Microsoft Cluster Installation Documentation

To assist you in installing your HP NetServer Microsoft Cluster, this file contains three separate documents combined into one pdf file.

- **Configuration Guide** - This guide provides configuration information specific to your cluster configuration that you will need during the installation of your cluster.
- **HP NetServer Microsoft Cluster Installation Guide** - This is the first of two documents used to install the cluster. It covers the installation of all cluster supported HP NetServers and the cluster software, and references the Shared Storage Supplement for installation and setup of the shared storage.
- **Shared Storage Supplement** - This supplement is specific to the shared storage device you are using and must be used with the installation guide. It provides instructions for installing and setting up your shared storage devices.

14 July 1999
(See next page)

Version History

14 July 1999	Revised the No. of Power Supplies specification. See Versions in the Configuration Guide for details.
17 March 1999	Updated the pdf to include the latest version of the HP NetServer Microsoft Cluster Installation Guide. This later version incorporates technical, grammatical and format changes along with adding installation instructions for additional HP NetServers.
18 November 1998	Revised the Configuration Guide to add, “6 maximum per NetRAID adapter” to Logical Disks in Shared Storage.
10 October 1998	Package released

HP NetServer LH 3
with
NetRAID (HP Rack Storage/8)
Cluster Configuration Guide

14 July 1998
(see Versions at the end of this document)

Introduction

This document defines the supported HP NetServer LH 3 configurations for Microsoft Cluster Server. These configurations minimize single points of failure, provide maximum availability, and have been certified by Hewlett-Packard and Microsoft. This guide is prescriptive; it describes the HP NetServer LH 3 configurations supported by HP. Any configuration not expressly allowed by this guide will not be supported by HP.

What's Defined in Cluster

- *Cluster*
- *SPUs*
- *Local and Shared Storage*
- *Intra-cluster and Client LANs*
- *Shared Storage Cabling*

Cluster

Type of SPUs	HP NetServer LH 3 Each node must be the same model SPU, but may have different size main memory, cache, and CPU clock speeds.
Installation	Pedestal or racked
Number of nodes	2
Shared Storage	HP Rack Storage/8 with HP NetRAID controller and HP disks. See *Shared Storage* below.
LANs:	
Client LAN	Any NIC that is HP and Microsoft approved. See *Client LAN* below.
Intra-cluster (Heartbeat) LAN	HP D5013A or J3171A only with crossover cable. See *Intra-cluster LAN* below.
Power source	Direct from power mains, power conditioner or uninterruptible power supply (UPS) using any power conditioner or UPS.

System software:

Navigator version	L.10.00 or later
Operating System	Microsoft Windows NT Server 4.0, Enterprise Edition or later
Service pack	SP4 or later

SPU

Model	HP NetServer LH3
Clock speed	350 or 400 MHz.
No. of CPUs	2
BIOS version	4.06.22 PL or later
CPU cache	Any size
RAM	128 MB minimum. Must be HP.
No. of power supplies	2 required, 3 for redundancy
Local storage	Internal or external, using any controller except embedded RAID or a NetRAID-3Si. Must use HP disks. See *Local Storage* below.
I/O slots:	P7 - P8 Shared storage controller P1 – Intra-cluster (Heartbeat) LAN P2 – Client LAN All others – Any other plug-in cards.

Storage

Local

Controller	May not use embedded RAID or a NetRAID-3Si, otherwise any number, manufacturer or driver in any available I/O slot. However, for NetRAID local storage use slot P8.
Cabinets (Physical drive location)	SPU internal drive bays or HP external drive cabinet (e.g., HP Rack Storage/8), any number.
Disk drives (hot swap or fixed)	Must be HP.
SCSI bus	Any HP cables that meet SCSI specifications and any SCSI bus speed.
SCSI IDs	Any

Shared

Controller

Model	HP NetRAID Adapter D4943A Use with HP Rack Storage/8 (D4902A) and HP Cluster Adapter (D5957A) only.
No. of controllers	1
Firmware	S.01.00
Driver	2.03
NetRAID Assistant	A.01.09
SPU I/O slot	P7 or P8
SCSI ID	6, 7
Channels	0 and 1 only Do not use channel 2 for any purpose.
RAID level	1, 5, 10, and 50 only

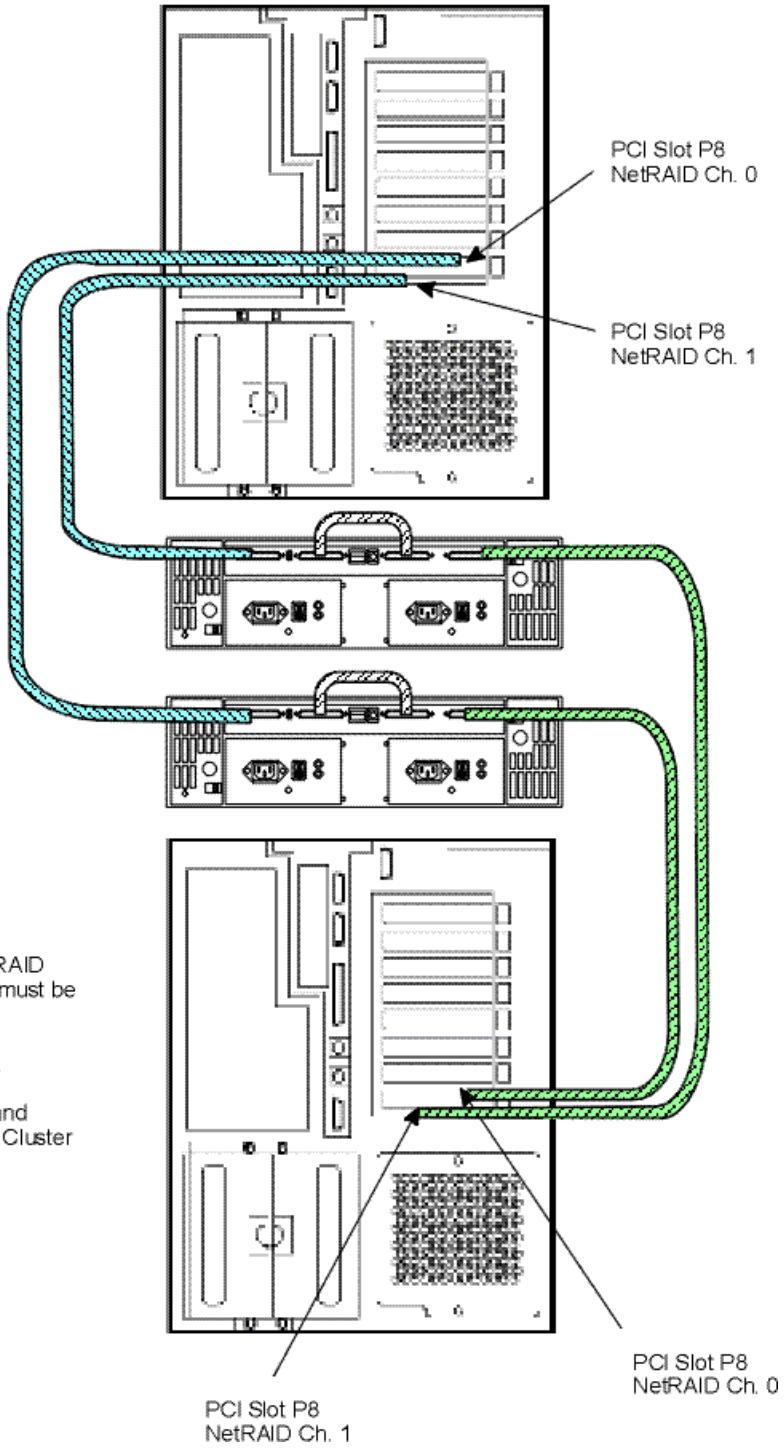
Logical disks	1 per RAID array 6 maximum per NetRAID adapter
Configuration options:	Cluster mode on (cache write-through) Ultra SCSI disabled BIOS disabled Set any other options as you prefer
Cabinet	
Model	HP Rack Storage/8 D4902A
No. of cabinets	1 – 2
Disk drives:	HP 4.2 GB Hot-Swap Ultra SCSI Disk Module D3583C HP 4.2 GB 10K rpm Hot-Swap Ultra SCSI Disk Module D4903A HP 9.1 GB Hot-Swap Ultra SCSI Disk Module D4289A HP 9.1 GB 10K rpm Hot-Swap Ultra SCSI Disk Module D6019A HP 18.2 GB Hot-Swap Ultra SCSI Disk Module D5039A
RAID arrays	A RAID array (logical disk) must be composed of all the same disk model (i.e., part number and suffix). Different size or speed disks are not allowed in the same RAID array. Any combination of disk models is allowed on a SCSI channel. Any combination of disk models is allowed in a cluster.
Cables	HP D5957A Cluster Adapter. See Shared Storage Cabling below.

LANs

	Intra-cluster (Heartbeat) LAN	**Client LAN**
LAN connection	HP D5954A crossover cable or any equivalent. The intra-cluster LAN may only be used for cluster node communication via a crossover cable. It may not be used for client communication.	Any LAN
NIC:		
Model	HP D5013A (10/100TX PCI) (or HP J3171A)	Any that is on both the HP Tested Products List and the Microsoft Hardware Compatibility List.
Driver	3.00.06.004 or later	Any driver If the NIC used is the same as the Intra-cluster LAN, then the Client LAN must use the same driver as the Intra-cluster LAN.
No. of NICs	1	1 minimum
SPU I\O slot	P1	P2

Shared Storage Cabling

This part of the guide defines the allowable cabling configurations for clusters using the HP NetServer LH 3 and HP Rack Storage/8s. Only these cabling configurations and cables are supported.



NOTES:

1. Configure cluster using 1 or 2 Rack Storage/8s.

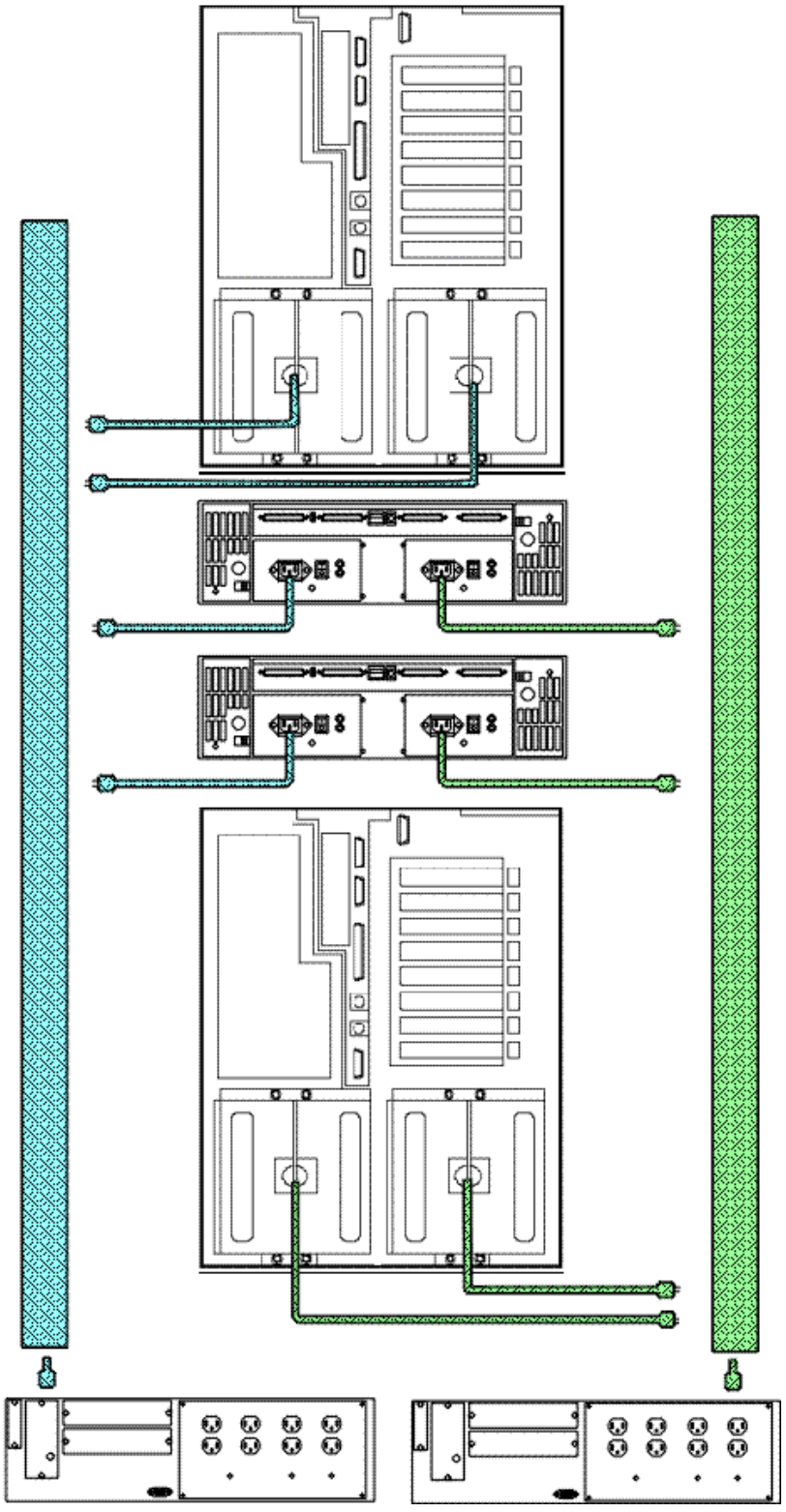
2. Channel 0 and 1 of each NetRAID Adapter for each HP NetServer must be connected together through the Rack Storage/8 as shown in the diagram. Do not cross channels.

3. Cables between the servers and shared storage must be D5957A Cluster Adapters.

HP Microsoft Cluster Server with One HP NetRAID Adapter

NOTES:

The HP NetServer can have one or two power supply cages. This drawing depicts the use of two cages with redundant power cabling. For NetServers with one cage connections are the same.



HP Microsoft Cluster Server Power Cabling

Versions

14 July 1999	Revised No. of Power Supplies specification from "2 - 3" to "2 required, 3 for redundancy."
22 June 1999	In System Software changed from "SP3 with hotfix or later" to "SP4 or later". This revision does not impact performance and does not require updating earlier clusters using SP3 with the hotfix.
18 November 1998	Initial release

HP NetServer
Microsoft Cluster Installation Guide

with
Shared Storage System Supplement

Rack Storage/12FC
Rack Storage/12
Rack Storage/8
Storage System/6
HP AutoRAID Disk Array Model 12H
or
HP A3661B Model 30/FC High Availability Disk Array

23 June 1999

This page intentionally left blank.

Notice

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material. Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

Warranty

If you have any questions about the warranty for this product, contact your dealer.

Safety Considerations

The product and related documentation must be reviewed for familiarization with safety markings and instructions before installation and operation.

Safety Symbols

A **WARNING** denotes a hazard that can cause personal injury.

A **CAUTION** denotes a hazard that can damage equipment or result in lost data.

A **NOTE** contains information that is useful in accomplishing a task and should be read before performing the associated instruction(s).

Do not proceed beyond a **WARNING** or **CAUTION** notice until you understand the hazardous conditions and have taken appropriate steps.

Grounding

The computer in which this product is installed is a safety class I product and has a protective earthing terminal. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

Servicing

Any service, adjustment, maintenance, or repair must be performed only by authorized service-trained personnel.

Trademark Notice

The use of trademarks or other designations is for reference purposes only. The following trademarks are used in this manual:

- Microsoft and MS-DOS are U.S. registered trademarks of Microsoft Corp.
- Windows and Windows NT are trademarks of Microsoft Corporation.
- 3M is a registered Trademark of the 3M Company.

Hewlett-Packard
Network Server Division
10955 Tantau Avenue
Cupertino, CA 95014-0770, USA

Contents

Some topics in this guide are applicable to all HP NetServer clusters while others are HP NetServer and shared storage specific. A complete installation guide consists of two documents: this document (common to all HP NetServers) and the supplement for your shared storage system.

Overview

HP NetServer clusters provide increased availability solutions for critical applications. The basic cluster consists of two HP NetServer systems coupled to shared storage units. The operating system files, application files, and other files local to each node are stored on fixed or hot swap disks. Local disks are usually located internally in the system.

Both HP NetServers share external drives located in the shared storage unit(s). Shared drives are accessed using an interface card (typically referred to as the Host Bus Adapter) located in each HP NetServer unit. Both HP NetServers run Microsoft Windows NT Server, Enterprise Edition, which includes Microsoft Cluster Server software.

This guide has been designed to help you setup the HP NetServers, set up, assemble and cable the cluster, and install server and cluster software.

NOTE	This installation guide is incomplete without the supplement specific to your shared storage system. When directed by this guide, turn to the supplement to get the necessary instructions.

Version History

Date	**Change**
23 June 99	Added installation instructions f or a fibre channel cluster solution using the LH4 with the Rack Storage/12FC and up to two optional Rack Storage/12s.
7 April 99	Corrected error (changed LHI to LH4 two places in the LH4 install procedures). Simplified the overall installation procedure by removing the need to match drive letters for the second node.
8 March 99	Added instructions for the LPr, using NetRAID local and shared storage and Revised instructions to use Navigator L.15.05 on LH4, LPr, and LXr 8000.
19 Jan. 99	Added installation instructions for the LPr.
18 Dec. 98	Added installation procedures for the HP NetServer LH 4 and LXr 8000.
20 Nov. 98	Revised the LH3 installation procedures in part 5 to allow using LH3 clusters with Model 12H and FC-30 shared storage subsystems.
5 Oct. 98	Revised part 5 – Installation to provide separate server configuration and Windows NT installation procedures. Added the LH3 installation procedure including using a NetRAID adapter for local storage.
20 July 98	Added installation instructions in part 5 for the LC3.
9 June 98	Initial release

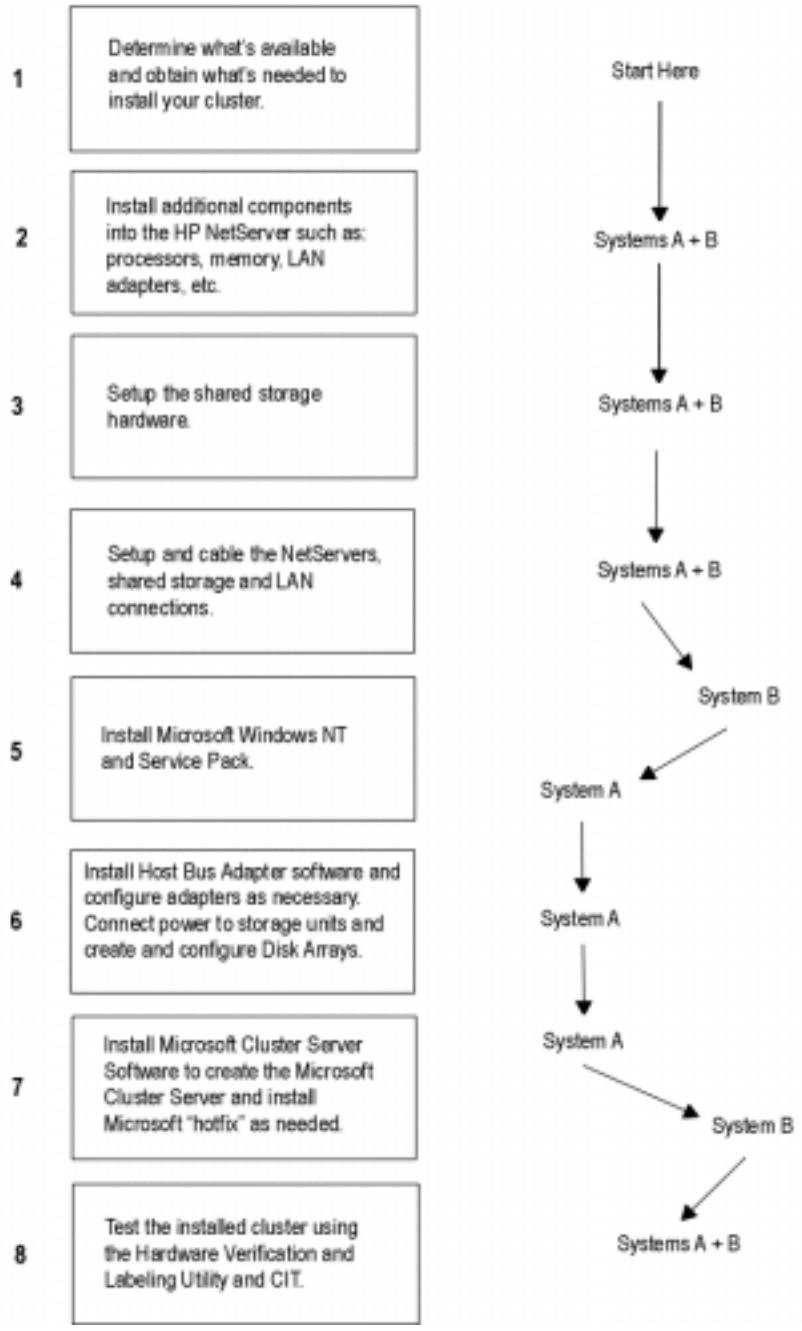
Intended Audience

The guide is for the person who installs, administers, and troubleshoots the Microsoft Cluster Server. Hewlett-Packard assumes this person is qualified to service computer equipment and trained to recognize hazards in products with hazardous energy levels.

NOTE	Hewlett-Packard only supports and recommends installation of clustered HP NetServer systems using Microsoft Cluster Server software by a Microsoft or HP Cluster Certified Installer.

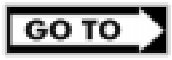
A Graphical Overview to Setting Up the Cluster

CAUTION	Departing from the sequence shown here can cause unnecessary work and unpredictable results.



1 What's Needed

Before beginning the installation, make sure you have the following items prepared and tools and resources available.



Some information in this part is shared storage specific. See part "1 What's Needed" of the **Shared Storage Supplement** and the Configuration Guide for your cluster. Review the supplement, refer to the Configuration Guide as directed, then return to this part.

Addresses / Names

- Minimum of three Client LAN IP addresses: one for each HP NetServer system and one for the HP NetServer cluster client LAN.
- Two Intra-cluster LAN IP addresses for the intra-cluster LAN: One for each HP NetServer system. (May use *hidden* or *intranet* addresses. See the MSCS Administrator's Guide for a discussion of IP addressing.)

NOTE	The Client LAN IP address and Intra-cluster LAN IP addresses must be on different subnets.

- Cluster and node names (limited to 15 or fewer alphanumeric characters)
- Subnet mask
- User name, password, and domain to be used for the cluster service.

Hardware

Compare the hardware you have received with your ordering documentation, such as the parts lists created by HP NetServer Order Assistant and Rack Assistant

Software

- **Microsoft Windows NT Server** (Enterprise Edition), version 4.0, which includes Windows NT, version 4.0 and Service Pack (SP). See the Configuration Guide for your cluster solution for the applicable Windows NT and SP versions and Microsoft Cluster Server installation software.

NOTE	Some HP NetServers, as stated in part "5 NetServer Software Setup," require installing Windows NT from floppy disks. To create floppy disks, on a computer running Windows 95 or NT, insert the Windows NT Server/E base CD in the CDROM drive and from the command line execute: D:\i386\winnt32.exe /ox. If needed, see, "How to Create Windows NT Boot Floppy Disks" under Support Online for the Microsoft web site.

- **Microsoft Hotfix (clusfixi.exe) for Windows NT**. This software is only needed if you are using Service Pack 3. To download.

  1. Access the Microsoft web site at http://www.microsoft.com.
  2. On the site navigator bar, select SEARCH, then search for Q147222 in the "Support & Knowledge Base" category.
  3. On the Search Results page, select Group of Hotfixes for Exchange 5.5 and IIS 4.0, then follow the ftp path to download the "clusfixi.exe" file.

NOTE	When performing this search on the Microsoft web site you may be prompted to register with Support Online. If prompted to register, you must first complete the questionnaire and then complete the search.

- **HP NetServer Navigator CD**. HP recommends you use the latest version, however you may use an earlier version if it is specified in the Configuration Guide for your cluster.
- **Cluster Installation Test**. Downloaded from the Certified Installer Corner under Install & Configure on the HP NetServer Clustering Solutions web site.
- **NIC drivers**. Download HP drivers from Software Downloads page under Install & Configure" on the HP NetServer Clustering Solutions web site.

Tools

Common hand tools plus the following:

- Torx™ T-25 driver supplied in the Rack Installation Toolkit. For rack installed clusters only.
- Portable Field Service Grounding Kit (3M® part number 8505, or equivalent).

Need More Help?

HP Information Assistant provides extensive support information and is available on the HP NetServer Online Documentation CD-ROM. Although you can access HP Information Assistant from the NetServer Navigator Main menu, HP recommends that you install it on an available Windows client connected to a printer. For more information about installing HP Information Assistant, refer to the system documentation.

The following reference materials may also be useful:

- HP NetServer Microsoft Windows NT 4.0 Installation Guide for your HP NetServer
- Processor Upgrade Instructions

These materials are available by choosing Install or Reference Books on the HP Information Assistant's Main menu.

Referenced Documents

- MSCS Administrator's Guide on the Microsoft NT 4.0 base CD under \Support\Books
- HP NetServer Configuration Guide. If not bundled with this Installation Guide downloaded from the Supported Configurations page under Plan on the HP Cluster Solutions web site

2 NetServer Hardware Setup

When HP NetServers are shipped from the factory, they are configured for stand-alone operation. The first step in creating a cluster is to install additional hardware that allows the HP NetServers to:

- Share data
- Communicate with one another
- Communicate with the LAN

CAUTION	Installing hardware requires opening the HP NetServers. HP therefore, recommends using a grounding kit. See part "1 What's Needed" for details. The kit contains a wrist strap, anti-static mat, and cable.

Install Components

NOTE	Perform the following procedure on either HP NetServer first, and then repeat the procedure for the second NetServer.

1. Gather the required hardware components for the HP NetServers and separate the components into two systems.
2. Remove the HP NetServer cover(s).
3. Install any of the following types of components that were supplied with your HP NetServers using the instructions supplied with each component. If needed, refer to HP Information Assistant for additional instructions:

    - **Processors**. If additional processors were supplied with your HP NetServers install them at this time.
    - **Main Memory**. Cluster operations require a minimum amount of main memory (RAM). Typically you do not need to add memory to your HP NetServers. However, if additional memory is required, it will be identified by the HP Order Assistant program and will be supplied. Install any additional memory that has been provided with your order. See the Configuration Guide for your cluster configuration and check that you meet the minimum memory requirements.
    - **LAN Adapters**. Install two LAN adapters in each HP NetServer. Refer to the HP NetServer Configuration Guide for your cluster and install the adapters in the PCI slots stated in the guide. If other boards are installed in these slots, remove them and install them in other slots.
    - **Internal Disks**. If provided install the local storage drives (fixed or hot swap) into the HP NetServers.
    - **Local Storage Adapter**. This adapter provides the interface to the local storage of the node. See the Configuration Guide for your cluster configuration for the PCI slot to use.
    - **Host Bus (Shared Storage) Adapters**. These adapters provide the interface to the Shared Storage Systems and must be installed in specific PCI slots. See the Configuration Guide for your cluster configuration for the HP NetServer PCI slots to use.

See instructions supplied with the component or see part "2 NetServer Hardware Setup" of the **Shared Storage Supplement** for instructions on installing these adapters.

3 Shared Storage Hardware Setup

part "3 Shared Storage Hardware Setup" in the **Shared Storage Supplement**

4 Cluster Cabling and Setup

Setup Cluster Hardware

Non-racked clusters - Follow the Site Preparation guidelines provided in the Planning Guide under Plan on the HP NetServers Clustering Solutions web site.

Racked clusters - Follow the Road Map supplied with the system and instructions in the shared storage supplement. In addition you should have rack layouts of your system printed from the HP NetServers Rack Assistant program. If not, see HP NetServers web site to download this program.

Connect the LAN Adapters

Two sets of LAN adapters need to be connected. One set allows the cluster to communicate node-to-node over what is typically called the intra-cluster LAN. The second set allows the cluster to communicate with external clients over what is typically called the client LAN.

NOTE	See the Configuration Guide for your cluster for the PCI slots to be used for the intra-cluster and client LANs.

To connect the cluster's LAN adapters:

1. Connect the intra-cluster LAN adapter in one node to the intra-cluster LAN adapter in the other node using a crossover cable.
2. Connect the client LAN adapter in each node to the client LAN using Ethernet cables.

Connect Shared Storage & Cable the Cluster

part "4 Cluster Cabling and Setup" in the **Shared Storage Supplement**

5 NetServer Software Setup

Follow the procedures in this part to configure the hardware and BIOS and to install Windows NT including the applicable Service Pack.

Start Here

In this part you will perform two major tasks. First you will configure the NetServer Hardware and BIOS and Install Windows NT following a procedure specific to your HP NetServer as listed below. Secondly, you will install the applicable Service Pack on the NetServer. Select your procedure from the following list:

You will…	Go to procedure for…	On page …
First	LCII	12
	LC3	13
	LH Pro	14
	LH 3	15
	LH 3 (with NetRAID local storage)	17
	LH 4	19
	LH 4 (Fibre Channel)	21
	LPr	21
	LPr (with NetRAID local and shared storage)	25
	LX/LXr Pro	27
	LXr 8000	28
Second	Installing the Microsoft Service Pack	30

LCII

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive of System B and restart the server. The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 3; otherwise go to step 6.

3. To update the BIOS, choose **Configuration Assistant**, then **Custom**, **Microsoft**, **NT 4.0**, and **No** for automated NOS installation.
4. Select **Update**, then **Execute**. Follow screen prompts to update the BIOS.
5. After the server reboots return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. Install a utilities partition on the local storage disk by choosing **Configuration Assistant**, then **Custom**, **Microsoft**, MS Windows **NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.
7. Choose **Install/Update Utility Partition**.
   When finished, the system reboots and displays the Custom Configuration window.

Install Windows NT

1. Remove the *HP NetServer Navigator CD*, insert the first CD of the Microsoft Windows NT Server, Enterprise Edition, and exit Navigator to reboot the server.
2. Select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system.
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

LC3

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive of System B and restart the server.
   The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **`Continue`** and go to step 3; otherwise go to step 6.

3. To update the BIOS, choose **`Configuration Assistant and Installation Assistant`**, then **`Custom`**, **`Microsoft`**, **`NT 4.0`** and **`No`** for automated NOS installation.
4. Select **`Update`**, then **`Execute`**. Follow screen prompts to update the BIOS.
5. After the server reboots return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. Install a utilities partition on the local storage disk by choosing **`Configuration Assistant and Installation Assistant`**, then **`Custom`**, **`Microsoft`**, MS Windows **`NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
7. Choose **`Install/Update Utility Partition`**.
   When finished, the system reboots and displays the Custom Configuration window.

Install Windows NT

1. Remove the *HP NetServer Navigator CD,* insert the first CD of the Microsoft Windows NT Server, Enterprise Edition, and exit Navigator to reboot the server.
2. Select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system.
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

LH Pro

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive of System B and restart the server.
   The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **`Continue`** and go to step 3; otherwise go to step 6.

3. To update the BIOS, choose **`Configuration Assistant`**, then **`Custom`**, **`Microsoft`**, MS Windows **`NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
4. Select **`Update`**, then **`Execute`**. Follow screen prompts to update the BIOS.
5. After the server reboots return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. From the Navigator Main menu, choose **`NetServer Utilities`**, then **`EISA Configuration Utility`**.
7. In the EISA Configuration Utility, disable the **`Embedded IDE Hard Disk Controller`**.
   (The embedded IDE controller is not used on HP NetServer systems.)
8. Save and exit the EISA Configuration Utility.
   The Utility saves your configuration data, restarts the HP NetServer and reloads the *HP Navigator CD-ROM*.
9. Install a utility partition on the local storage disk by choosing **`Configuration Assistant`**, then **`Custom`**, **`Microsoft`**, MS Windows **`NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
10. Choose **`Install/Update Utility Partition`**.
    When finished, the system reboots and displays the Custom Configuration window.

Install Windows NT

1. Remove the *HP NetServer Navigator CD*, insert the first CD of the Microsoft Windows NT Server, Enterprise Edition, and exit Navigator to reboot the server.
2. Select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **TCP/IP Protocol** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

LH 3

These procedures provide instructions for servers using NetRAID, AutoRAID Model 12H, and Model 30/FC shared storage solutions.

NOTE	If you are use NetRAID adapters for both shared and local storage go to the next procedure, LH3 (with NetRAID Local and Shared Storage) on page 17.

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
3. During reboot enter the Setup Utility by pressing F2.
4. Select **`User Preferences`** and then the **`LH4 Integrated NetRAID`** setting you want to use.
   If you are using NetRAID for shared storage, disable the **`LH4 Integrated HP NetRAID`**.
   It must be disabled otherwise it will conflict with the HP NetRAID adapter used for shared storage.
5. Exit the Setup Utility.
   The server reboots. If you have special NetServer local SCSI bus options enter the Symbios utility, by pressing Ctrl+C at the Symbios boot banner during reboot and set the options you need; otherwise allow the server to reboot. The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **`Continue`** and go to step 6; otherwise go to step 9.

6. To update the BIOS, choose **`Configuration Assistant and Installation Assistant`**, then **`Custom`**, **`Microsoft`**, **`MS Windows NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
7. Select **`Update`**, then **`Execute`**. Follow screen prompts to update the BIOS.

8. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
9. From the Navigator main menu, install a utility partition on the local storage disk by choosing **`Configuration Assistant and Installation Assistant`**, then **`Custom`**, **`Microsoft`**, **`MS Windows NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
10. Choose **`Install/Update Utility Partition`**.
    When finished, the system reboots and displays the Custom Configuration window.
11. Make an *NT 4.0 Drivers* disk by choosing **`Create Driver Diskette(s), Execute,`** and following the prompts. Label the floppy disk *NT 4.0 Drivers.*

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" for additional information.

1. Remove the *HP NetServer Navigator CD,* insert the boot floppy for Windows NT4.0, and exit Navigator to reboot the server.
2. When Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
   - The drivers are loaded from the *NT 4.0 Drivers* floppy disk you created from the Navigator CD.
   - First, load the driver for the device you want to boot from. For drives in the LH 3 internal bays this will normally be the embedded SCSI Symbios driver.
   - Secondly, load the IDE driver, since the CD drive is on the IDE bus.
   - Finally, load any other mass storage drivers you need. If you are using NetRAID for shared storage do not load the HP NetRAID driver at this time. It will be loaded later.
3. Continue the installation, inserting floppy disks #2 and #3 and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

     Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

     Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

     Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

4. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **Settings**, **Control Panel**, **Network**, and **Adapters**. For each D5013A adapter, select **Properties** then **Settings** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

LH 3 (with NetRAID Local and Shared Storage)

A NetRAID adapter may only be used for either shared storage or local storage; one adapter may not be used for both. To use NetRAID adapters for both shared and local storage, you must use two adapters.

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
3. During reboot enter the Setup Utility by pressing F2.
4. Using the Setup Utility disable the LH3 Integrated NetRAID.
   Integrated NetRAID is not used in a cluster because it conflicts with the HP NetRAID adapter used for shared storage.

NOTE Auto IRQ assignments can give IRQ conflicts. If this occurs manually set the IRQ assignments. In **Configuration**, **PCI Slot Devices**, **PCI IRQ Locking**, assign the IRQs to the cards. The following assignments work for the standard configuration:

Card	PCI Slot	IRQ
NIC	P1	9
NIC	P2	9
NetRAID	P7	5
NetRAID	P8	5
-	SCSI A	10 (or disabled)
-	SCSI B	10 (or disabled)

Disable SCSI A and SCSI B if they are not used!
Set any other options as you desire.

5. Exit the Setup Utility
   The server reboots. If you have special NetServer local SCSI bus options enter the Symbios utility, by pressing Ctrl+C at the Symbios boot banner during reboot and set the options you need; otherwise allow the server to reboot. The server boots from the CD and displays the Navigator Main menu.

NOTE If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 6; otherwise go to step 9.

6. To update the BIOS, choose **Configuration Assistant and Installation Assistant**, then **Custom**, **Microsoft**, **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.
7. Select **Update**, then **Execute**. Follow screen prompts to update the BIOS.
8. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.

9. From the Navigator main menu select, **Configuration Assistant**, then **Custom**, **Microsoft**, **MS Windows NT 4.0 Enterprise Edition**, and **No.** Check the advisories in Configuration Advisor for IRQ conflicts and other problems. Click **Continue**.

10. Define the local storage RAID arrays. Select **Configure Disk Array** and use HP NetRAID Assistant to define the arrays. Be sure to define the arrays for the local storage adapter (Adapter_0), not the shared storage adapter (Adapter_1).

NOTE	DO NOT define the shared storage arrays at this time. They will be defined later.

11. From the Navigator main menu install a utility partition on the local storage disk by choosing **Configuration Assistant and Installation Assistant**, then **Custom**, **Microsoft**, **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.

12. Choose **Install/Update Utility Partition**.
When finished, the system reboots and displays the Custom Configuration window.

13. Make an *NT 4.0 Drivers* floppy disk by choosing **Create Driver Diskette(s), Execute,** and following the prompts. Label the floppy disk *NT 4.0 Drivers*.

Copy the NetRAID Driver for Clusters

Copy the "Mraidnt.sys" file from the *NR Firmware & Driver* floppy disk to the "\Netraid" directory on the *NT 4.0 Drivers* floppy disk you created in step 13 above (page 18). You can do this either by booting the server on which you are installing to DOS and copying the file, or by copying this file using another computer:
This will overwrite the NetRAID single system driver already there with the NetRAID cluster driver.

NOTE	Do not copy the oemsetup.inf file on the *NR Firmware & Driver* floppy disk.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" for additional information.

1. Insert the boot floppy for Windows NT4.0 and exit Navigator to reboot the server.
2. When Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
3. Load drivers using the *NT 4.0 Drivers* floppy disk you created in step 13 above (page 18).
   - Load the driver for the device you want to boot from. This will be the HP NetRAID Adapter Driver.
   - Load the IDE driver, since the CD drive is on the IDE bus.
   - Load any other mass storage drivers you need. If you are using the embedded SCSI channels, load the Symbios driver at this time.
4. Continue the installation and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system

- When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
- Make sure **TCP/IP Protocol** is selected.
  Other protocols may be selected in addition, but TCP/IP is required.
- If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

  Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

  Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

  Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

5. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **Settings**, **Control Panel**, **Network**, and **Adapters**. For each D5013A adapter, select **Properties** then **Settings** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

LH 4

These procedures provide instructions for servers using NetRAID, AutoRAID Model 12H, and Model 30/FC shared storage solutions.

Configure NetServer Hardware and BIOS

6. Make sure you power down System A and power up System B.
7. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
8. During reboot enter the Setup Utility by pressing F2.
9. Select **User Preferences** and then the **LH4 Integrated NetRAID** setting you want to use.
   If you are using NetRAID for shared storage, disable the **LH4 Integrated HP NetRAID**.
   It must be disabled otherwise it will conflict with the HP NetRAID adapter used for shared storage.
10. Exit the Setup Utility (F10, Save, and Exit).
    The server reboots. If you have special NetServer local SCSI bus options enter the Symbios utility, by pressing Ctrl+C at the Symbios boot banner during reboot and set the options you need; otherwise allow the server to reboot. The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 6; otherwise go to step 9.

11. To update the BIOS, choose **Configuration Assistant and Installation Assistant**, then **Custom**, **Microsoft**, **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.

12. Select **Update**, then **Execute**. Follow screen prompts to update the BIOS.
13. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
14. From the Navigator main menu, install a utility partition on the local storage disk by choosing **Configuration Assistant and Installation Assistant**, **Custom**, **Microsoft**, then either:
    - **MS Windows NT4.0 Enterprise Edition Cluster Server** if using Navigator if L.15.05 or later.
    - **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation if using Navigator L.15.04 or earlier.
15. Choose **Install/Update Utility Partition**.
    When finished, the system reboots and displays the Custom Configuration window.
16. Make a *NT4.0 Drivers* floppy disk by choosing **Create Driver Diskette(s), Execute,** and following the prompts. Label the floppy disk *NT 4.0 Drivers*.
17. Return to the Navigator main menu by clicking the Back button three times.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" in the installation guide supplement for additional information.

18. Insert the boot floppy disk for Windows NT4.0 and exit Navigator to reboot the server.
19. When Windows NT Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
    - The drivers are loaded from the *NT 4.0 Drivers* floppy disk you created from the Navigator CD.
    - First, load the driver for the device you want to boot from. For drives in the LH 4 internal bays this will normally be the embedded SCSI Symbios driver.
    - Secondly, load the IDE driver, since the CD drive is on the IDE bus.
    - Finally, load any other mass storage drivers you need. If you are using NetRAID for shared storage do not load the HP NetRAID driver at this time. It will be loaded later.
20. Continue the installation using floppy disks#2 and #3 and select the following options when prompted:
    - Choose the unpartitioned space and install Windows NT.
    - Choose NTFS file system
    - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
    - Make sure **TCP/IP Protocol** is selected.
      Other protocols may be selected in addition, but TCP/IP is required.

- If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

  Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

  Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

  Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

21. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **`Settings`**, **`Control Panel`**, **`Network`**, and **`Adapters`**. For each D5013A adapter, select **`Properties`** then **`Settings`** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

LH 4 (with Fibre Channel)

These procedures provide instructions for servers using Fibre Channel shared storage solutions (HP Rack Storage/12FC.

Configure NetServer Hardware and BIOS

1. System A and System B can both be powered on.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
3. During reboot enter the Setup Utility by pressing F2.
4. Select **`User Preferences`** and then the **`LH4 Integrated NetRAID`** setting you want to use.
5. Exit the Setup Utility (F10, Save, and Exit).
   The server reboots. If you have special NetServer local SCSI bus options enter the Symbios utility, by pressing Ctrl+C at the Symbios boot banner during reboot and set the options you need; otherwise allow the server to reboot. The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **`Continue`** and go to step 6; otherwise go to step 9.

6. To update the BIOS, choose **`Configuration Assistant and Installation Assistant`**, then **`Custom`**, **`Microsoft`**, **`MS Windows NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation.
7. Select **`Update`**, then **`Execute`**. Follow screen prompts to update the BIOS.
8. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
9. From the Navigator main menu, install a utility partition on the local storage disk by choosing **`Configuration Assistant and Installation Assistant`**, **`Custom`**, **`Microsoft`**, then either:
   - **`MS Windows NT4.0 Enterprise Edition Cluster Server`** if using Navigator if L.15.05 or later.

- **`MS Windows NT 4.0 Enterprise Edition`**, and **`No`** for automated NOS installation if using Navigator L.15.04 or earlier.

10. Choose **`Install/Update Utility Partition`**.
    When finished, the system reboots and displays the Custom Configuration window.
11. Make a *NT4.0 Drivers* floppy disk by choosing **`Create Driver Diskette(s), Execute,`** and following the prompts. Label the floppy disk *NT 4.0 Drivers.*
12. Return to the Navigator main menu by clicking the Back button three times.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" of the installation guide supplement for additional information.

1. Insert the boot floppy disk for Windows NT4.0 and exit Navigator to reboot the server.
2. When Windows NT Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
   - The drivers are loaded from the *NT 4.0 Drivers* floppy disk you created from the Navigator CD.
   - First, load the driver for the device you want to boot from. For drives in the LH 4 internal bays this will normally be the embedded SCSI Symbios driver or embedded NetRAID.
   - Secondly, load the IDE driver, since the CD drive is on the IDE bus.
   - Finally, load any other mass storage drivers you need. If you are using the Fibre Channel HBA for shared storage do not load the HP Fibre Channel driver at this time. It will be loaded later.
3. Continue the installation using floppy disks#2 and #3 and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

     Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

     Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

     Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

4. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **Settings**, **Control Panel**, **Network**, and **Adapters**. For each D5013A adapter, select **Properties** then **Settings** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

Part "6 Shared Storage Software Setup" in the **Shared Storage Supplement** and start with Install Fibre Channel HBA Driver.

LPr

These procedures provide instructions for servers using NetRAID and AutoRAID shared storage solutions.

NOTE	If you are use NetRAID adapters for both shared and local storage go to the next procedure, LPr (with NetRAID Local and Shared Storage) on page 25.

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
3. If you have special NetServer local SCSI bus options enter the Symbios utility by pressing Ctrl+C at the Symbios boot banner during boot and set the options you need; otherwise allow the server to boot. The server boots from the CD and displays the Navigator Main Menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 4; otherwise go to step 6.

4. To update the BIOS, choose **NetServer Utilities | More NetServer Utilities | BIOS Update Utility**. Select **Execute** and follow the screen prompts to update the BIOS.
5. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. From the Navigator main menu, install a utility partition on the local storage disk by choosing **Configuration Assistant and Installation Assistant**, **Custom**, **Microsoft**, then either:
   - **MS Windows NT4.0 Enterprise Edition Cluster Server** if using Navigator if L.15.05 or later.
   - **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation if using Navigator L.15.04 or earlier.
7. Choose **Install/Update Utility Partition** and **Execute**.
   When finished, the system reboots and displays the Custom Configuration window.
8. Make an *NT 4.0 Drivers* floppy disk by choosing **Create Driver Diskette(s), Execute,** and following the prompts. Label the floppy disk *NT 4.0 Drivers*.
9. Press the **Back** button three times to return the Navigator Main Menu.
10. If you are using a NetRAID adapter for either shared or local storage, create a set of installation floppy disks for NetRAID Assistant by choosing **NetServer Utilities | Diskette Library**. Select **NetRAID Assistant for WindowsNT** and **Windows95** from the list and then the

Execute button. Follow the instructions to create the NetRAID Assistant installation floppy disks. Label the floppy disks *HP NetRAID Assistant 1* and *HP NetRAID Assistant 2*.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" for additional information.

1. Remove the *HP NetServer Navigator CD,* insert the boot floppy for Windows NT4.0, and exit Navigator to reboot the server.
2. When Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
   - The drivers are loaded from the *NT 4.0 Drivers* floppy disk you created from the Navigator CD.
   - First, load the driver for the device you want to boot from. For drives in the LPr internal bays this will normally be the embedded SCSI Symbios driver on the drivers disk. Select "SCSI Symbios driver for the HP NetServer LPr."
   - Secondly, load the IDE driver, since the CD drive is on the IDE bus.
   - Finally, load any other mass storage drivers you need. If you are using NetRAID for shared storage do not load the HP NetRAID driver at this time. It will be loaded later.
3. Continue the installation, inserting floppy disk #3 and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **TCP/IP Protocol** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

     Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

     Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

     Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

4. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **Settings**, **Control Panel**, **Network**, and **Adapters**. For each D5013A adapter, select **Properties** then **Settings** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

LPr (with NetRAID Local and Shared Storage)

A NetRAID adapter may only be used for either shared storage or local storage; one adapter may not be used for both. To use NetRAID adapters for both shared and local storage, you must use two adapters.

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.
3. If you have special NetServer local SCSI bus options enter the Symbios utility by pressing Ctrl+C at the Symbios boot banner during boot and set the options you need; otherwise allow the server to boot. The server boots from the CD and displays the Navigator Main Menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 4; otherwise go to step 6.

4. To update the BIOS, choose **NetServer Utilities | More NetServer Utilities | BIOS Update Utility**. Select **Execute** and follow the screen prompts to update the BIOS.
5. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. From the Navigator main menu, install a utility partition on the local storage disk by choosing **Configuration Assistant and Installation Assistant**, **Custom**, **Microsoft**, then either:
   - **MS Windows NT4.0 Enterprise Edition Cluster Server** if using Navigator if L.15.05 or later.
   - **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation if using Navigator L.15.04 or earlier.
7. Define the local storage RAID arrays. Select **Configure Disk Array** and use HP NetRAID Assistant to define the arrays. Be sure to define the arrays for the local storage adapter (Adapter_0), not the shared storage adapter (Adapter_1).

NOTE	DO NOT define the shared storage arrays at this time. They will be defined later.

8. Exit HP NetRAID Assistant. The server will reboot.
   During the reboot, at the NetRAID banner press **<Ctrl><M>** to enter the NetRAID Express utility. From the Management Menu, check that the BIOS is enabled. If it is not, enable it.
9. Exit the NetRAID Express utility and reboot. Navigator will return to the Custom Configuration screen. Install a utility partition on the local storage disk by choosing **Install/Update Utility Partition**.
   After installing the utility partition, Navigator returns to the Custom Configuration screen.
10. Make an *NT 4.0 Drivers* floppy disk by choosing **Create Driver Diskette(s), Execute,** and following the prompts. Label the floppy disk *NT 4.0 Drivers*.
11. Press the **Back** button three times to return the Navigator Main Menu.
12. Create a set of installation floppy disks for NetRAID Assistant by choosing **NetServer Utilities | Diskette Library**. Select **NetRAID Assistant for WindowsNT** and **Windows95** from the list and then the **Execute** button. Follow the instructions to create the NetRAID Assistant installation floppy disks. Label the floppy disks *HP NetRAID Assistant 1* and *HP NetRAID Assistant 2*.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" for additional information.

1. Remove the Navigator CD, insert the boot floppy for Windows NT4.0, and exit Navigator to reboot the server.
2. When Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
3. Load drivers using the *NetRAID-3Si Cluster Firmware and Driver* floppy disk you created in part 1 "What's Needed" and the *NT 4.0 Drivers* floppy disk you created in step 10 above of this procedure.
   - Load the driver for the device you want to boot from. This will be the HP NetRAID Adapter Driver.

     If you are using a NetRAID-3Si Adapter for shared storage, load this driver from the *NetRAID-3Si Cluster Firmware and Driver* floppy disk. Be sure to use the driver version specified for shared storage in the Configuration Guide, since this driver is used for both the NetRAID local storage adapter and the NetRAID-3Si shared storage adapter.
   - Load the IDE driver from the *NT 4.0 Drivers* floppy disk, since the CD drive is on the IDE bus.
   - Load any other mass storage drivers you need. If you are using the embedded SCSI channel, load the Symbios driver from the *NT 4.0 Drivers* floppy disk at this time.
4. Continue the installation and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

     Make sure adapter [2] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

     Select adapter [1] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

     Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

5. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **`Settings`**, **`Control Panel`**, **`Network`**, and **`Adapters`**. For each D5013A adapter, select **`Properties`** then **`Settings`** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

LX/LXr Pro

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive of System B and restart the server. The server boots from the CD and displays the Navigator Main menu.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 3; otherwise go to step 6.

3. To update the BIOS, choose **Configuration Assistant**, then **Custom**, **Microsoft**, MS Windows **NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.
4. Select **Update**, then **Execute**. Follow screen prompts to update the BIOS.
5. After the server reboots return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. From the Navigator Main menu, choose **NetServer Utilities**, then **EISA Configuration Utility**.
7. At the Utility window select **Step 3 - View or Edit Details** and:
   - Make sure **MP Spec Version** is set to **V1.4**.
   - Disable the on-board IDE Hard Disk Controller by scrolling to **On-board IDE Hard Disk Controller,** pressing Enter, and choosing **Disable**.
     The embedded IDE controller is not used on the HP NetServer LX and LXr Pro.
8. Save and exit the EISA Configuration Utility.
   The utility saves the configuration data, restarts the server, and reloads the HP NetServer Navigator CD.
9. Install a utility partition on the local storage disk by choosing **Configuration Assistant**, then **Custom**, **Microsoft**, MS Windows **NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.
10. Choose **Install/Update Utility Partition**.
    When finished, the system reboots and displays the Custom Configuration window.

Install Windows NT

1. Remove the *HP NetServer Navigator CD*, insert the first CD of the Microsoft Windows NT Server, Enterprise Edition, and exit Navigator to reboot the server.
2. Select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **TCP/IP Protocol** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

LXr 8000

These procedures provide instructions for servers using NetRAID, AutoRAID Model 12H, and Model 30/FC shared storage solutions

Configure NetServer Hardware and BIOS

1. Make sure you power down System A and power up System B.
2. Insert the HP NetServer Navigator CD in the CD-ROM drive and restart the server.

NOTE	If prompted that the HP NetServer Navigator BIOS is a newer version, choose **Continue** and go to step 3; otherwise go to step 6.

3. To update the BIOS, choose **Configuration Assistant**, then **Custom**, **Microsoft**, **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation.
4. Select **Update**, then **Execute**. Follow screen prompts to update the BIOS.
5. After the server reboots, return to the Navigator main menu by clicking the Back button twice on the displayed window.
6. From the Navigator main menu, install a utility partition on the local storage disk by choosing **Configuration Assistant and Installation Assistant**, **Custom**, **Microsoft**, then either:
   - **MS Windows NT4.0 Enterprise Edition Cluster Server** if using Navigator if L.15.05 or later.
   - **MS Windows NT 4.0 Enterprise Edition**, and **No** for automated NOS installation if using Navigator L.15.04 or earlier.
7. Choose **Install/Update Utility Partition**.
   When finished, the system reboots and displays the Custom Configuration window.
8. Make an *NT 4.0 Drivers* floppy disk by choosing **Create Driver Diskette(s), Execute**, and following the prompts. Label the floppy disk *NT 4.0 Drivers*.

Install Windows NT

NOTE	Windows NT must be installed from floppy disks, not the CD, so that the mass storage drivers will be loaded correctly. If you have not created a set of Windows NT boot floppy disks, see Software in part "1 What's Needed" for additional information.

1. Insert the boot floppy disk for Windows NT4.0 and exit Diagnostic Assistant to reboot the server.
2. When Setup prompts to detect mass storage devices, skip detection and manually specify the mass storage drivers:
   - The drivers are loaded from the *NT 4.0 Drivers* floppy disk you created from the Navigator CD.
   - First, load the driver for the device you want to boot from. For drives in the LXr 8000 internal bays this will normally be the embedded SCSI Symbios driver.
   - Secondly, load the IDE driver, since the CD drive is on the IDE bus.
   - Finally, load any other mass storage drivers you need. If you are using NetRAID for shared storage do not load the HP NetRAID driver at this time. It will be loaded later.
3. Continue the installation and select the following options when prompted:
   - Choose the unpartitioned space and install Windows NT.
   - Choose NTFS file system
   - When prompted to search for a Network Adapter, load NIC drivers for both the intra-cluster and the client LAN. Be sure to load the correct intra-cluster LAN driver version as specified in the Configuration Guide for your cluster. If you are using two HP D5013A NICs, load the driver twice, once for the intra-cluster NIC and once for the client NIC.
   - Make sure **`TCP/IP Protocol`** is selected.
     Other protocols may be selected in addition, but TCP/IP is required.
   - If you are using two HP D5013A NICs, when prompted for TCP/IP Properties:

     Make sure adapter [1] is highlighted and specify its IP address and subnet mask. This will be the LAN adapter for the intra-cluster LAN.

     Select adapter [2] and specify its IP address and subnet mask. This will be the LAN adapter for the client LAN.

     Set TCP/IP Properties for DNS, WINS Address, etc. at this time.

NOTE	The Client LAN IP addresses and Intra-cluster LAN IP addresses must be on different subnets.

4. Once the NT installation is complete, the D5013A NIC drivers must be manually set to the correct LAN speed. Log on and from the start menu select: **`Settings`**, **`Control Panel`**, **`Network`**, and **`Adapters`**. For each D5013A adapter, select **`Properties`** then **`Settings`** and set the network speed to the appropriate setting (either 10 Mbps or 100 Mbps) for your network. The intra-cluster LAN should be set to 100 Mbps. Do not use the Auto setting.

Install Service Pack for All HP NetServers

Refer to the Configuration Guide for your cluster configuration and install the applicable Microsoft Service Pack (SP3 or SP4). Do not install the Hot Fix associated with Service Pack 3 at this time.

NOTE Do not install the Microsoft Cluster Server Software (MSCS) at this time.

NOTE After completing these procedures, power down System B and power up System A. Repeat all of the procedures in this part for System A.

For **Fibre Channel solutions using the Rack Storage/12FC** simply reboot System B and repeat the procedures on Systems A. Both systems can be powered up.

6 Shared Storage Software Setup

Use these procedures to install host bus adapter (interface) software, create the arrays and array file systems.

Shared Storage Setup

Part "6 Shared Storage Software Setup" in the **Shared Storage Supplement.** For Fibre Channel solutions go to Configure the Storage Devices using FCArray Assistant in the supplement

Create the Array File Systems

Use the instructions below and Windows NT Disk Administrator to partition, assign drive letters, and format the shared logical drives.

Reboot System A

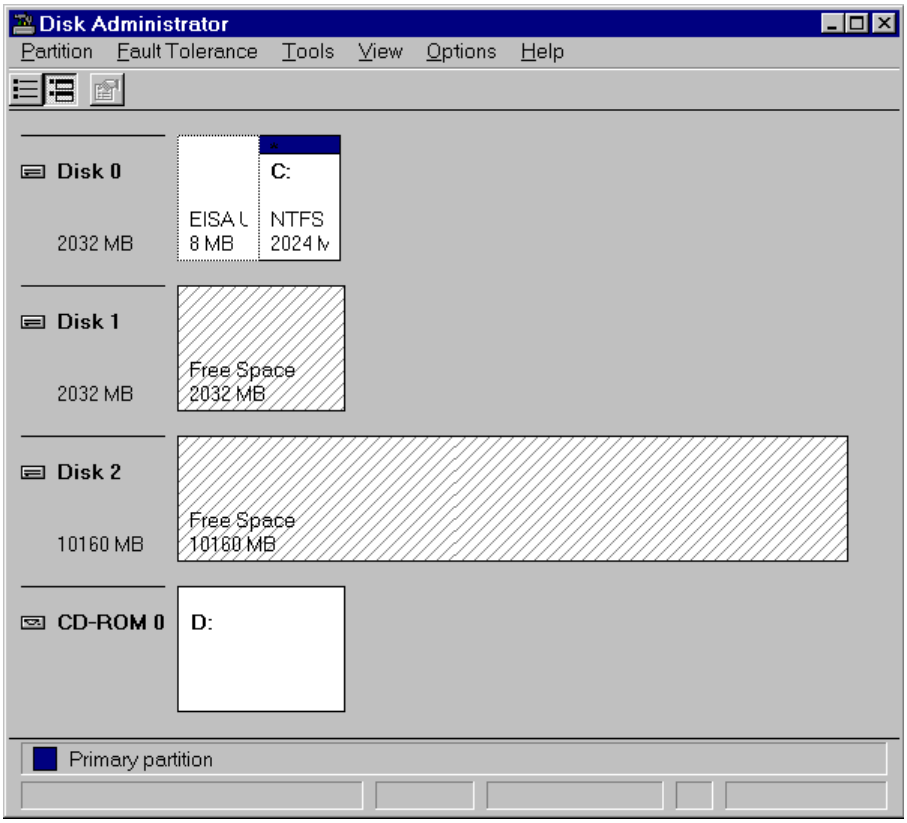
Reboot System A so that Windows NT can recognize the logical drives created when you setup the shared storage. The system boots and loads Windows NT on System A.

CAUTION	You **must** reboot System A to get accurate information about your shared disks **before** running Disk Administrator.

Run Windows NT Disk Administrator

From the Start menu, choose **`Programs`**, **`Administrative Tools`**, and then **`Disk Administrator`**. Disk Administrator loads and scans the disks, and displays a list of the logical disks you identified. An example display follows:

NOTE	Disk Administrator lists disks in order, beginning with local (non-shared) disks followed by the shared disk arrays.



Disk Administrator, Scanned Logical Disks

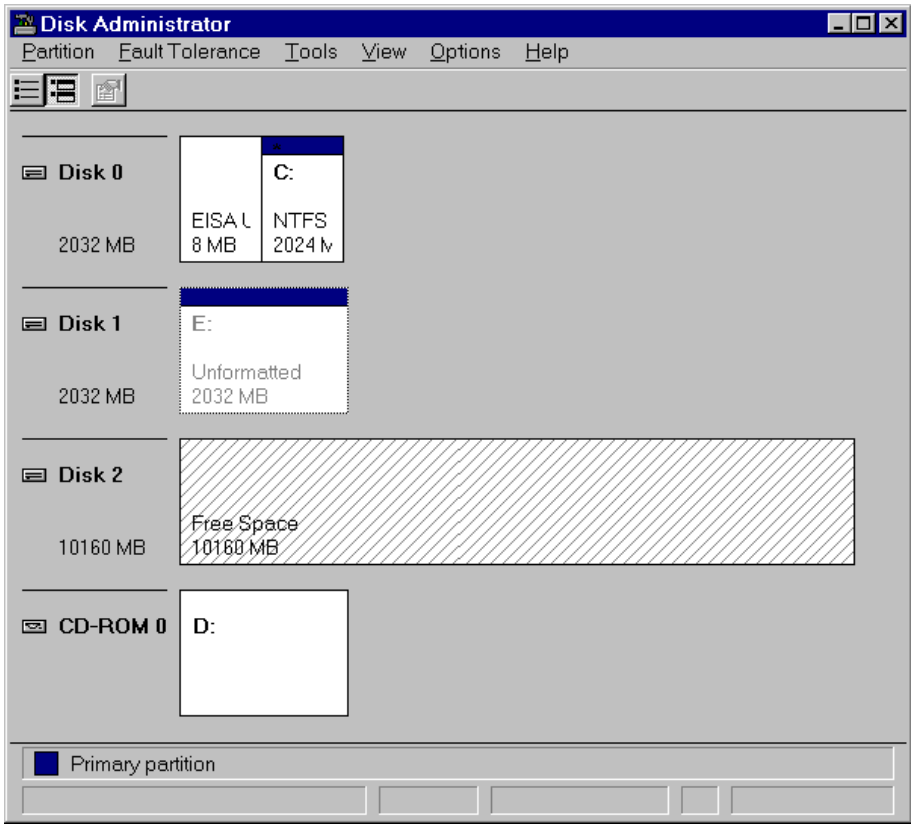
Create Full Disk Partitions for each Array

1. Click the disk box to select the shared array to be partitioned.
   Disk Administrator highlights the selected disk.
2. From Disk Administrator's **`Partition`** menu, choose **`Create`**.
   A dialog appears indicating the maximum size of a single partition.

NOTE Don't be misled by the displayed disk capacity for your arrays. When Disk Administrator calculates disk capacity, it disregards redundancy storage used by the selected RAID level. The displayed and usable storage capacity for the array is, therefore, less than the total capacity of all drives in the array. For example, the displayed and usable array capacity for a RAID 5 array would be C(N-1), where N is the number of drives and C is the capacity of one drive. Likewise, for RAID 1 the capacity would be one-half the capacity of the two drives.

---

3. Click **`OK`** to include the full disk in the partition (the default).
   In the following example, Disk 1 has been partitioned and Disk Administrator assigned a temporary drive letter to the disk array.

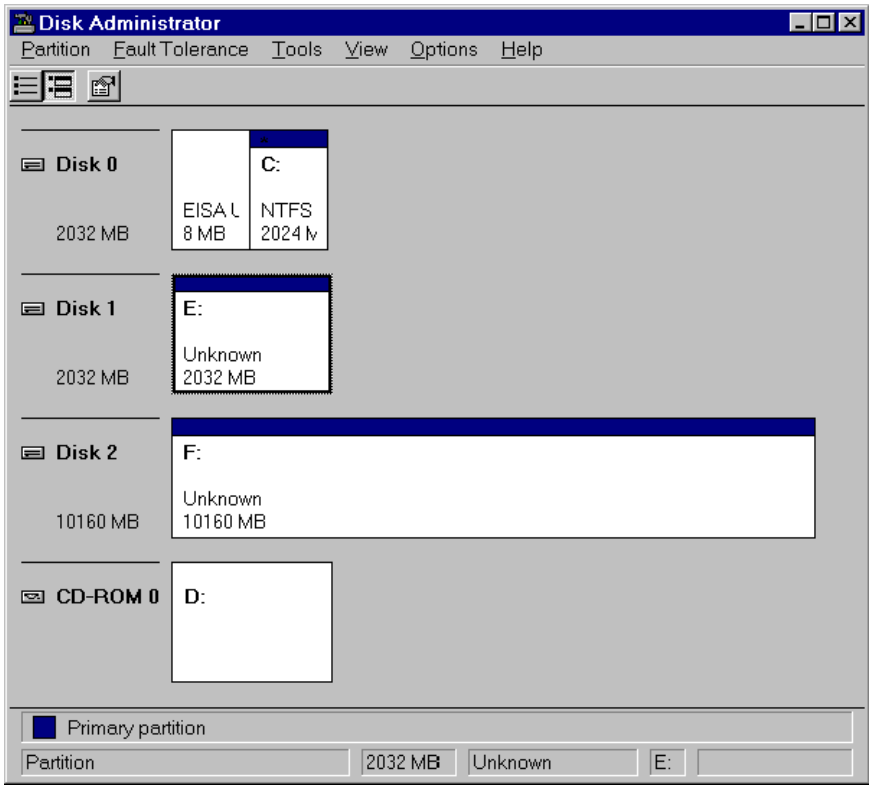


Disk Administrator, Partitioned Disk Array

NOTE	Do not partition a disk into separate drives. Microsoft Cluster Server Software will only manage one partition per disk.

4. Repeat steps 1 through 3 to create a partition for each disk array to be shared by the cluster.
5. From Disk Administrator's **`Partition`** menu, choose **`Commit Changes Now`**, then choose **`Yes`** to save changes and **`OK`** when prompted.

NOTE	In the following example, Disk 2 has been partitioned and Disk Administrator assigned the next sequential letter to the disk array.



Disk Administrator, All Disk Arrays Partitioned and Committed

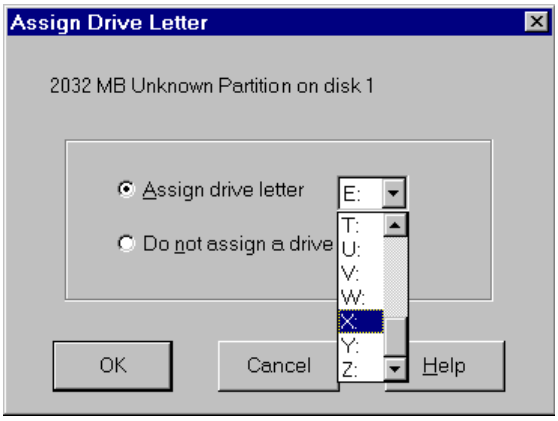
Assign Drive Letters

Disk Administrator has assigned sequential and temporary drive letters to the disk arrays you partitioned. You must assign a permanent (static) drive letter to each drive you want to make available to both Systems A and B.

NOTE When partitioning logical drives with Windows NT the logical drive letters are sequentially assigned in a predefined sequence. These drive letters are temporary assignments that can change according to the drives installed in your system. For clustered systems it is critical that the drive letters for the shared storage drives be fixed. Therefore, make sure that you assign permanent drive letters to the shared logical drives.

---

1. Select one of the disks you just partitioned.
   Disk Administrator highlights the selected disk.
2. From the Disk Administrator's **`Tools`** menu, choose **`Assign Drive Letter`**.
   Disk Administrator displays the **`Assign Drive Letter`** dialog.
3. In the dialog, select a drive letter, and click **`OK`**.
   To avoid confusion later, HP recommends that you choose sequential drive letters. The example in this guide uses drive letters X and Y.

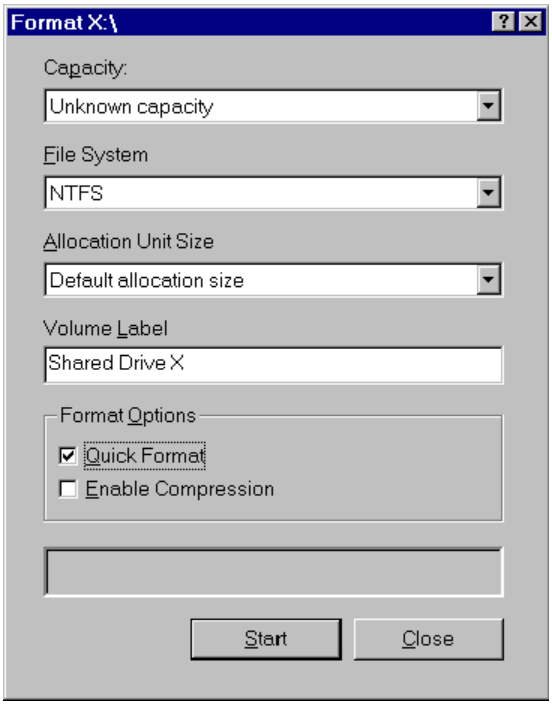


Disk Administrator, Assigning Drive Letters

4. Repeat steps 1 through 3 to assign a drive letter for each array to be shared in the cluster.

Format Logical Drives

1. Click a disk box to select one of the arrays that you just partitioned and assigned a drive letter. Disk Administrator highlights the selected disk.
2. From the Disk Administrator's **`Tools`** menu, choose **`Format`**.
   A dialog appears with a list of formatting options.



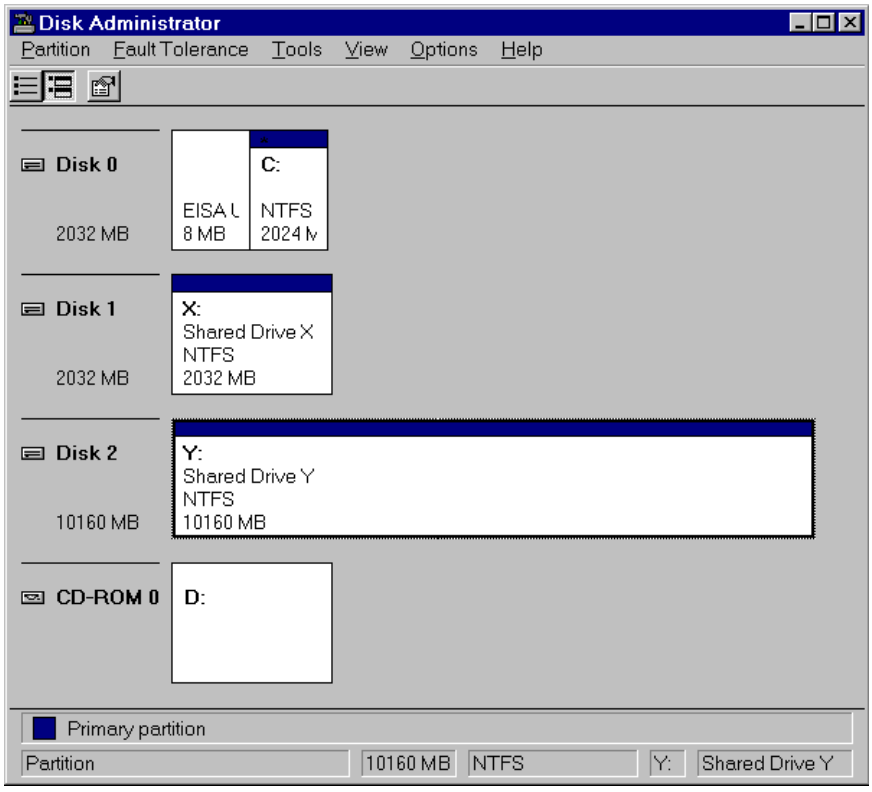
Disk Administrator, Formatting and Assigning Volume labels

3. In the **`Format`** dialog make sure that **`File System`** is set for **`NTFS`**.
4. In the **`Volume Label`** field type a label (name) for the drive.
   Choose a descriptive label such as "Shared Drive X.".

5. Select **`Quick Format`** in the **`Format Options`** field, and then **`Start`** to begin formatting the logical drive.

NOTE	No action is necessary for the `Capacity` and `Allocation Unit Size` fields.

6. Repeat steps 1 through 5 to format each drive to be shared in the cluster.
   The following example depicts both drives formatted with permanent drive letters assigned.



Disk Administrator, Formatting and Assigning Volume labels

7. Exit Disk Administrator.

7 Microsoft Cluster Server Software Setup

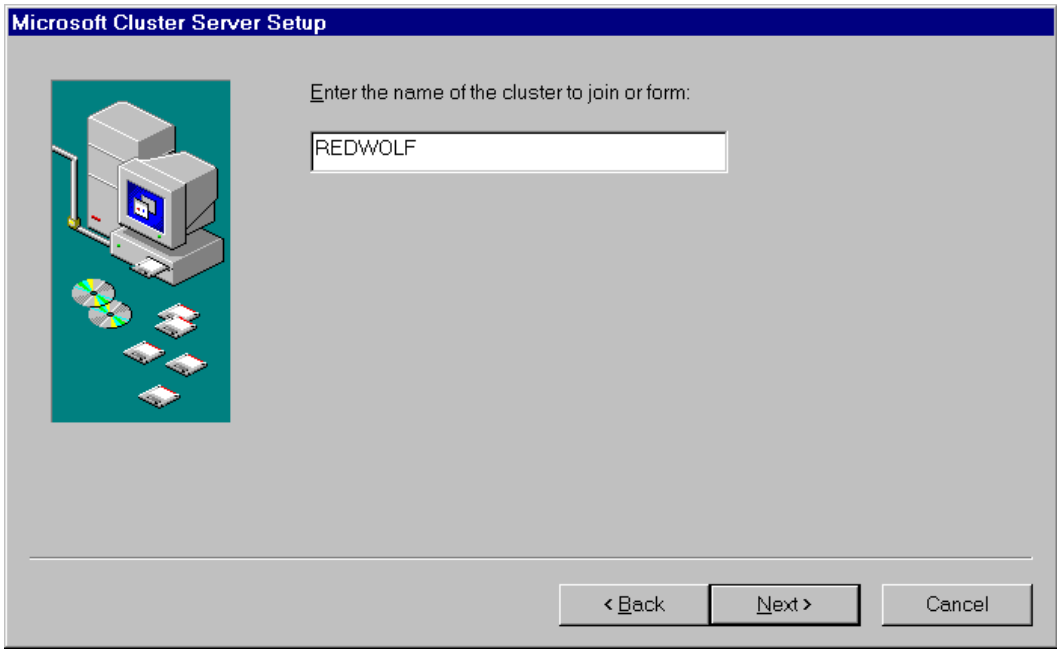
During installation of Microsoft Cluster Server Software (MSCS) at System A, you will create a Microsoft Cluster Server. Initially, it is a cluster with only one server (System A). Later, you will join System B to the cluster and thus create a standard two-server (node) cluster. If you need more information about the installation process outlined here, see the *Microsoft Cluster Server Administrators Guide*.

Install MSCS on System A

MSCS installation includes slightly different software setups for System A and System B. Since you just finished configuring arrays on System A, continue Microsoft Cluster Server Setup where you left off with Disk Administrator.

To install MSCS at System A:

1. Insert the *Component CD* of Microsoft Windows NT Server, Enterprise Edition in the CD-ROM drive of System B.
2. Run the Microsoft Cluster Server setup program.
   Setup.exe is located in the following folder on the Component CD: `\mscs\cluster\i386`
3. Choose **`Form a new cluster`** and click **`Next`**.
   Setup prompts you to identify the cluster by name.
4. Type a name for the cluster. Make note of the name you type. You will need to provide the identical name during Microsoft Cluster Server software setup of System A. Click **`Next`**.



Microsoft Cluster Administrator, Assigning a Cluster Name

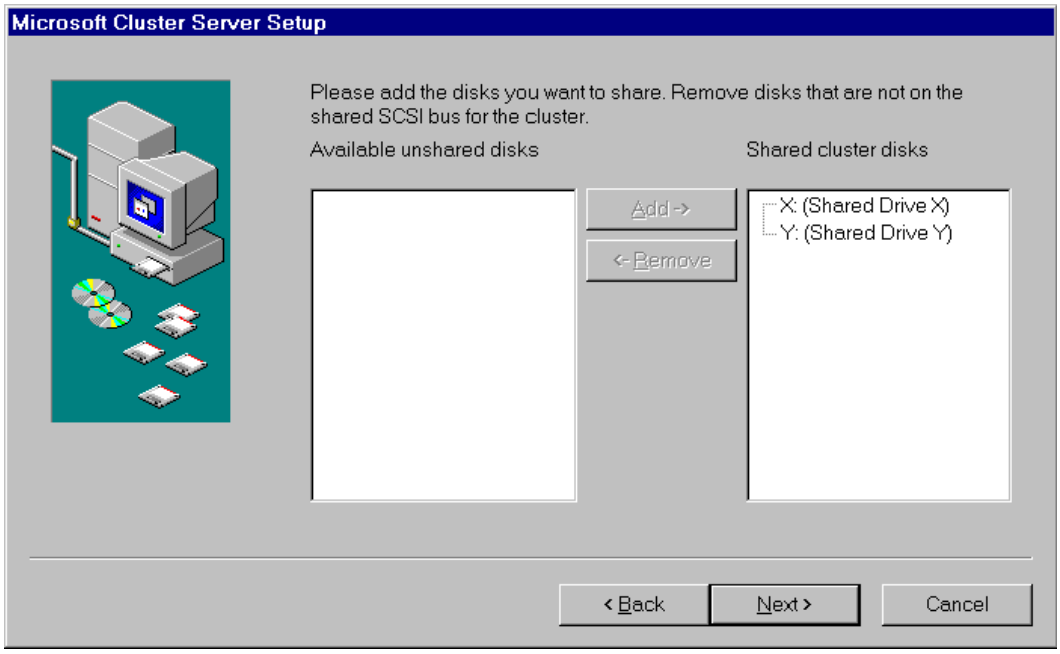
5. Setup prompts you for the location to store cluster files. Either accept the default or type a new location and click **Next**.

6. Setup prompts you for the cluster domain account. Provide a user name and password for an appropriate Microsoft Domain account for the cluster. Click **Next**.

NOTE	If you are unsure of the correct MS Domain account, consult the Windows NT documentation supplied with your system.

7. Setup presents a two-column list of **Available unshared** and **Shared cluster disks**. Use the **Add** and **Remove** buttons to place the disks in the desired columns. Click **Next**.

   Keep in mind that disks listed in the left column are reserved for the exclusive use of System B while disks listed in the right column are shared by both systems. Normally you would share all disks listed.



Microsoft Cluster Server Setup, Assigning Shared Disks to the Cluster

8. Setup prompts you to select a disk (quorum disk) on which to store permanent cluster files. Cluster Administrator uses the disk you select to store synchronizing information about Systems A and B. The disk must always be available to the cluster. Select the disk that you will commit to keeping online then click **Next**.

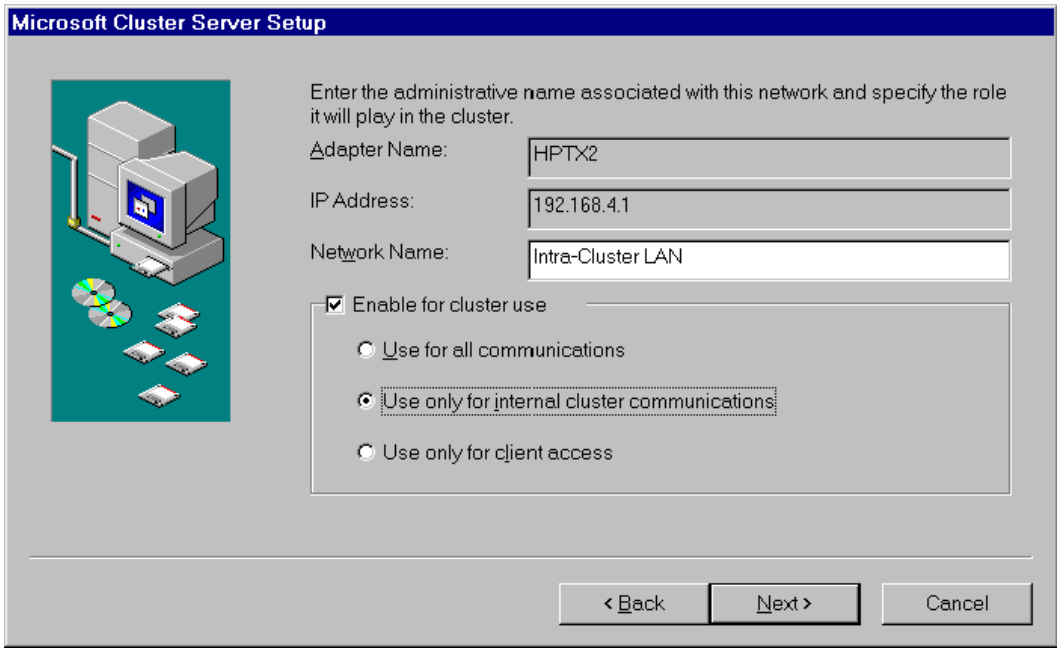
9. Configure your LAN adapters.
   Setup scans the System's LAN adapters so they can be configured for cluster use and presents a dialog for each LAN adapter installed in your HP NetServer. Setup uses the IP address you specified during NT installation. Type a **Network Name** for the LAN Adapter, and check **Enable for cluster use**.

   HP recommends that you identify the LAN adapter according to use (for example, intra-cluster LAN). When you enable cluster use setup gives you three options:

   - **Use for all communications**
     Choose this option if you are configuring a client LAN adapter, and System A and B reside on the same IP subnet.

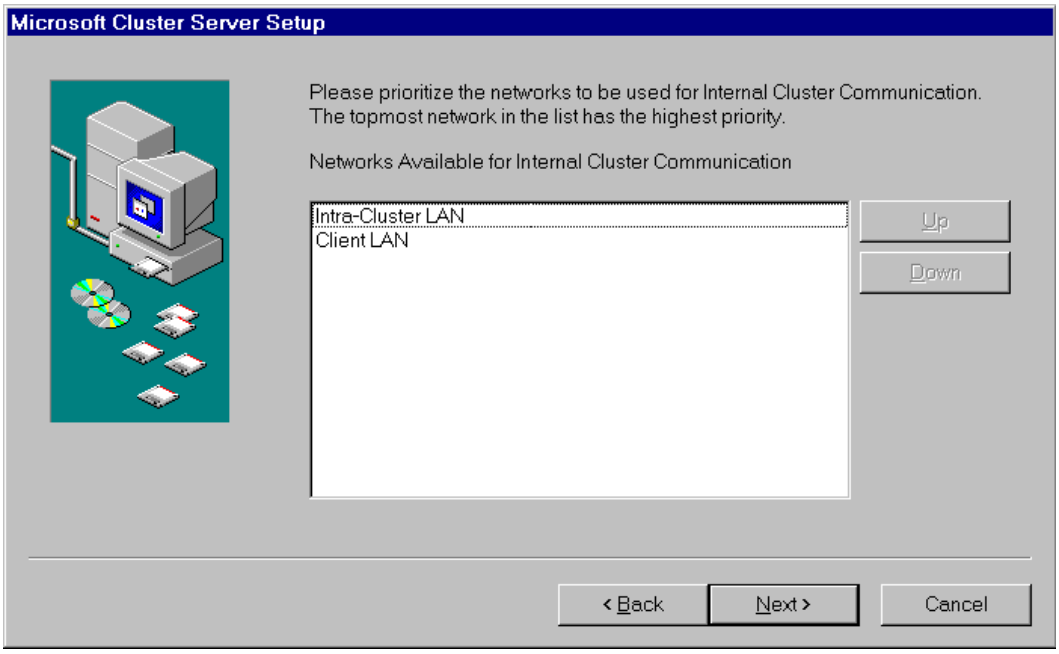
- **`Use only for internal cluster communications`**
  Choose this option if you are configuring an intra-cluster LAN adapter.
- **`Use only for client access`**
  Choose this option if you are configuring a client LAN adapter and System A and B reside on different IP subnets.

NOTE In this example, the intra-cluster LAN is shown first with the **`Adapter Name`** and **`IP Address`** already filled in. However, your configuration may display the Client LAN first.



Microsoft Cluster Server Setup, Assigning a Network Name to the intra-cluster LAN

10. Repeat the previous step for each LAN adapter. After you have configured all LAN adapters, click **`Next`**.
11. Setup lists your LAN adapters and asks you to prioritize them for internal communications between nodes. Move the Intra-cluster LAN to the top of the list so it has the highest priority. See the example dialog below.



Microsoft Cluster Server Setup, Setting the LAN Priority

12. Follow the on-screen instructions to order the adapters so that the intra-cluster LAN adapter is identified first (at the top of the list). After you have ordered the adapters click **Next**.

NOTE	If you previously defined the client IP addresses of Systems A and B as residing on different subnets, the client LAN will be unable to assume responsibility for intra-cluster communication.

13. Setup prompts you for the Cluster IP address. Type the proper IP address and subnet mask for the CLUSTER, then click **Next**.

NOTE	The previous step requires a unique IP address for the cluster. Do not use either of the IP addresses assigned to System A or System B.

14. Click **Finish** to complete installation of the Microsoft Cluster Server software. Setup activates your configuration specifications and starts the cluster service.
15. Microsoft Cluster Server is now fully installed on System A. Reboot System A.
16. To finish installation of the Microsoft Cluster Server, leave System A running, go to the next procedure and install MSCS on System B.

Install MSCS on System B

While you have been configuring System A, System B has been idling at the Restart dialog.

1. Click **Restart** to reboot System B to Windows NT.
2. Insert the *Component CD* of Microsoft Windows NT Server (Enterprise Edition) in the CD-ROM drive of System B.
3. Run the Microsoft Cluster Server setup program.
   Setup.exe is located in the following folder on the Component CD: `\mscs\cluster\i386.`
4. Setup examines your system and displays a dialog that lists a number of install options including **Join an existing cluster**.
5. Choose **Join an existing cluster** and click **Next**.
6. Identify the cluster using the same name you used when you formed the cluster at System B.
   Setup validates your entry by prompting you for the cluster domain account password.
7. Type the password.
   Setup prompts you to complete the installation upon entry of a valid password.
8. Click **Finish**.
   You have now installed and configured all necessary software and hardware components to create a Microsoft Cluster Server.
9. Reboot System B.

Install Service Pack or Hot Fix

After installing MSCS software your must either reinstall SP4 or if you installed SP 3, install the Hot Fix at this time.

Install Hot Fix

Install the Hot Fix (clusfixi.exe):

1. If you have not already downloaded *clusfixi.exe*, see "Software" in part "1 What's Needed."
2. Install the Microsoft hotfix *clusfixi.exe* on System A and System B.

NOTE	When downloading the file, refer to the Microsoft readme file for instructions on installing the hotfix.

8 Cluster Testing

There are two programs for testing the installed cluster. These programs are the Hardware Verification and Labeling Utility and the Cluster Installation Test.

Hardware Verification and Labeling Utility

The Hardware Verification and Labeling Utility scans the system and checks system integrity before you perform system configuration. It helps you simplify the assembly process that must be performed while trying to setup a new product.

With this utility you can:

- Create an asset inventory list
- Check cabling connections
- Label installed hardware
- Health check hardware components

Obtain the Utility

The Hardware Verification and Labeling Utility is included on the *HP NetServer Navigator CD-ROM*. You can run the test directly from the CD, or you can create a bootable floppy disk from HP NetServer Navigator's disk library. The floppy disk is bootable to ensure that it is independent of the customer's network operating system. However, it does not include COMMAND.COM, so it is not usable as a DOS disk.

Run the Utility

CAUTION	The Hardware and Verification Utility is designed to run on a single HP NetServer and not a cluster. Therefore, to prevent corrupting the shared storage in your cluster, power down the cluster node (HP NetServer) not being tested when running this test.

If the system is booted from the *HP NetServer Navigator CD-ROM* you will find that the utility does not appear as a direct menu choice. However, when the Configuration Assistant is run, you will be given the option of first running the Hardware Verification and Labeling Utility. This offer is only made the first time Configuration Assistant is selected after a reboot.

The Hardware Verification and Labeling Utility is supplied with a README.TXT file. This file contains detailed information on the utility and instructions for setting up and running the utility.

Cluster Installation Test

The HP Cluster Installation Test (CIT) should be performed on your installed cluster before placing it online. The CIT performs an operational failover test of the cluster to verify that if a node fails the operating node takes over all functions..

Obtain CIT

If you do not have CIT, see part "1 What's Needed" for instructions to download this program.

Run CIT

Follow the instructions in the CIT program. If additional information is needed refer to CIT on-line help. CIT help is context sensitive and has been expanded to provide detailed instructions for each step of the program.

NetRAID Supplement
to
HP NetServer
Microsoft Cluster Installation Guide

8 March 1999

Notice

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material. Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

The use of trademarks or other designations is for reference purposes only. The following trademarks are used in this manual:

- Microsoft and MS-DOS are U.S. registered trademarks of Microsoft Corp.
- Windows and Windows NT are trademarks of Microsoft Corporation.

Hewlett-Packard
Network Server Division
10955 Tantau Avenue
Cupertino, CA 95014-0770, USA

Intended Audience

This supplement is for the person who installs, administers, and troubleshoots the Microsoft Cluster Server. Hewlett-Packard Company assumes this person is qualified to service computer equipment and trained to recognize hazards in products with hazardous energy levels.

NOTE	Hewlett-Packard only supports and recommends installation of clustered HP NetServer systems using Microsoft Cluster Server software by a Microsoft or HP Cluster Certified Installer.

Version History

Date	Change
8 March 99	Revised to add instructions for HP Rack Storage/12.

Contents

NOTE	This supplement is incomplete without the HP NetServers Microsoft Cluster Installation Guide.

1 What's Needed

Software

- Obtain HP NetRAID Utilities as stated below.
- MS-DOS version 6.0 or later if using NetRAID or NeRAID-1. Not required for NetRAID-3Si.

Need More Help?

The following documents are available by choosing "Install" or "Reference Books" on the HP Information Assistant's Main menu:

- HP NetRAID User Guide
- HP Rack Storage/12 Installation Guide
- HP Rack Storage/8 Installation Guide
- HP Storage System/6 Installation Guide

Obtain HP NetRAID Utilities

You must use the cluster certified versions of the NetRAID driver and firmware for cluster installations. To obtain the correct versions of this software:

1. Go to the Certified Consultant's Corner of the HP cluster web at: http://www.hp.com/netserver/products/cluster.
2. Select your cluster configuration from the table.
3. Select NetRAID software from the table and download the applicable self-extracting archive:
   - For **NetRAID-3Si (D5955A)** the download is "3si_clus.exe"
   - For **NetRAID** (D4943A)and **NetRAID-1** (4992A) the download file is "nr_clust.exe"
4. Depending on the adapter you are using, create the installation floppy disks from the downloaded file following the instructions starting with step 5 or 6:
5. For NetRAID-3Si (D5955A)
   - Execute 3si_clus.exe to unpack the archive.
   - Follow the instructions in the readme.txt file to create the installation floppy disk. Label the floppy disk *NetRAID-3Si Cluster Firmware and Driver* then go to part 2 "NetServer Hardware Setup."

6. For NetRAID (D4943A) or NetRAID-1 (D4992A)

   - At Windows NT Explorer, extract the downloaded file by double-clicking the filename. The file is self-extracting, and when executed, creates the following subdirectories:

Subdirectory	***Contents***	***Label Floppy Disk***
Fw_dvr	*NetRAID firmware update and NetRAID Driver for Windows NT*	*NR Cluster Firmware and Driver*
Nrast_1	*HP NetRAID Assistant program Setup*	*HP NetRAID Assistant 1*
Nrast_2	*HP NetRAID Assistant program files*	*HP NetRAID Assistant 2*

7. Label three blank formatted floppy disks as listed.

8. Copy the contents of each subdirectory to the appropriate floppy disk.

2 NetServer Hardware Setup

1. Install HP NetRAID Adapters in the PCI slots specified by the HP NetServer Configuration Guide for your cluster configuration.

2. Make sure that previously installed adapters are in the correct PCI slots.

NOTE	For clusters using HP NetRAID adapters, typically, only one is provided (installed) in the server for management of shared storage. Some cluster configurations use two NetRAID adapters. If an additional adapter is provided install it in the next allowable PCI slot listed in the Configuration Guide.

3. Replace the HP NetServer cover(s) and secure thumbscrews.

part "3 Shared Storage Hardware Setup" of this supplement

3 Shared Storage Hardware Setup

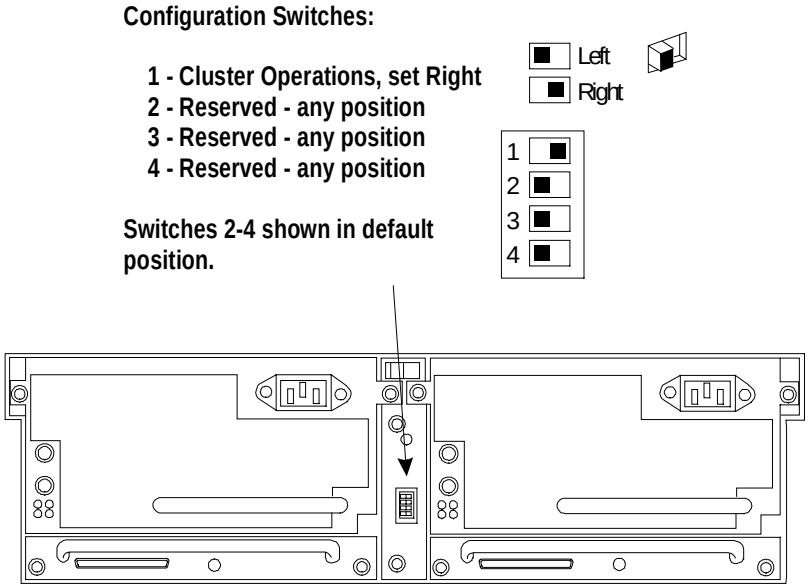
This section includes instructions for setup of three types of shared storage devices. Follow the instructions for the type(s) of devices that you are using in your cluster. See the Configuration Guide for allowed shared storage devices that can be used in your cluster.

- HP Rack Storage/12
- HP Rack Storage/8
- HP Storage System/6

HP Rack Storage/12 Setup

Set Configuration Switches

Set the configuration switches as shown below:



HP Rack Storage/12 Cluster Configuration

Install Additional Controllers

For use as shared storage in a cluster, each Rack Storage/12 must have two SCSI controllers. Install a second SCSI controller (D6025A) in each Rack Storage/12. Follow the instructions supplied with the Controller for installation.

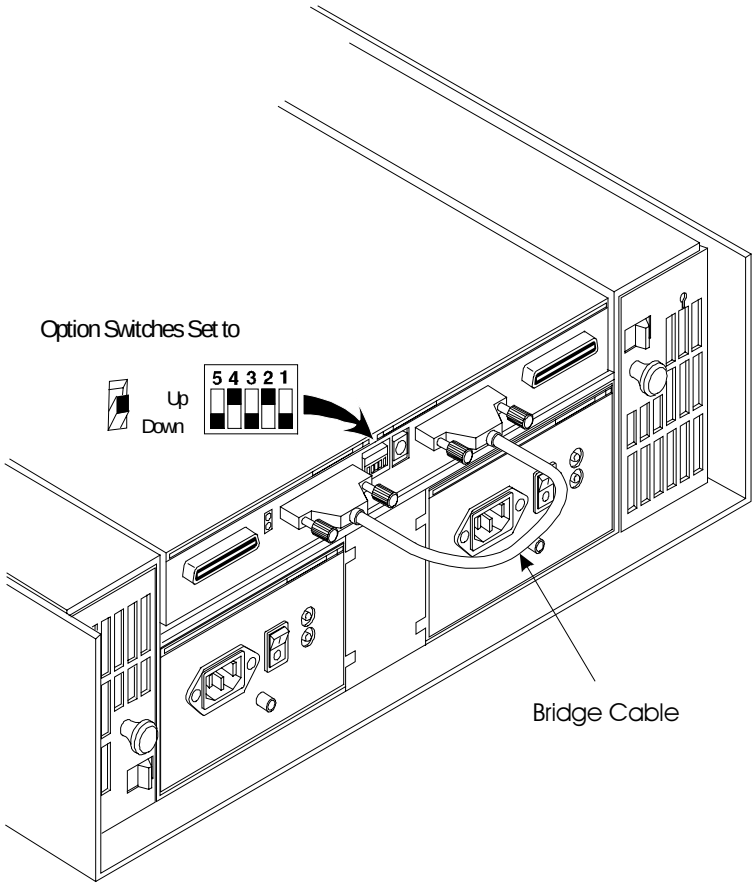
RETURN to part "4 Cluster Cabling and Setup" in the Installation Guide or setup another share storage device such as the Rack Storage/8.

HP Rack Storage/8 Setup

HP Rack Storage/8 units for shared storage in the cluster must be set up for single bus operation. When cabled as a single bus unit, the HP Rack Storage/8 provides up to 8 hard disk drives on a single SCSI bus. Although the HP Rack Storage/8 are shipped from the factory configured for single bus operations, check their setups as outlined below and make changes as necessary.

Set Option Switches

Set the option switches as shown below.



HP Rack Storage/8 Single Bus Configuration

Connect the Bridge Cable

Use the bridge cable included as part of the shipped items, and connect the port labeled **1-Out** to the port labeled **2-In**. as shown above.

RETURN to part "4 Cluster Cabling and Setup" in the Installation Guide

HP Storage System/6 Setup

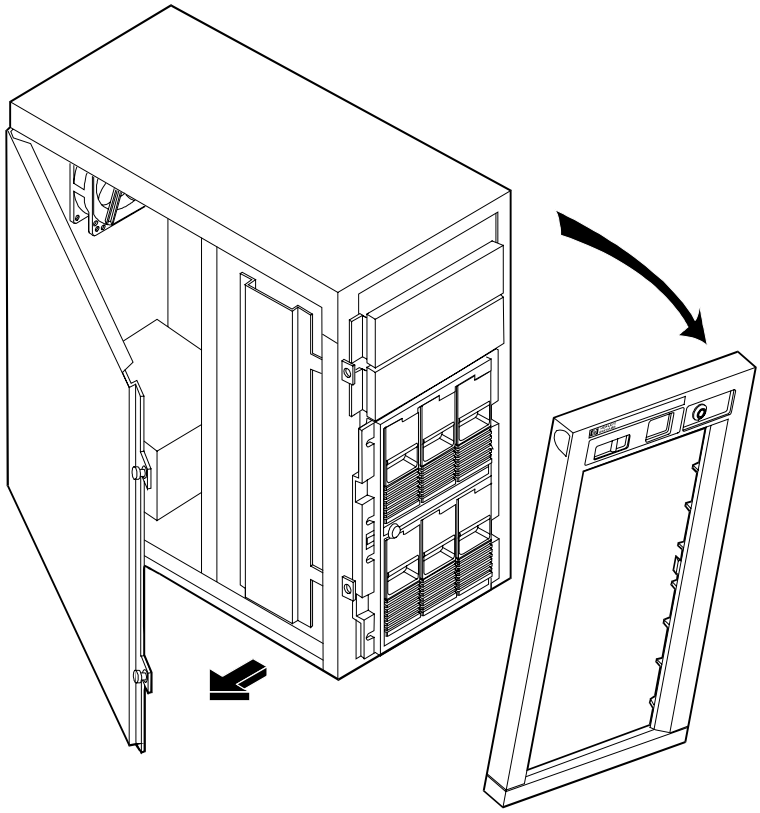
This section describes how to prepare the HP Storage System/6 for cluster operations by:

- Configuring the internal cabling on the HP Storage System/6.
- Assigning SCSI IDs for the disks in the HP Storage System/6 using DIP switches.

Access the Cabinet Interior

Before connecting the disks housed in the HP Storage System/6, set up the internal cables to support the cluster. To gain access proceed as follows:

1. Unlock the bezel from the chassis.
2. Pull the top of the bezel forward, swinging it down to clear the retaining clips at the bottom of the chassis. Lift the bezel away from the chassis as shown below.
3. Loosen the cover mounting screws using a flat-blade screwdriver.
   The screws remain attached to the cover.
4. Swing the cover open and lift it off the chassis.

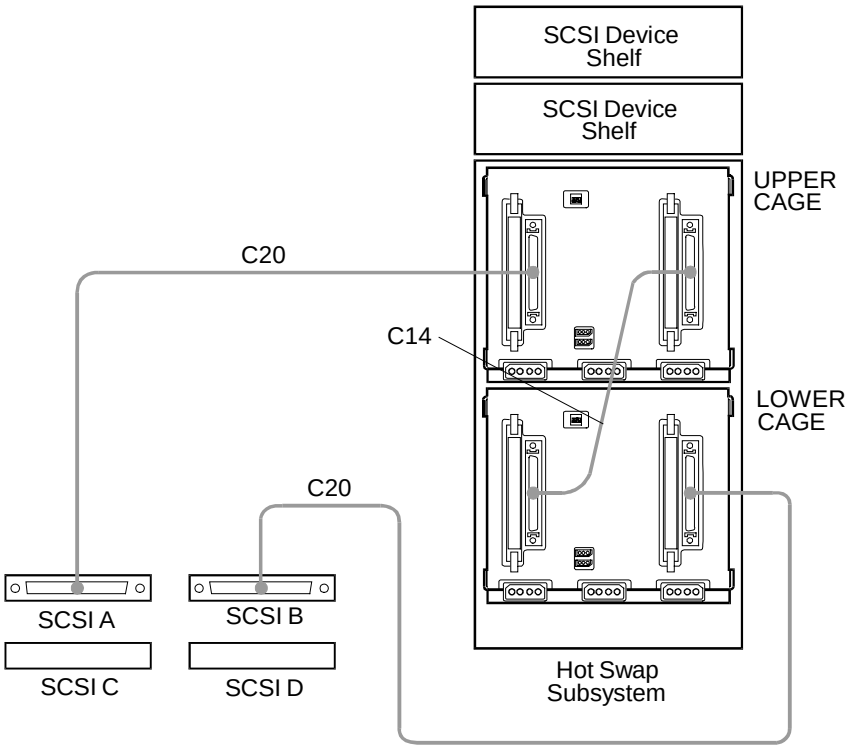


HP Storage System/6 Cabinet with Bezel and Side Cover Removed

Verify and Reconnect Internal Cabling

Using the schematic view of the HP Storage System/6's internal cabling shown below, check and if necessary, reroute the three cables located inside the storage unit. These are:

- C14: A short cable connecting the lower cage to the upper cage.
- C20: A cable connecting the external port and routed to the "in" side of the lower disk cage.
- C20: A cable connecting the other external port to the upper cage.



Cabling Diagram Legend

Cable Label	*Description*	*Part Number*
C14	*Fast-Wide SCSI (68 pin) cable*	*5182-6747*
C20	*Fast-Wide SCSI (68 pin) cable with external connector*	*5182-9326*

Storage System/6 Cabinet Internal Cabling

Assign SCSI IDs

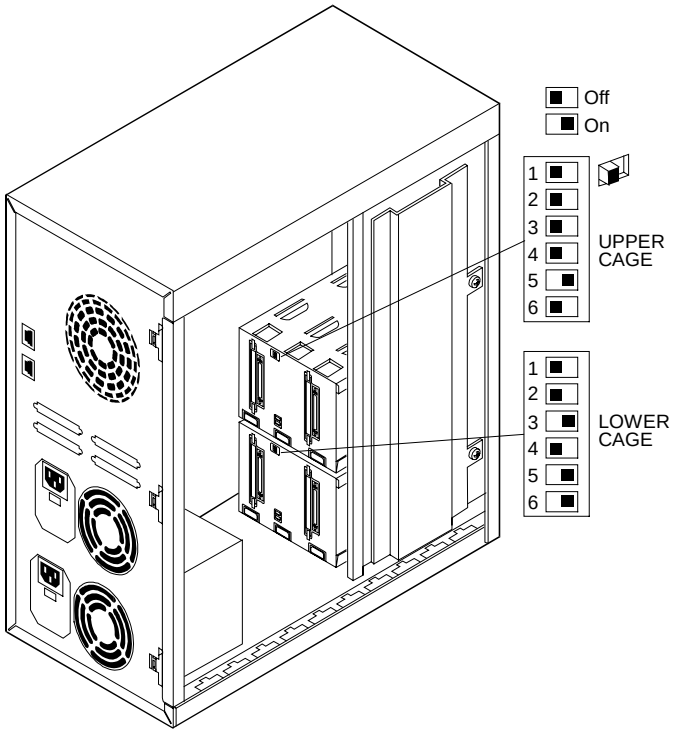
To configure the shared disks, change the SCSI ID assignments for each of the HP Storage System/6 units in the cluster:

1. Check, and if necessary reassign, SCSI IDs for both the upper and lower cages. Configure the upper and lower cage DIP switches as indicated below. Note that the upper cage settings are shown in their default positions.

2. Reattach and close the HP Storage System/6 side cover. Replace the front bezel. Leave the power off.

3. Repeat steps 1 and 2 for each HP Storage System/6 to be included in the cluster.

NOTE	The HP Storage System/6 must be operated with the side cover closed to ensure proper airflow and to prevent radio frequency interference.



HP Storage System/6 DIP Switch and Cluster Assignments

WARNING	Do not cable the shared storage units to System A or B at this time. You must configure the HP NetRAID Adapter and install Microsoft Windows NT Server, Enterprise Edition before attaching the shared storage unit.

RETURN to part "4 Cluster Setup and Cabling" of the Installation Guide

4 Cluster Cabling and Setup

Connect Shared Storage

NOTE	NetRAID channels must not cross. That is, make sure to connect channel 0, 1, and 2 from one HP NetServers through the storage cabinet to channel 0, 1, and 2 respectively on the second HP NetServer. Follow the cabling diagram(s) in the configuration guide carefully. It is a good idea to number or color-code the cable ends for the channels used. In this way, when a cluster device is removed for maintenance or repair, it can easily be reconnected without danger of crossing channels.

CAUTION	To prevent damage to device cables before extending any racked device from the rack, check that there is either sufficient cable length or disconnect the cables. Also make sure to extend the anti-tip bar at the bottom front or rear (if applicable) of the rack before extending any devices.

Cabling Guidelines

- **Use the Right Cables**. Only cables specified in your Configuration Guide are to be used for connecting NetServers and shared storage.
- **Use Diagrams in the Configuration Guide**. Cabling a cluster requires that SCSI connections be made in a specific manner so that the appropriate redundancy and therefore, high availability requirements are meet. Use the diagrams in the applicable Configuration Guide to cable the cluster configuration.
- **Rack Layout**. Cables bundled with a clustered system dictate the stacking or arrangement of devices in the rack. When defining your cluster using HP Rack Assistant, a rack layout should have been printed. Lay out devices in the rack according to the Rack Assistant layout to ensure that all required cable connections can be made and that the layout conforms to usability and safety standards.

Power Down Shared Storage

If Shared Storage power is on, make sure that it is turned off before continuing.

to part "5 NetServer Software Setup of the Installation Guide"

5 NetServer Software Setup

This part of the supplement is intentionally left blank.

6 Shared Storage Software Setup

NOTE	In "Update the Firmware" and "Launch HP NetRAID Express" you are required to take action during bootup. Review these procedures before restarting the system so that you are prepared to take the necessary actions.

Update the Firmware

Perform one of the two following procedures based on the NetRAID version you are using for shared storage.

Update the Firmware for NetRAID (D4943A) or NetRAID-1 (D4992A)

1. Restart System A and during bootup (after initialization and channel scanning) check that the displayed HP NetRAID firmware version for all installed NetRAID adapters is:

   HP NetRAID Adapter BIOS VER S.01.00 or later.

   If correct, go to "Configure Your Systems NetRAID Adapters" below. If not, go to the next step.

2. Shut down the system and boot to DOS.

3. Insert the utility floppy disk labeled *NR Cluster Firmware and Driver* in the system's floppy drive and log on to the A drive.

4. At the A: prompt, run the firmware update program mflash.exe by typing: a:\mflash [Return].
   The mflash utility begins updating the firmware and provides feedback in the form of animated bars that assess the utility's progress.

5. Be sure to update the firmware for all NetRAID adapters. When complete, click Yes and reboot the system when prompted.

Update the Firmware for NetRAID-3Si (D5955A)

1. Restart system A and during bootup (after initialization and channel scanning) check that the displayed HP NetRAID-3Si BIOS and firmware versions for all installed NetRAID-3Si adapters is shown on the boot banner as:

   BIOS VER B.01.10
   Firmware Ver W.01.20

   If correct, go to "Configure Your Systems NetRAID Adapters" below. If not, go to the next step.

2. Insert the *NetRAID-3Si Cluster Firmware and Driver* floppy disk you created earlier and reboot the system.

3. The system will boot to DOS and run the HP NetRAID firmware flash utility. Follow the instructions to update the firmware on all NetRAID-3Si adapters. When complete, cycle power on the system to reboot.

Configure Your Systems NetRAID Adapters

Launch HP NetRAID Express

When the following prompt appears, press Ctrl+M:

```
Option: Experienced users may press <Ctrl> <M>
for HP NetRAID Express Tools now.
```

NOTE	Configure the NetRAID Adapters in your system using one of the two following procedures. The procedure you will use is based on whether your are or are not using a NetRAID Adapter for Local Storage.

Configure the Adapters (not using a NetRAID Adapter for Local Storage)

1. From the Management Menu check that the BIOS is **Disabled**. If not, disable it.
   HP NetRAID Express Tools displays the message, **BIOS Is Currently Disabled**.

2. If you have more than one NetRAID card, from the Management Menu select the first shared storage adapter (**Select Adapter**, **Adapter-0**).

3. From the Management Menu select **Objects**, **SCSI Channel**.

4. Perform one of the following based on the shared storage adapter you are using

   NetRAID (D4943A) or NetRAID-1 (D4992A). Select each channel you are using in turn. Set the termination to **Terminate Wide Channel**. Set **Ultra SCSI** to **DISABLED**.

   NetRAID-3Si. Select each channel you are using in turn. For each channel connected to a Rack Storage/8, set the **SCSI Transfer rate** to **ULTRA**. For each channel connected to a Rack Storage/12, set the **SCSI Transfer rate** to **ULTRA-2**.

5. Enable cluster mode on the shared storage NetRAID adapter by choosing **Objects**, **Adapter**, **Adapter-0**, **Cluster Mode**, then **Enable**.

6. Choose **Initiator ID**. Make sure the Initiator ID is set as listed below. If not, change the settings. If changes are made you will be prompted to reboot the system. :

   - System A **Initiator ID** to **7**
   - System B **Initiator ID** to **6**

7. If you are using a second adapter for shared storage, repeat this procedure starting with step 2, except replace **Adapter-0** with **Adapter-1**.

8. Exit HP NetRAID Express Tools when all adapters have been configured.

9. Power down System A, power up System B, and repeat the procedures for System B starting at the beginning of this part (Update the Firmware).

Configure the Adapters (using a NetRAID Adapter for Local Storage)

1. From the Management Menu check that the BIOS is **Enabled**. If not, enable it.
   HP NetRAID Express Tools displays the message, **BIOS Is Currently Enabled**.

2. If you are using a NetRAID (D4943A) or NetRAID-1 (D4992A) for local storage:

   From the Management Menu select the local storage NetRAID adapter (**Select Adapter**, **Adapter-0**). Then select **Objects**, **SCSI Channel**. Select each channel you are using in turn and make sure the termination is set to **Terminate Wide Channel**.

3. From the Management Menu select the local storage NetRAID adapter (**Select Adapter**, **Adapter-0**). Then select **Objects**, **SCSI Channel**. Based on the disks and enclosure you are using (refer to the documentation for these devices) set the SCSI transfer rate for each channel of the NetRAID Adapter.

4. Disable cluster mode on the local storage NetRAID adapter by choosing **Objects**, **Adapter**, **Adapter-0**, **Cluster Mode**, then **Disable**.

5. From the Management Menu, select the shared storage NetRAID adapter (**Select Adapter, Adapter-1**). Choose **Objects**, then **SCSI Channel**.

6. Perform one of the following based on the shared storage adapter you are using

   NetRAID (D4943A) or NetRAID-1 (D4992A). Select each channel you are using in turn. Set the termination to **Terminate Wide Channel**. Set **Ultra SCSI** to **DISABLED**.

   NetRAID-3Si. Select each channel you are using in turn. For each channel connected to a Rack Storage/8, set the **SCSI Transfer rate** to **ULTRA**. For each channel connected to a Rack Storage/12, set the **SCSI Transfer rate** to **ULTRA-2**.

7. Enable cluster mode on the shared storage NetRAID adapter by choosing **Objects**, **Adapter**, **Adapter-1**, **Cluster Mode**, then **Enable**.

8. Choose **Initiator ID**. Make sure the Initiator ID is set as listed below. If not, change the settings. If changes are made you will be prompted to reboot the system.

   - System A Initiator ID to 7
   - System B Initiator ID to 6

9. If you are using a second adapter for shared storage, repeat this procedure starting with step 5 except replace **Adapter-1** with **Adapter-2**.

10. Exit HP NetRAID Express Tools when all adapters have been configured.

11. Power down System A, power up System B, and repeat the procedures for System B starting at the beginning of this part (Update the Firmware).

Install NetRAID Software

1. With System A off reboot System B to NT.

2. If you are using a NetRAID Adapter for local storage you have already installed the NetRAID driver, therefore go to step 7. Otherwise, start with the next step to install the driver.

3. At the Windows NT's Control Panel start the SCSI Adapters utility.

4. Select the **`Drivers`** tab, **`Add`**, and then **`Have Disk.`**

5. Insert the floppy disk labeled *NR Cluster Firmware and Driver* if you are using a NetRAID or NetRAID-1 adapter for share storage or insert the floppy disk labeled *NetRAID-3Si Cluster Firmware and Driver* if you are using a NetRAID-3Si adapter for shared storage. Click OK.

   If you have not created this floppy disk, go to "Obtain HP NetRAID Utilities" in part "1 What's Needed" of this supplement to create the floppy disk.

6. Follow screen prompts to install the driver, then remove the floppy disk and click **`Yes`** to reboot the system.

7. Insert the floppy disk labeled *HP NetRAID Assistant 1* that you created earlier into the floppy drive. If you have not created this floppy disk create using one of the following:

   NetRAID (D4943A) or NetRAID-1 (D4992A) for shared storage, go to "Obtain HP NetRAID Utilities" in part "1 What's Needed" of this supplement.

   NetRAID-3Si for shared storage, go to "Configure NetServer Hardware and BIOS" in part "5 NetServer Software Setup" of the Installation Guide.

8. Run SETUP.EXE.

9. During installation of HP NetRAID Assistant, you will see two options:

   - Manage NetRAID adapters
   - Manage NetRAID adapters in NT and Netware servers

10. Choose the option that does not include Netware servers.

11. When installation is complete, shutdown System B, reboot System A to NT and repeat the above procedures on System A.

CAUTION	In the LH 3 NetRAID cluster configuration, the NetRAID driver puts an event in the NT system log during reboot. The entry is: Event ID: 4 Source: mraidnt Type: Error Description: Driver detect an internal error in its data structure for. This is a spurious event and may be ignored. No error occurred.

Power Up Shared Storage

Turn on power for the HP shared storage cabinet(s).

Create the Arrays

CAUTION	From this point forward and until Microsoft Cluster Server Software is fully installed after part "7 Microsoft Cluster Server Software Setup" in the Installation Guide, make sure that only one HP NetServer is running Windows NT 4.0 at a time. The other system must be held at the NT loader prompt. (Hold the NetServer at the NT loader prompt by pressing Esc during reboot when prompted to select the operating system.)

Define RAID Arrays

Check that no CDs or floppy disks are in System A drives.

1. Power on System B and hold it at the NT loader prompt by pressing Esc during reboot when prompted to select the operating system. Use the following steps to create and initialize the shared logical disks on System A.

2. Setup your RAID arrays using RAID level 1, 5, 10 and/or 50.. See "Set RAID Levels on a Cluster" below for examples of how to setup RAID levels. Refer to the HP NetRAID User Guide in HP Information Assistant for detailed information about HP NetRAID configuration issues.

NOTE	Make sure each RAID array's cache write policy is set to **`Write Thru`**. Using a "Write Back" cache policy for shared storage can cause an application to read stale data from storage after a failover. Cache write policy is set when the RAID array is being defined in the NetRAID Assistant configuration wizard at the logical drive definition pane by pressing the Advanced button. If you do not set the cache write policy to **`Write Thru`**, the NetRAID Assistant will not configure the array.

After setting RAID levels as stated below return to "Create the Array File Systems" in part "6 Shared Storage Software Setup" of the Installation Guide.

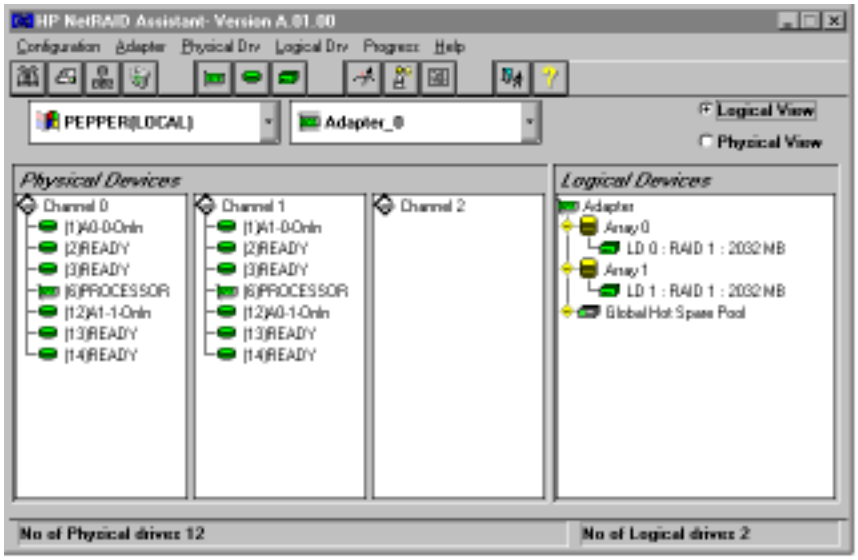
Set RAID Levels on a Cluster

Use these instructions to set up HP NetServer cluster RAID level 1, 5, 10, or 50, or any combination of these levels. Refer to the Configuration Guide for your cluster configuration for allowable RAID levels. See part "1 What's Needed" in the Installation Guide.

Getting Started

NOTE	If not already done, partially boot System B and hold it at the NT loader prompt by pressing Esc during reboot when prompted to select the Operating System. Boot System A to NT.

From the Windows NT **`Start`** menu, click **`Programs|NetRAID|NetRAID Assistant`**. The HP NetRAID Assistant program loads and displays its main window.



HP NetRAID Assistant Screen

HP NetRAID Assistant lists the Physical Devices (actual physical drives) and Logical Devices (RAID arrays) on the NetRAID Assistant screen. The Physical Devices heading lists the drives in columns by channel. Some clusters do not use channel 2 and so no devices will be listed. Likewise, some clusters only use one channel and so both channels 1 and 2 will be devoid of entries.

To view the properties of a physical or logical device listed, double-click the device. The number in parentheses to the right of each physical drive icon is its SCSI ID. The state of each physical drive appears to the right of the SCSI ID. Initially the device will be described as READY. The possible states of a physical drive are as follows:

The state...	***Indicates the drive is...***
Onln	*Online, functioning normally, and part of a configured array.*
Rdy or READY	*Functioning normally, but not part of a configured logical drive nor configured as a hot spare.*
HOTSP	*Configured as a hot spare, powered up and ready for use.*
FAILED	*Out of service because a fault occurred.*
REBUILDING	*Rebuilding an array on a new drive.*

Refer to the HP NetRAID User Guide in Information Assistant for more information about HP NetRAID Assistant.

Setup RAID 1 and 10 Arrays

Each RAID 1 disk array is composed of two hard (hot swap) drives located in external shared storage cabinets. RAID level 1 (mirroring) provides storage redundancy with maximum performance. A RAID 1 array consists of two drives that contain exactly the same data. That is, all of the data on one drive is replicated (mirrored) on the other. Since each drive contains a complete copy of all data, all data is still

available after the failure of one drive. To rebuild the RAID array after a failure, the failed drive is replaced and the data simply copied from the good drive to the new drive. The following table shows how data is distributed:

Raid Level 1 Data Distribution

Stripe	*Drive 1*	*Drive 2*
1	*Block 1*	*Block 1*
2	*Block 2*	*Block 2*
3	*Block 3*	*Block 3*

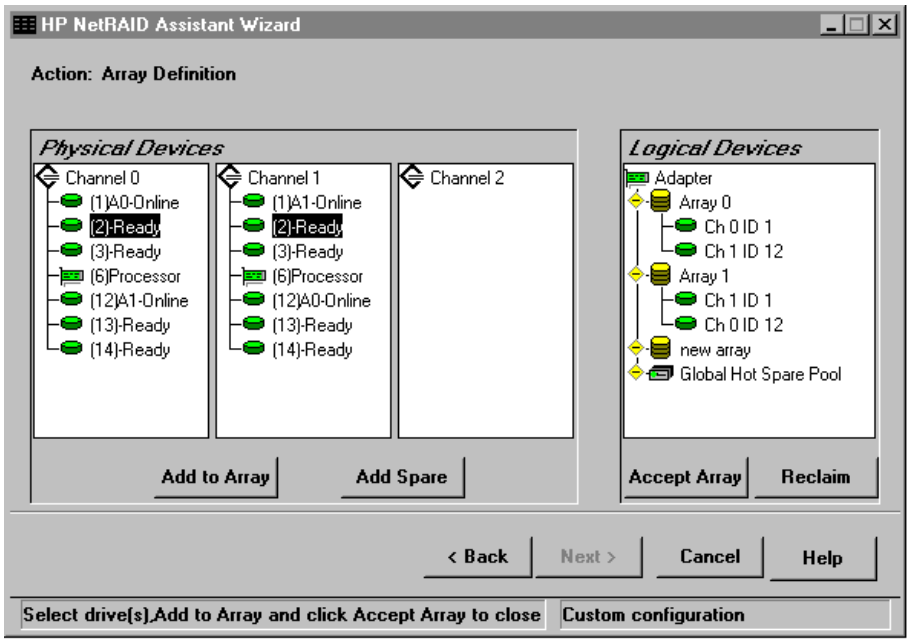
A RAID 10 disk array comprises multiple RAID 1 disk arrays to provide a larger volume (2 for NetRAID or NetRAID-1 and up to 4 for NetRAID-3Si).

Define an Array

RAID arrays are defined using the Configuration Wizard. To define an array:

1. On the NetRAID Assistant's menu bar click **`Configuration`**, then **`Wizard`**.

2. Select **`Custom`** in the dialog and click **`Next`**.
   The Configuration Wizard displays its Array Definition window.



HP NetRAID Array Definition

3. In the Array Definition window define an array by selecting the two physical drives in the **`Physical Devices`** pane that will comprise the array.
   As you click your selections, they are highlighted.

4. Click **`Add to Array`**, then **`Accept Array`**.

5. If you want to create a RAID 10 array, repeat steps 3 and 4 to define identical arrays.

Set Array Parameters

After the array has been defined, set its parameters as follows:

1. Click **Next**.
   The wizard displays its **Logical Drive Definition** window.

2. This window shows the array's RAID level and its usable size.

NOTE	Since all data is duplicated, the size of the array is one-half the sum of the capacity of the two drives composing the array.

3. Click **Advanced** and set the **Write Policy** to **Write Thru**. Click **OK**.

4. If you are creating a RAID 1 array, press **Accept**. If you are creating a RAID 10 array, check the **Span Arrays** box, then press **Accept**.

5. If you:

   - want to define another array, click **Back** and repeat the steps listed in "Define an Array" above starting with step 3.
   - have identified all your arrays, click **Next**, **Finish**, and then **OK**.
     NetRAID Assistant saves the array configuration and prompts that the array configuration has changed. Click **OK**.

Initialize the Array

After you have defined the cluster's arrays, initialize the arrays you defined. HP NetRAID Assistant initializes all arrays at the same time.

To initialize the arrays:

1. Click **OK** at the **Would you like to Initialize?** prompt.
   HP NetRAID Initialization may be time consuming. Plan on 5 to 15 minutes per array.

2. When initialization is complete, exit NetRAID Assistant.

Setup RAID 5 and 50 Arrays

Each RAID 5 disk array is composed of at least three hard (hot swap) drives located in external shared storage cabinets. RAID level 5 (striping with distributed parity) provides storage redundancy with good overall performance and a minimum loss in storage capacity. With RAID 5 the equivalent of only one hard drive in the array is used for redundancy.

The following table shows how data is distributed for a RAID 5 array of three disks. Each stripe has one block assigned to store parity data. Parity data is used to reconstruct the data on that stripe if one of the disks fails. Parity information is distributed equally among all disk drives to equalize data I/O and achieve better overall performance.

Raid Level 5 Parity Distribution

Stripe	***Disk 1***	***Disk 2***	***Disk 3***
1	*Block 1.1*	*Block 1.2*	*Parity 1*
2	*Block 2.1*	*Parity 2*	*Block 2.2*
3	*Parity 3*	*Block 3.1*	*Block 3.2*

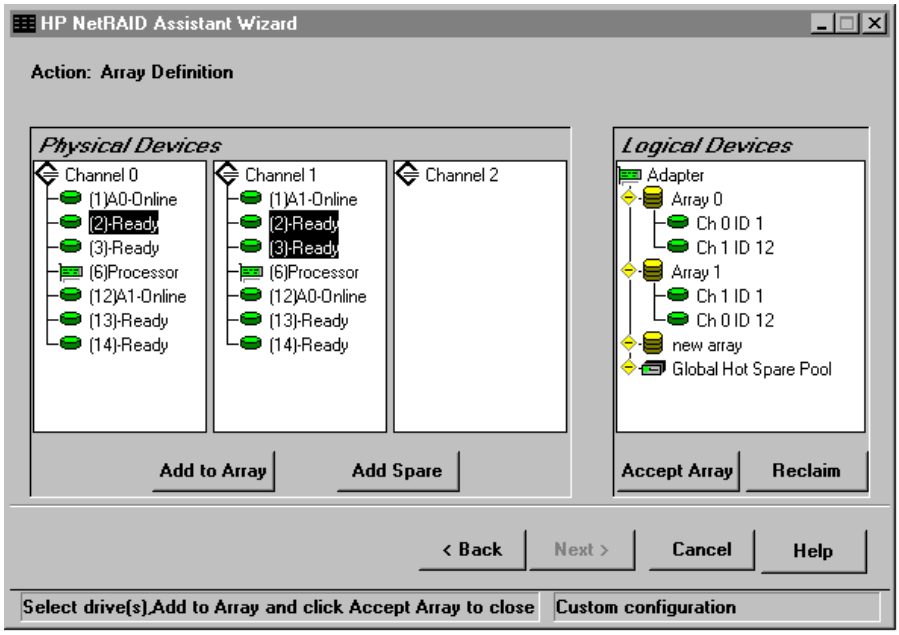
A RAID 50 disk array comprises multiple RAID 5 disk arrays to provide a larger volume (2 for NetRAID or NetRAID-1 and up to 4 for NetRAID-3Si).

Define the Array

RAID arrays are defined using the Configuration Wizard. To define an array:

1. On the NetRAID Assistant's menu bar click **Configuration**, then **Wizard**.

2. Select **Custom** in the dialog and click **Next**.
   The Configuration Wizard displays its Array Definition window.



HP NetRAID Array Definition

3. In the Array Definition window define an array by selecting the three or more physical drives in the **Physical Devices** pane that will comprise the array.
   As you click your selections, they are highlighted.

4. Click **Add to Array**, then **Accept Array**.

5. If you want to create a RAID 50 array, repeat steps 3 and 4 to define identical arrays.

Set Array Parameters

After the array has been defined, its parameters must be set.

1. Click **Next**.
   The wizard displays its **Logical Drive Definition** window.

2. This window shows the array's RAID level and its usable size.

NOTE When Disk Administrator calculates disk capacity, it disregards redundancy storage used by the selected RAID level. Therefore, the displayed and useable storage capacity for the

array is less than the total capacity of all drives in the array. The useable array capacity will be C(N-1), where N is the number of drives and C is the capacity of one drive.

3. Click **Advanced** and set the **Write Policy** to **Write Thru**. Click **OK**.

4. If you are creating a RAID 5 array, press **Accept**. If you are creating a RAID 50 array, check the **Span Arrays** box, then press **Accept**.

5. If you:

   - want to define another array, click **Back** and repeat the steps listed in "Define an Array" above starting with step 3.
   - have identified all your arrays, click **Next**, **Finish**, and then **OK**.
     NetRAID Assistant saves the array configuration and prompts that the array configuration has changed. Click **OK**.

Initialize the Array

After you have defined the cluster's arrays, initialize the arrays you defined. HP NetRAID Assistant initializes all arrays you have defined at the same time.

To initialize the arrays:

1. Click **OK** at the **Would you like to Initialize?** prompt.
   HP NetRAID Initialization may be time consuming.

2. When initialization is complete, exit HP NetRAID Assistant.