Host" on page 29

Installation Server

You require an installation server for all installation methods. An installation server enables you to install the Solaris operating system and the Foundation Services on the cluster using the Solaris JumpStart™ software.

The installation server requires the following:

Hardware requirements

UltraSPARC® platform

Two network devices

- If the installation server is part of the public network, one network device is used to connect the installation server to an external network. The other network device is used to connect the installation server to the cluster network.
- If the installation server is a portable machine, you require only one network device to connect to the cluster network.

Operating system	Solaris operating system. For information about supported software versions, see the Netra High Availability Suite Foundation Services 2.1 6/03 Release Notes
Software requirements	Perl Version 5, which is available with the Developer Solaris Software Group
Disk capacity	Minimum 1.5 Gbytes for a Solaris software distribution 4 Gbytes for an eight node cluster. This size does not include applications that you might want to deploy on the cluster.
Free space	Minimum 1.5 Gbytes after the Solaris operating system has been installed

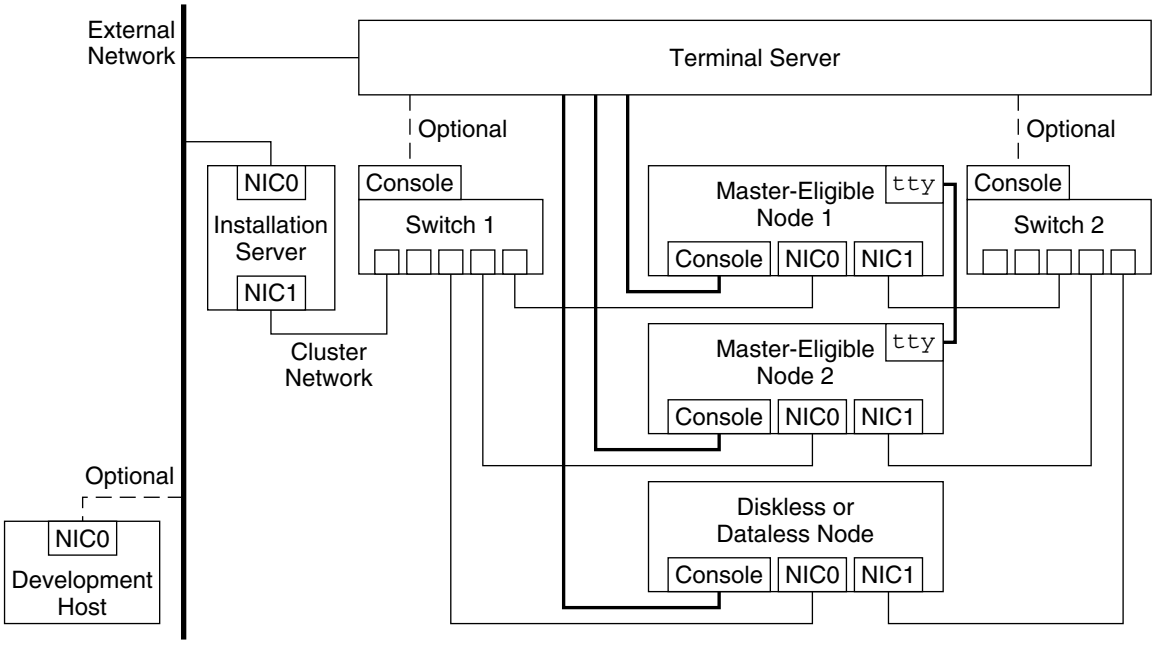
Connecting the Hardware for Installation

For an example of how to connect the cluster hardware and the installation hardware, see Figure 4–1 . The nodes of your cluster are connected to each other through switches. You can connect the console of each node to the terminal server to provide access to the console of the node. To install the software on the cluster, connect the installation server to the cluster network through a switch. If necessary, connect the development host to the external network.

In addition, you can directly connect the serial ports of the master-eligible nodes. 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. The direct link between the master-eligible nodes must then be configured as described in the *Netra High Availability Suite Foundation Services 2.1 6/03 Custom Installation Guide*.

The cluster nodes must not be on the same physical wire as the nodes of another cluster. When a diskless node boots, it sends a broadcast message to find the master node. If two clusters share the same wire, the diskless node could receive messages from the wrong master node.

The following diagram illustrates an example cluster of three nodes: two master-eligible nodes and a node that can be either diskless or dataless.



NIC0 = Interface to the first network card.

NIC1 = Interface to the second network card.

FIGURE 4–1 Example of Connecting the Hardware for Installation

For more information about installation, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Custom Installation Guide*.

Development Host

If you are developing applications that you plan to deploy on a cluster running the Foundation Services, you can install a *development host*. The development host is an optional hardware component. If you are developing applications using the Cluster Membership Manager (CMM) API, you might require specific software. For more information about CMM and the specific software required to develop applications for your cluster, see the *Netra High Availability Suite Foundation Services 2.1 6/03 CMM Programming Guide*.

To connect the development host to the cluster, see "Connecting the Hardware for Installation" on page 28. The development host requires the following:

Hardware requirements	UltraSPARC platform
	One network device
Operating system	Solaris operating system
Software requirements	Forte™ Developer 6 Software Suite (at least Update 1)
	Java 2 Software Development Kit Standard Edition
Disk capacity	Minimum 1.5 Gbytes for a Solaris software distribution
Free space	Minimum 1.5 Gbytes after the Solaris operating system has been installed

For further information on sofware versions, see the *Netra High Availability Suite Foundation Services 2.1 6/03 Release Notes*.

Index

A

access server, *See* terminal server
alarm cards, 14, 15

B

boards
  Netra CP2140, 14, 20
  Netra CP2160, 14, 20
  Netra CP2300, 15, 20

C

cards
  See also Ethernet cards
  alarm, 14, 15
cluster hardware
  See also hardware configuration, choosing
  connecting for manual installation, 28-29
  connecting for `nhinstall` installation, 28-29
  Ethernet switches, installing, 23
  nodes, installing, 19
  planning to install, 10
  supplemental Ethernet cards, installing, 25
  task list, 10
  terminal server, installing, 20, 23
CompactPCI servers
  cluster configuration, 13
  hardware watchdogs, 16-17
  installing, 19, 20
CompactPCI servers (Continued)
  Netra CT 410 cluster, 14
  Netra CT 810 cluster, 14
  Netra CT 820 cluster, 15
configuring
  Ethernet switches, 23
  Netra servers, 19
  supplemental Ethernet cards, 25
  terminal servers, 20
CP2140 boards, 14, 20
CP2160 boards, 14, 20
CP2300 boards, 15, 20
  IDE disks, 16

D

dataless nodes, Netra 120 servers, 15
development host (optional), hardware requirements, 29-30
direct link, configuring, 28
disabling STP for switches, 24
disk types, 16
diskless nodes
  Netra CP2160 boards, 14
  Netra CP2300 boards, 15
  Netra T1 servers, 13

E

eight-node cluster, hardware configuration, 14
Ethernet cards
  Gigabit Ethernet, 13
  HME, 15
  installing supplemental, 25
  PMC, 14, 15
  QFE, 15
Ethernet switches
  eight-node cluster, 14
  five-node cluster, 15
  four-node cluster, 14
  installing, 23
  IP addresses, configuring, 23
  six-node cluster, 14
  SNMP support, 23
  Spanning Tree Protocol, 23
  Spanning Tree Protocol, disabling, 24
  twelve-node cluster, 15
  two-node cluster, 13
example hardware configurations, *See* hardware configuration, choosing

F

Fibre Channel-Arbitrated Loop (FC-AL)
  disks, 15, 16
five-node cluster, hardware configuration, 15
four-node cluster, hardware configuration, 13-14

G

Gigabit Ethernet cards, 13, 25

H

hardware configuration, choosing, 12-15
  disk types, 16
  eight-node cluster, 14
  five-node cluster, 15
  four-node cluster, 13-14
  hardware watchdogs, 16-17
  six-node cluster, 14
  twelve-node cluster, 14-15
hardware configuration, choosing (Continued)
  two-node cluster, 13
hardware requirements, *See* cluster hardware
hardware watchdogs, 16-17
hubs, 20, 23
Hundred Megabit Ethernet (HME) cards, 15, 25

I

IDE disks, 16
installation
  manual, 9
  `nhinstall` tool, 9
installation hardware
  connecting for manual installation, 28-29
  connecting for `nhinstall` installation, 28-29
  development host (optional), 29-30
  planning, 10
  task list, 10
installing
  CompactPCI boards, 20
  Ethernet switches, 23
  Netra servers, 19
  supplemental Ethernet cards, 25
  terminal servers, 20
IP addresses, configuring for switches, 23

L

LOMlite and LOMlite 2 watchdogs, 16

M

manual installation, 9
  connecting hardware, 28-29
master-eligible nodes
  Netra 120 servers, 13
  Netra 20 servers, 14
  Netra 240 servers, 13
  Netra CP2140 boards, 14
  Netra CP2300 boards, 15
  Netra T1 servers, 13

N

Netra 120 servers
  cluster configuration, 13, 14-15
  hardware watchdogs, 16-17
  HME Ethernet cards, 25
  installing, 19
Netra 20 servers
  cluster configuration, 14-15
  FC-AL disks, 15, 16
  hardware watchdogs, 16-17
  installing, 19
Netra 240 servers
  cluster configuration, 13
  Gigabit Ethernet cards, 25
  hardware watchdogs, 16-17
  installing, 19
Netra CompactPCI servers, *See* CompactPCI servers
Netra CT 410 servers
  cluster configuration, 14
  hardware watchdogs, 16-17
  insalling, 20
  PMC Ethernet cards, 25
Netra CT 810 servers
  cluster configuration, 14
  hardware watchdogs, 16-17
  installing, 20
  PMC Ethernet cards, 25
Netra CT 820 servers
  cluster configuration, 13, 15
  hardware watchdogs, 16-17
  IDE disks, 16
  installing, 20
  PMC Ethernet cards, 25
Netra T1 servers
  cluster configuration, 13-14
  hardware watchdogs, 16-17
  HME Ethernet cards, 25
  installing, 19
`nhinstall` installation, 9
  connecting hardware, 28-29
nodes
  See also master-eligible nodes
  dataless, 15
  diskless, 14, 15

O

OBP-level watchdogs, 16

P

PCI Mezzanine Card (PMC) cards, 14, 15, 25
planning, hardware, 9

Q

Quad-Fast Ethernet (QFE) cards, 15, 25

R

remote terminal server, *See* terminal server

S

SCSI disks, 16
servers
  See also CompactPCI servers
  See also terminal server
  and hardware watchdogs, 16-17
  installing Netra, 19
  Netra 120, 13, 14-15
  Netra 20, 14-15
  Netra 240, 13, 19
  Netra CT 410, 14, 20
  Netra CT 810, 14, 20
  Netra CT 820, 13, 15, 20
  Netra T1, 13-14
six-node cluster, hardware configuration, 14
Spanning Tree Protocol, disabling for switches, 24
split brain, preventing, 28
STP, disabling for switches, 24
supplemental Ethernet cards, *See* Ethernet cards
switches, *See* Ethernet switches
system console server, *See* terminal server

T

terminal server
configuring, 21
eight-node cluster, 14
five-node cluster, 15
four-node cluster, 14
installing, 20
six-node cluster, 14
twelve-node cluster, 15
two-node cluster, 13
twelve-node cluster, hardware
configuration, 14-15

V

volume management, 16

W

watchdogs, hardware, 16-17