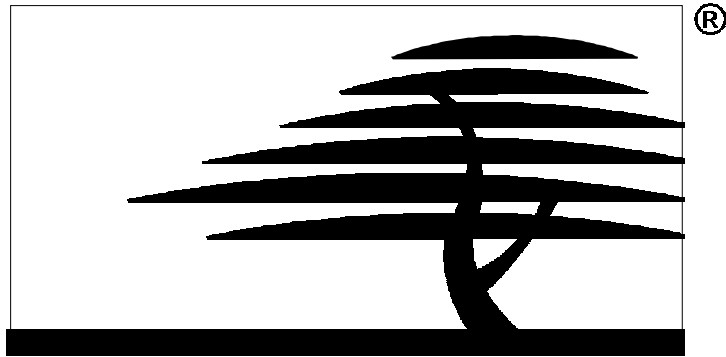




SCO

**UnixWare[®] 7 NonStop[®]
Clusters[®] Curriculum
Hardware Supplement**

Release: 1.0

For Software: UnixWare[®] 7 NonStop[®] Clus-
ters Version 7.1.1

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1

Hardware Overview



Lesson 1

Hardware Overview

Introduction

This supplement provides information on the specific hardware components supported by UnixWare 7 NonStop Clusters. It is separate from the NonStop Clusters course guides for several reasons:

- The core NSC curriculum is hardware- and vendor-independent.
- The ***NSC Curriculum Hardware Supplement*** can be revised separately as new hardware becomes available without requiring the entire course to be updated.

While it may be theoretically possible to use any computer capable of running UnixWare 7 as a cluster node, or any JBOD storage system as protected storage, this document lists only those components that have been certified by the vendor and/or SCO to work with SCO UnixWare 7 NonStop Clusters.

Note In some cases, the certifying vendor only supports specific configurations. That is, they may only support storage solution A when using computer models 1 through 3 as nodes, and storage solution B with when using their other supported computers as nodes. Where possible, this information is also included in this document and should be followed faithfully.

For the latest information on hardware supported by UnixWare[®] 7 NonStop[®] Clusters, see:

<http://www.sco.com/products/clustering/uw7nschw.html>

Organization

This supplement is divided into chapters for each hardware vendor. Within each chapter are sections for each hardware component, for example, nodes, protected storage, and server area network. Earlier sections list the currently supported devices, later ones provide detailed instructions for their installation and configuration.

To reflect the rapidly changing list of supported components, you are also directed to URLs on the world-wide web to find the latest information about any given vendor or component.

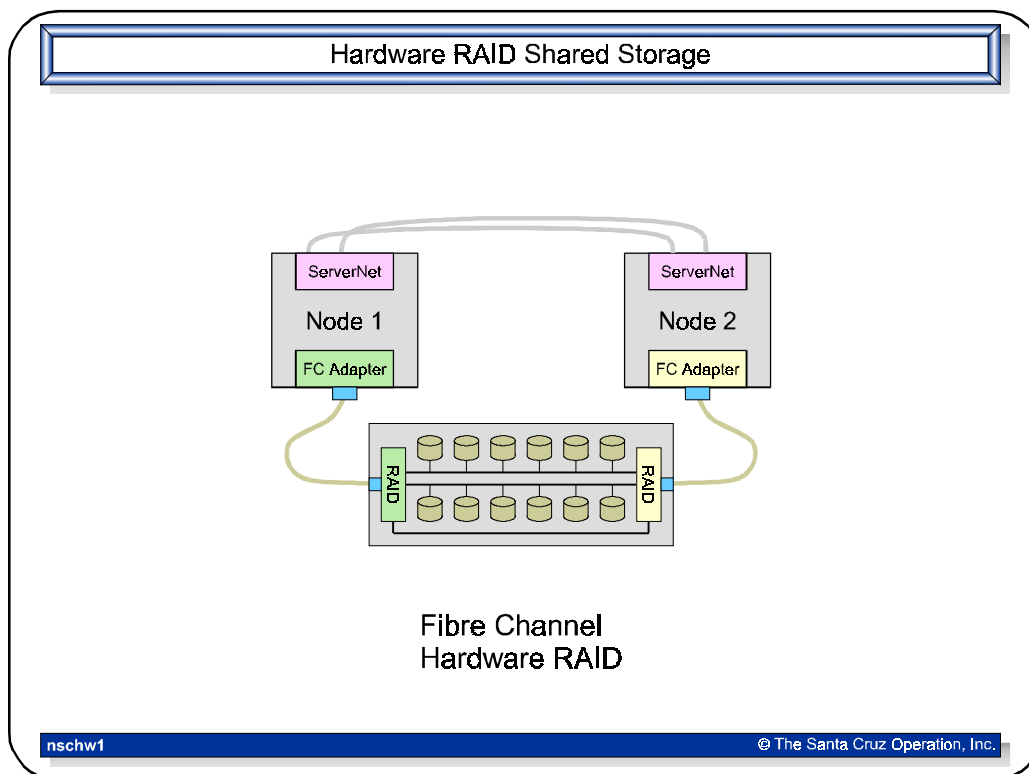
This first chapter is essentially a placeholder that allows generic cross-references from other NSC courses. Each section here points to the corresponding section in the vendor's chapter.

1.1 Supported Nodes

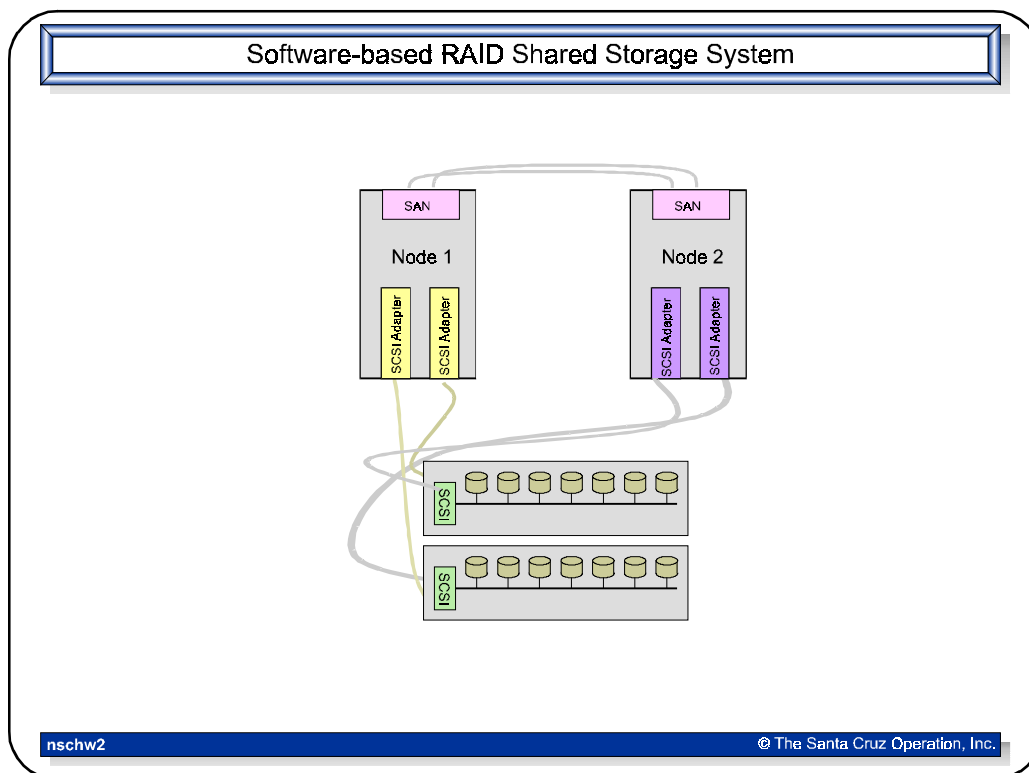
Several vendors have certified computer systems for use as nodes in a NonStop Cluster. Each vendor is listed below in its own subsection. Any vendor-specific information that applies to all of their nodes is discussed before any computer-specific information.

- See Section 1.1, “Compaq Supported Nodes,” on page 25 of the Compaq chapter.

AV 1-1



AV 1-2



1.2 Supported Protected Storage Methods

Several vendors have certified storage solutions for use as protected storage in NonStop Clusters. For vendor specific information, see:

- Section 1.2, “Compaq Shared Storage Units,” on page 27 of the Compaq chapter

Some vendors’ solutions:

- Are only intended to be used with their nodes
- Are meant to be used with any vendors’ nodes

All reliable storage systems are all based on redundant array of inexpensive disks (RAID) technology. RAID level 1 (disk mirroring) provides the highest level of data availability.

Storage systems are divided into two types; hardware-based RAID systems and software-based RAID systems.

The reliable storage system for the root file system must attach to both the current root node and the failover root node, so that each of the nodes has a path to the mirrored drive pair.

Secondary node pairs may also have reliable storage systems. Again, the basic connection requirement is that each node in the node pair must have a path to the mirrored drive pair.

Hardware-based RAID systems:

- Require specially-designed and configured RAID hardware to provide the mirroring of data on identical drives.
- Provide mirroring that is transparent to the software, and thus provides the fastest mirroring and failover operation.
- This transparency and speed comes at a higher cost for storage hardware, and some complex initial configuration of the storage system hardware.

Software-based RAID systems:

- Require the Veritas disk mirroring software in addition to the Veritas Volume Manager
- Can be used for internal storage, as exemplified by the cross-node mirroring support for all certified cluster hardware
- Can be used for external storage solutions that do not support RAID
- Is the lowest-cost solution, but incurs a performance penalty in moving data over the SAN to the mirrored drives.

1.3 Supported Server Area Network (SAN) Equipment

This section describes SAN options, including their components and capabilities. For specific information, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.3, "Compaq ServerNet I Equipment (SAN Interconnect)," on page 31 of the Compaq chapter.

1.4 Assembling Racks

These guidelines are provided to help you understand how to assemble racks for your cluster hardware. For specific instructions, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.4, "Assembling Compaq Racks," on page 33 of the Compaq chapter.

1.5 Assembling Nodes

These guidelines are provided to help you understand how to assemble your cluster nodes. For specific instructions, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.5, "Assembling Compaq Nodes," on page 39 of the Compaq chapter.

1.6 Assembling Shared Storage

These guidelines are provided to help you understand how to assemble shared storage units for your cluster. For specific instructions, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.6, “Assembling Compaq FibreChannel RAID Arrays,” on page 43 of the Compaq chapter.

1.7 Assembling SAN Switches

These guidelines are provided to help you understand how to assemble SAN switches. For specific instructions, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.7, “Assembling Compaq SAN Switches,” on page 49 of the Compaq chapter.

1.8 Initializing Nodes

These guidelines are provided to help you understand how to configure and initialize your cluster nodes. For specific instructions, refer to your hardware manufacturer's chapter in this guide:

- See Section 1.8, "Initializing Compaq Cluster Nodes," on page 50 of the Compaq chapter.

1.9 Initializing Shared Storage

These guidelines are provided to help you understand how to configure and initialize your shared storage unit(s). For specific instructions, refer to your hardware manufacturer's chapter in this guide.

- See Section 1.9, “Initializing Compaq Shared Storage Units,” on page 57 of the Compaq chapter.

1.9.1 Creating a logical volume for the external disk subsystem

If your cluster has an external storage system, you might be required to create at least one disk-subsystem logical volume for the *root* filesystem on your cluster before the UnixWare operating system will recognize the disk subsystem. Note that a disk subsystem logical volume is not the same thing as a Veritas logical volume.

The disk-subsystem logical volume must be at least as large as the internal disk for node 1 (the initial installation node). If you are preparing your system to take advantage of the OSU feature for future releases, you must create the disk-subsystem logical volume twice as large as the root filesystem.

- See Section 1.9.2, “Creating a logical volume for Compaq disk subsystems,” on page 63 of the Compaq chapter.

1.9.2 Stamping disks in the external disk subsystem

Certain storage system require that you verify the array's hardware connections and stamp its logical volumes with a SCSI nexus.

A nexus is a unique identifier for each disk. It is the name of the device in the `/dev/dsk` and `/dev/rdisk` directories and has the form `c#b#t#d#` where:

- The # after the 'c' is a controller number
- The # after the 'b' is a bus number
- The # after the 't' is a target-id (sometimes called TID) number
- The # after the 'd' is a logical unit (sometimes called LUN) number

This must be done after UnixWare 7 is installed on the initial root node, but before the NSC software is installed.

- See Section 1.9.3, "Stamping disks in a Compaq Fibre array," on page 65 of the Compaq chapter.

1.10 Powering Down Cluster Hardware

If your cluster hardware requires a specific power down sequence, the procedure is included in the section for your manufacturer.

- See Section 1.10, “Powering Down Compaq Clusters,” on page 72 of the Compaq chapter.

1.11 Testing the SAN Interconnect

Some vendors provide utilities to verify proper installation and cabling of the System Area Network (SAN) prior to UnixWare software installation. See your vendor's section to determine whether this is required.

- See Section 1.11, “Testing Compaq ServerNet SAN Interconnect,” on page 73 of the Compaq chapter.

1.12 Vendor-Supplied Software

If your hardware vendor requires additional drivers or software for UnixWare 7.1 to support your cluster hardware, you might need to create HBA disks to use during operating system installation, or EFSes to be installed after UnixWare 7.1 is running.

- See Section 1.12, “Compaq-Supplied Software,” on page 78 of the Compaq chapter.



2

Compaq Hardware Supplement



Lesson 2

Compaq Hardware Supplement

Introduction

This supplement provides information on the specific hardware components supported by Compaq for SCO UnixWare 7 NonStop Clusters.

To reflect the rapidly changing list of supported components, you are also directed to URL:

<http://www.compaq.com/pub/solutions/enterprise/>

on the world-wide web to find the latest information about Compaq certified hardware for NSC.



1.1 Compaq Supported Nodes

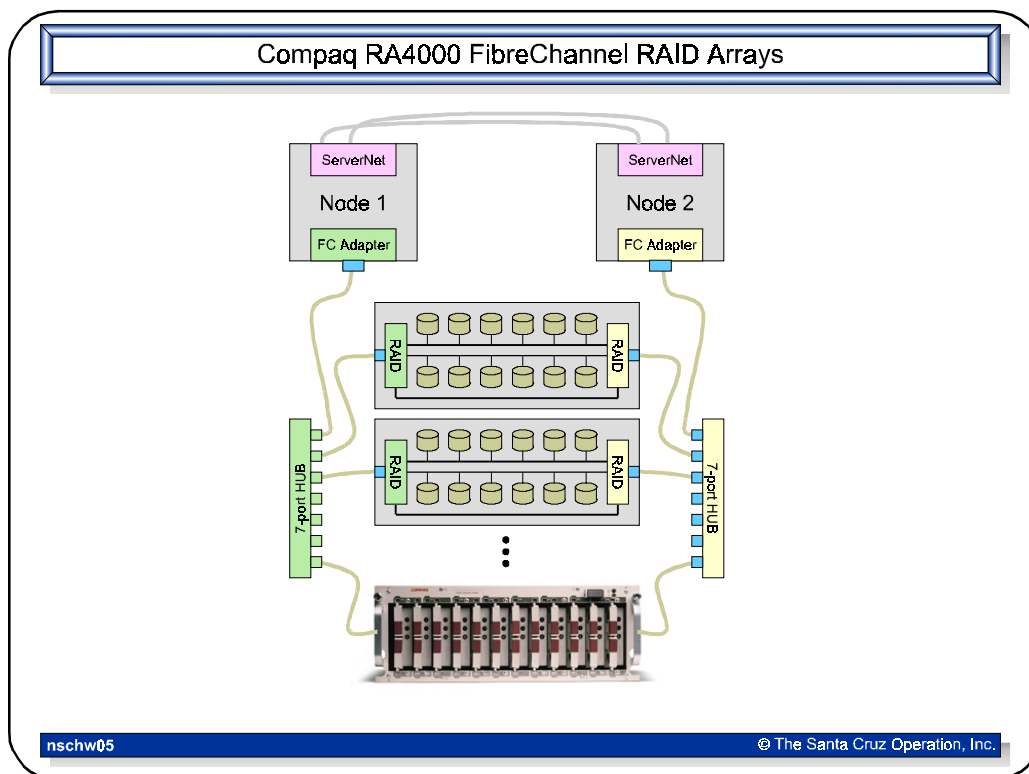
This table shows the current list of Compaq servers certified for use with SCO UnixWare 7 NonStop Clusters.

Compaq ProLiant Clusters for SCO UnixWare 7.1 Certification Matrix

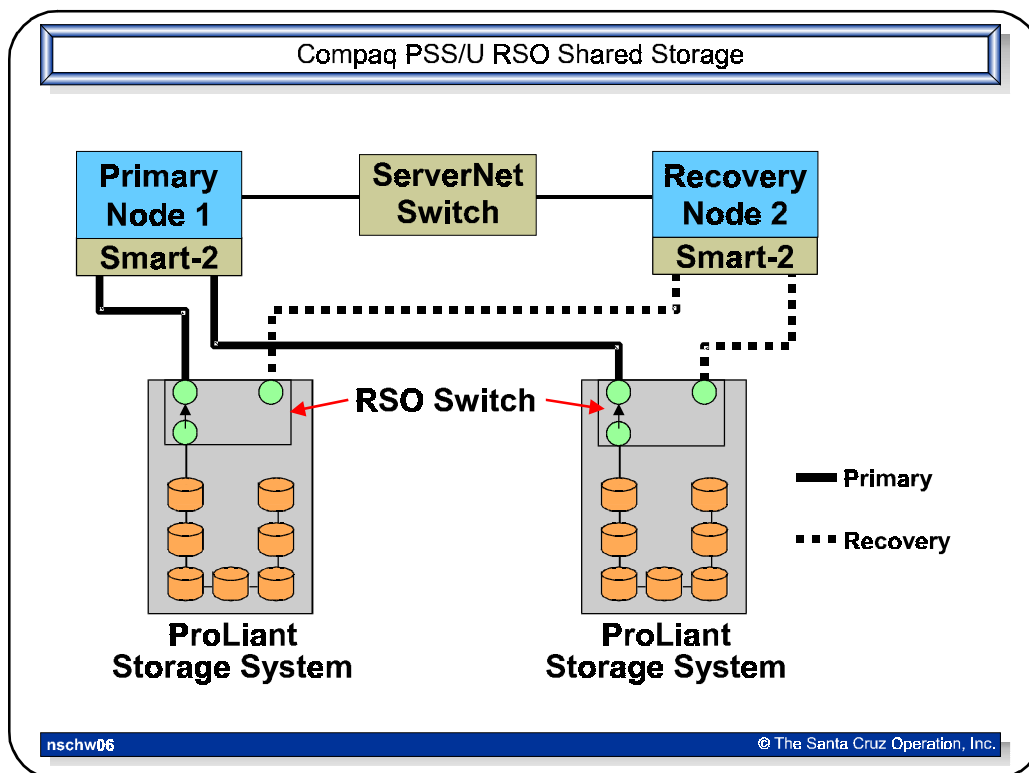
	Processor Speed					
Model	200	400	450	500	550	600
ProLiant 800				Certified	Certified	Certified
ProLiant 850R	Certified					
ProLiant 1600(R)	Certified	Certified	Certified	Certified	Certified	Certified
ProLiant 1850R		Certified	Certified	Certified	Certified	Certified
ProLiant 3000(R)		Certified	Certified	Certified	Certified	Certified
ProLiant 5500(R)		Certified	Certified	Certified	Certified	
ProLiant 6400R			Certified	Certified	Certified	
ProLiant 6500(R)	Certified					
ProLiant 8500R				Planned	Planned	

See <http://www.compaq.com/pub/solutions/enterprise/cpqnsc-cert.html> on the Compaq Clustering web site for the latest update.

AV 1-1



AV 1-2



1.2 Compaq Shared Storage Units

Compaq ProLiant servers support three types of external storage units:

- Compaq StorageWorks FibreChannel RAID Array 4000 (RA4000) or the RAID Array (RA4100)
- ProLiant Storage System (PSS/U) with RSO Storage System
- Dual-Hosted External SCSI Storage System

These reliable storage systems all use RAID level 1 (disk mirroring) to provide the highest level of data availability.

- The RA4000/4100 and PSS/U systems both support hardware RAID.
- Dual-hosted external SCSI storage systems use software RAID

All of the reliable storage systems supplied by Compaq provide a SCSI interface to plug-in disk drives in a drive array. None of the reliable storage systems support IDE drives.

Dual-hosted external SCSI storage systems do not depend on *Compaq* storage hardware. They are made up from commercial third-party vendor products.

Note Compaq has tested configurations with representative samples of third-party components, but cannot warrant the proper operation of third-party components in a dual-hosted external SCSI storage system.

The PSS/U and dual-hosted SCSI storage systems are not documented in this guide. See the Compaq documentation for details.



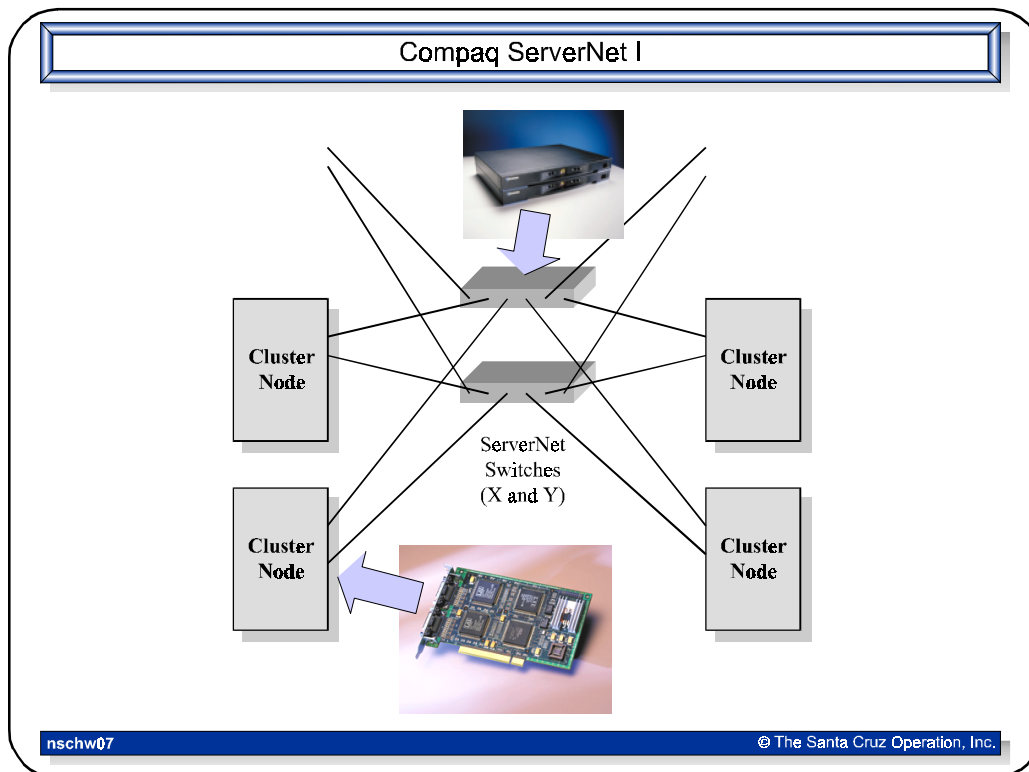
1.2.1 Compaq FibreChannel RAID arrays

The Compaq Fibre Channel Storage System is also known as the *Compaq StorageWorks* RAID Array 4000 Storage System. It is often referred to as RA4000, RA4x00, or FC array. These storage systems include these features:

- 16MB read and 48-MB user-selectable read/write, battery-backed cache
- Redundant RAID controllers with protected cache
- No single point of hardware failure
- Low-cost entry-level configurations
- Greater than 1TB of protected storage
- Addition of disks

AV 1-1 on page 1-6 shows a minimum fibre channel storage configuration for use with the UnixWare[®] 7 NonStop[®] Clusters environment. This is a two-node system with a single Fibre Channel Array. ServerNet SAN fabrics X and Y provide connectivity between the two nodes. They are shown as directly connected for simplicity, but they can connect through ServerNet SAN X and Y switches.

AV 1-3



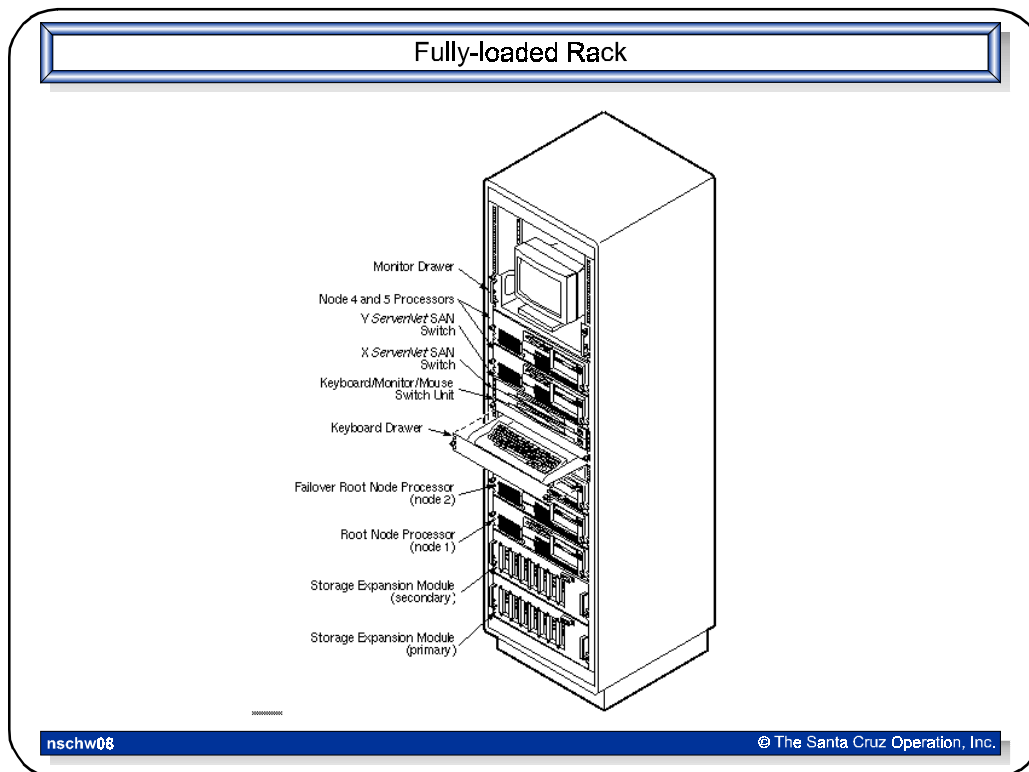
1.3 Compaq ServerNet I Equipment (SAN Interconnect)

Compaq ProLiant clusters require the ServerNet Adapter for all nodes running as UnixWare[®] 7 NonStop[®] Clusters. The ServerNet fault-tolerant interconnect technology provides:

- Standard PCI interface
- 50 MB/sec bidirectional throughput, per port
- Six-port switches for expansion
- Low-latency

The ServerNet interconnect technology core services provide a memory-like read/write interface for access among connected nodes. These services allow the upper layers to open physical connections among nodes and provide low-level support for the ServerNet interface devices. ServerNet technology also provides basic data mapping and movement services, as well as error handling.

AV 1-4



1.4 Assembling Compaq Racks

These guidelines can be used to assemble Compaq racks.

1.4.1 Positioning and leveling the rack

Before beginning this procedure, you should have already unpacked and unloaded the rack from the shipping pallet.

You will need the following tools for this procedure:

- Adjustable open-end wrench
- Carpenter's level or similar spirit level
- #3 Phillips screwdriver

Step 1. If the rack is to be bolted to an adjacent rack, remove the intervening side panels as described in the Compaq Rack Planning and Installation Guide.

In a factory-configured dual-rack system, the base system rack and the expansion rack each ship with one side panel removed. Position the racks with the open sides adjacent so you can run cables directly between the racks. For a dual-rack system, perform Step 2 through Step 5 for each rack.

Step 2. Maneuver the rack into its final location, and verify that the location meets the clearance requirements of System Rack Clearance Requirements.

Be sure to allow space for the stabilizing feet as shown in the figure. All racks require a front stabilizing foot. 42U and 36U racks require left and right side stabilizing feet. Coupled 42U or 36U racks require stabilizing feet at the left and right outside of the rack pair.

- Step 3. Align the rack front and sides with adjacent racks, if any.
- Step 4. With the adjustable wrench, lower all four leveling feet until the weight of the rack is lifted off the casters.

WARNING! The weight of the rack must be fully carried on the rack leveling feet. The rack casters are provided for short-term use in unloading and positioning the rack.

Use a carpenter's level or similar spirit level to determine if the rack is level, and adjust the leveling feet as needed to level the rack.

1.4.2 Coupling the rack(s)

If you have a dual-rack 42U or 36U system, you will need to couple the racks together with a rack coupling kit. The rack coupling kits include mounting hardware and coordinated cosmetic panels.

Compaq offers rack coupling kits for the 7000 series racks:

- 42U -- Coupling kit for rack 7142, Compaq part number 165664-001
- 36U -- Coupling kit for rack 4136, Compaq part number 303657-B21

The coupling kit is included with the Compaq NonStop Integrity XC 42U or 36U expansion rack offered by Compaq.

Follow the instructions provided in Compaq Rack Planning and Installation Guide to install the rack coupling kit.

1.4.3 Stabilizing the rack(s)

The rack or coupled pair of racks must be stabilized before you can extend any component on slide rails.

WARNING! Certain rack configurations are top-heavy, and extending excess weight could cause the rack to tip over, causing serious injuries or death.

Do not attempt to extend any rack component on slide rails until the rack is stabilized.

Do not attempt to extend more than one rack component on slide rails at the same time. The keyboard drawer is the sole exception to this rule.

The 22U rack has a single front stabilizing foot. Follow the instructions provided in the *Compaq Rack Planning and Installation Guide* to install the 22U rack stabilizing foot.

The 42U rack has three identical stabilizing feet. You must mount one stabilizing foot at the front, and the other two stabilizing feet at the left and right side of the rack. For a rack pair, you must install two stabilizing feet at the front (one per rack) and a stabilizing foot at the outer left and right side of the rack pair.

Follow the instructions provided in the *Compaq Rack Planning and Installation Guide* to install the 42U or 36U rack stabilizing feet at the front, left, and right sides of the rack or rack pair.

WARNING! Compaq safety rules for the 42U and 36U racks require stabilizing feet on coupled racks as well as on single racks, due to the top-heaviness of some configurations.

Open the rear door of the rack(s) and locate the RED cable ties that prevent rack components from being extended on rack slides. These ties are located at cable management arm joints and on certain cable bundles. Cut each of these RED cable ties and discard them. Do not cut any white cable ties that secure the large brown SCSI cables to the rack frame, as the attached storage units do not extend from the rack.

Upon completion, you may safely extend the keyboard drawer and one other component on the slide rails.

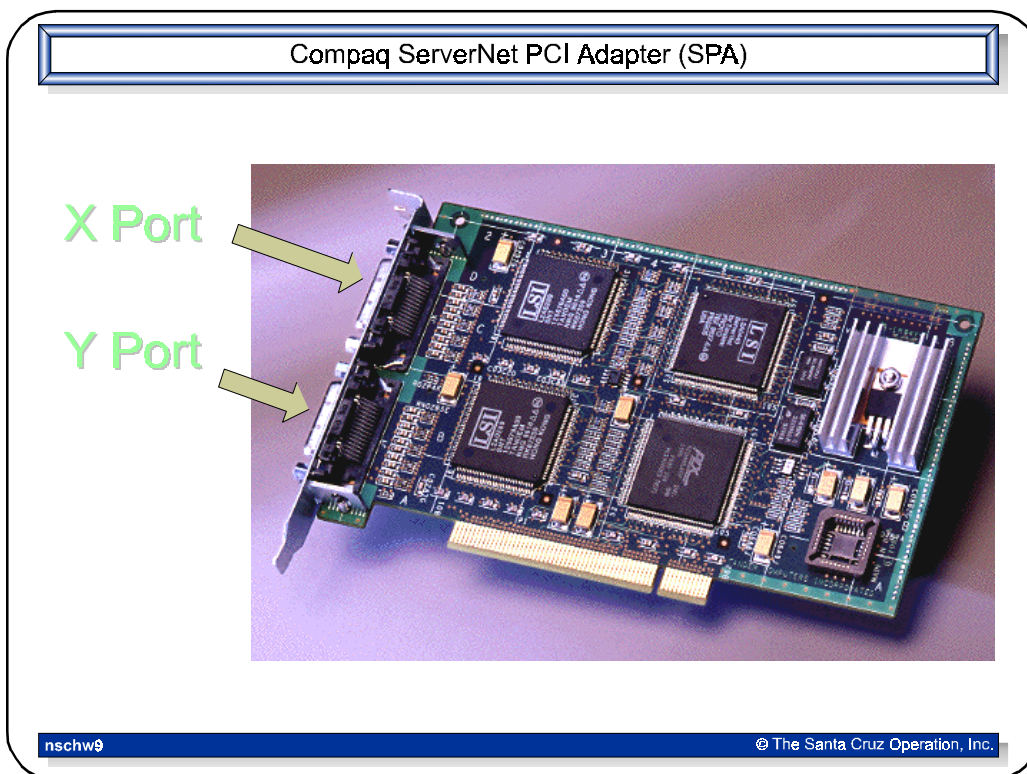
1.4.4 Installing the rack safety ground

A rack may have one or two AC power distribution units (PDUs), depending on how much equipment is installed in the rack. Each PDU requires an external earth ground connection for electrical safety.

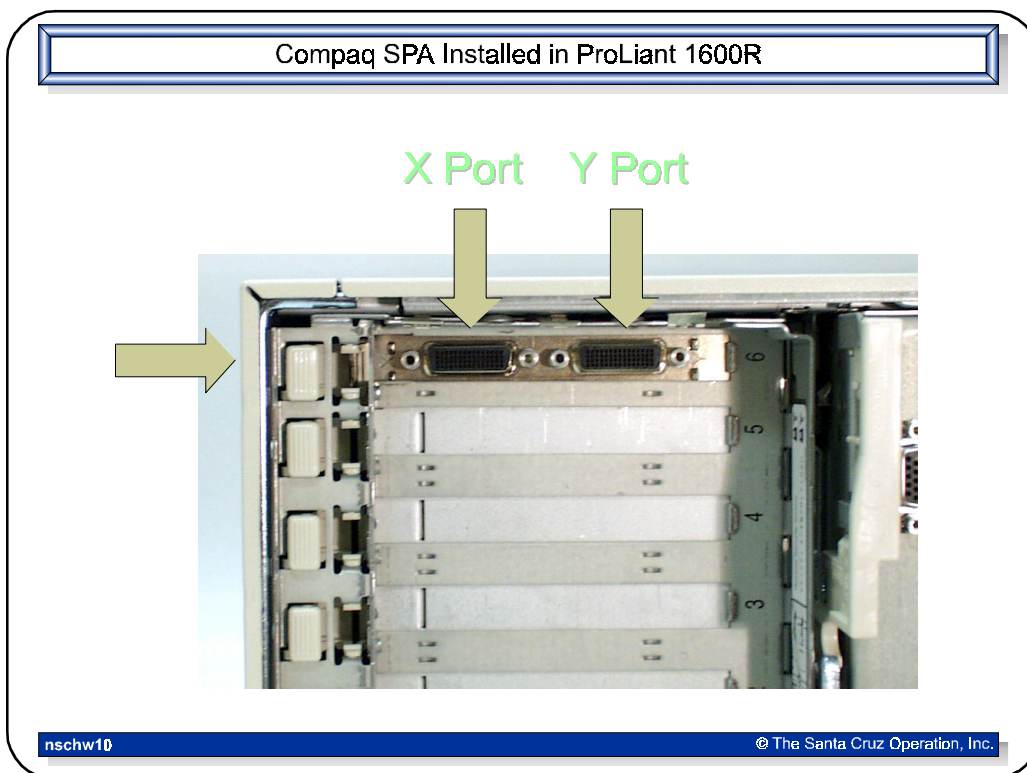
Perform the following steps to connect the external earth ground connection(s):

- Step 1. Open the rear door and locate the ground wire at each PDU. The ground wire is color-coded green with a yellow stripe and has a 0.25" inside diameter ground lug on the end. Each ground cable is approximately 2.4 m (96 in) long.
- Step 2. Route the ground wire to an external earth ground point. If there are two PDUs, run both ground wires to the same ground point. Secure the ground wires to the ground point with a metal screw, making sure there is bare metal-to-metal contact at the ground point.
- Step 3. Coil any excess ground wire within the cabinet and secure it with cable ties. Ensure that the external ground wire is safe from damage and does not represent a tripping hazard.

AV 1-5



AV 1-6



1.5 Assembling Compaq Nodes

In addition to the typical server setup tasks, such as installing processors, memory, disks, and other device adapters, you must install ServerNet PCI adapters (SPAs). You might also need to install a FibreChannel adapter for clusters with Compaq StorageWorks Raid Array 4000/4100 shared storage units.

1.5.1 Installing ServerNet adapters

Consider these factors when installing ServerNet adapters

- Each certified Compaq server requires the ServerNet card to be installed in the highest-priority PCI slot.

This table shows which slot the ServerNet card should occupy in each of the currently-supported Compaq servers:

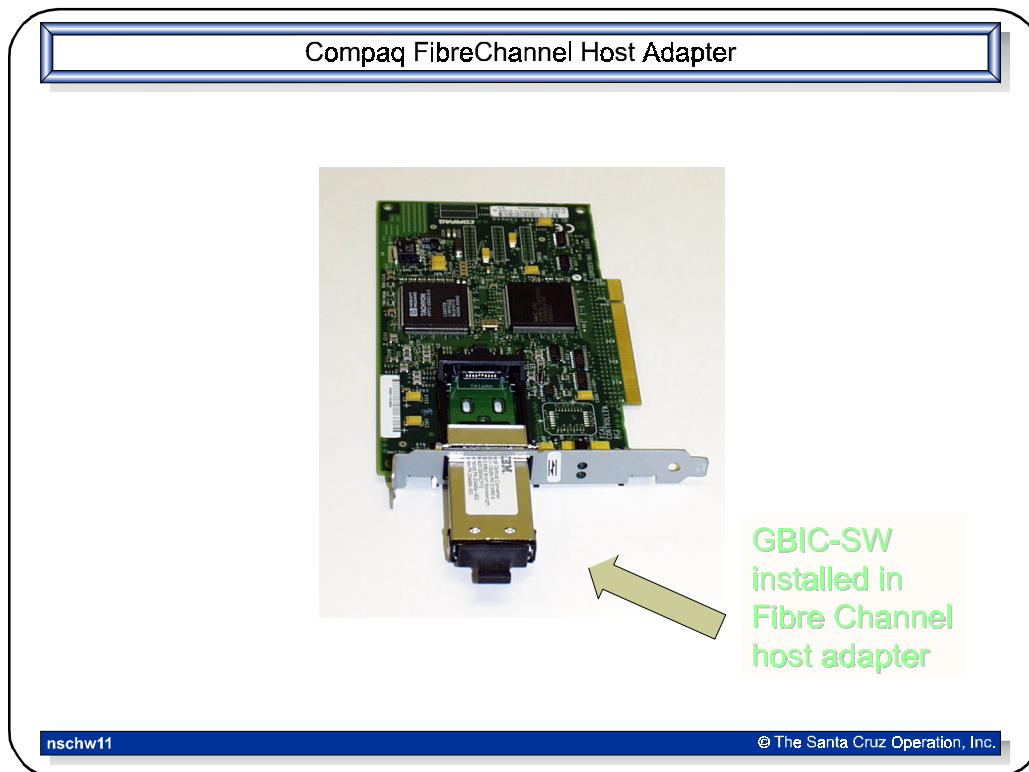
Table 1: Compaq ServerNet Slots

Server Model	ServerNet Slot
ProLiant 800	1
ProLiant 1600R	6
ProLiant 1850R	4
ProLiant 5500R	6
ProLiant 6400R	5

Some ProLiant models have PCI slot numbers printed on the inside chassis cover.

- The card must also be set to IRQ 15 trigger-level. This is configured during node initialization, as described in Section 1.8, “Initializing Compaq Cluster Nodes,” on page 50.
- Use the fastest PCI bus.
- Do not put slower-speed PCI cards in the same bus with the SAN card; all cards then operate at the lowest-common speed.

AV 1-7



1.5.2 Installing Compaq FibreChannel adapters

The Compaq StorageWorks FibreChannel Host Adapter is installed in each node attached to a Compaq FibreChannel Storage Array (RA4x00) unit.

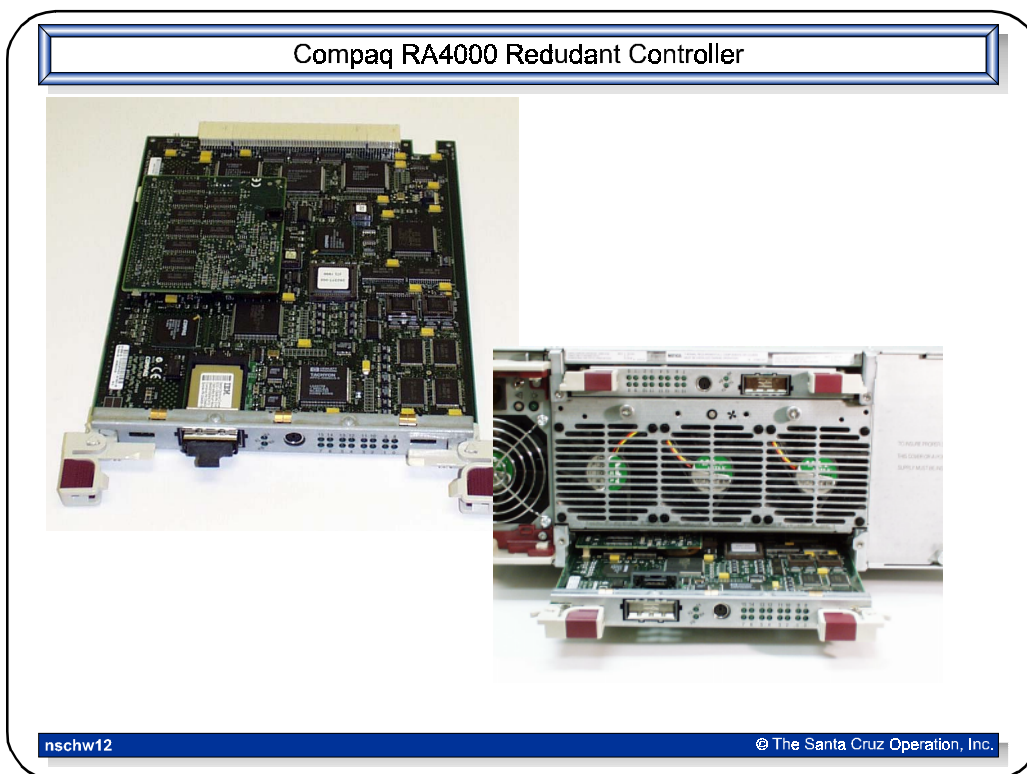
These host adapters:

- Are 32-bit PCI cards. There are no special requirements for selecting a PCI slot for the FibreChannel Host Adapter. Install in any available PCI slot.
- Requires a Gigabit Interface Controller (GBIC) to convert between parallel electrical signals on the controller and serial fiber-optic signals on the FCAL cables. Note these GBIC attributes:
 - The GBIC installs in a standardized GBIC receptacle on the controller.
 - The GBIC body includes alignment guides to ensure that the GBIC installs correctly in the GBIC receptacle. The GBIC is secured by either locking tabs at the top and bottom or by a wire locking bail.
 - Refer to the Installation Card for GBIC-SW (Giga-Bit Interface Converter-Short Wave) Modules manual for latching details.
 - Each GBIC provides dual Type SC fiber-optic connectors for the FCAL signal cables. The fiber-optic connectors are keyed so that the fiber-optic cables cannot be accidentally reversed.
 - The GBIC selected for use in Compaq NonStop Clusters is the GBIC-SW version, designed for multimode operation with short optical wavelengths.

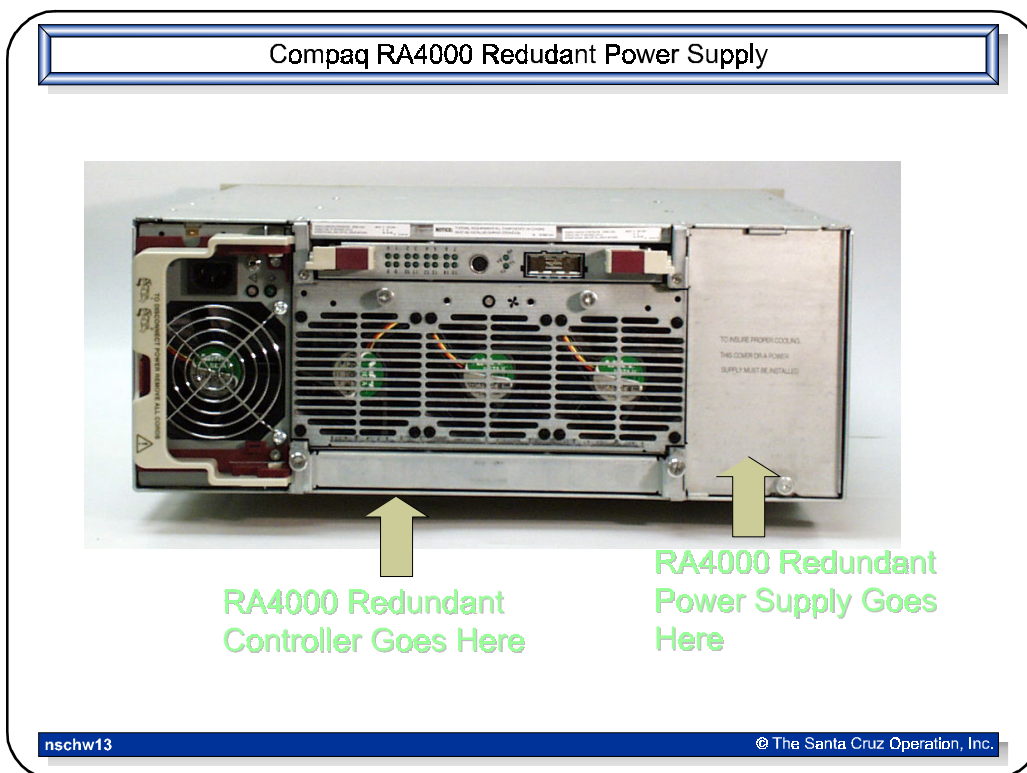
Note GBIC-SW modules do not interoperate with GBIC-LW modules (also offered by Compaq). Do not attempt to mix the two GBIC types.

When finished, return to Section 3.5.2, “Fibre Channel/JBOD/RSO procedure,” in the *UnixWare 7 NonStop Clusters Installation* course guide.

AV 1-8



AV 1-9



1.6 Assembling Compaq FibreChannel RAID Arrays

Compaq StorageWorks RA4x00 RAID arrays are shipped with a single FibreChannel controller and a single power supply. When using RA4x00s with NonStop Clusters, you must add a redundant controller and redundant power supply. Use this procedure to assemble your RA4x00 for use with UnixWare[®] 7 NonStop[®] Clusters.

The RA4x00 redundant RAID controller:

- Is FibreChannel external
- Drives dual SCSI busses
- Has 64MB battery-backed cache
- Is identical to the controller shipped with the base RA4x00 unit

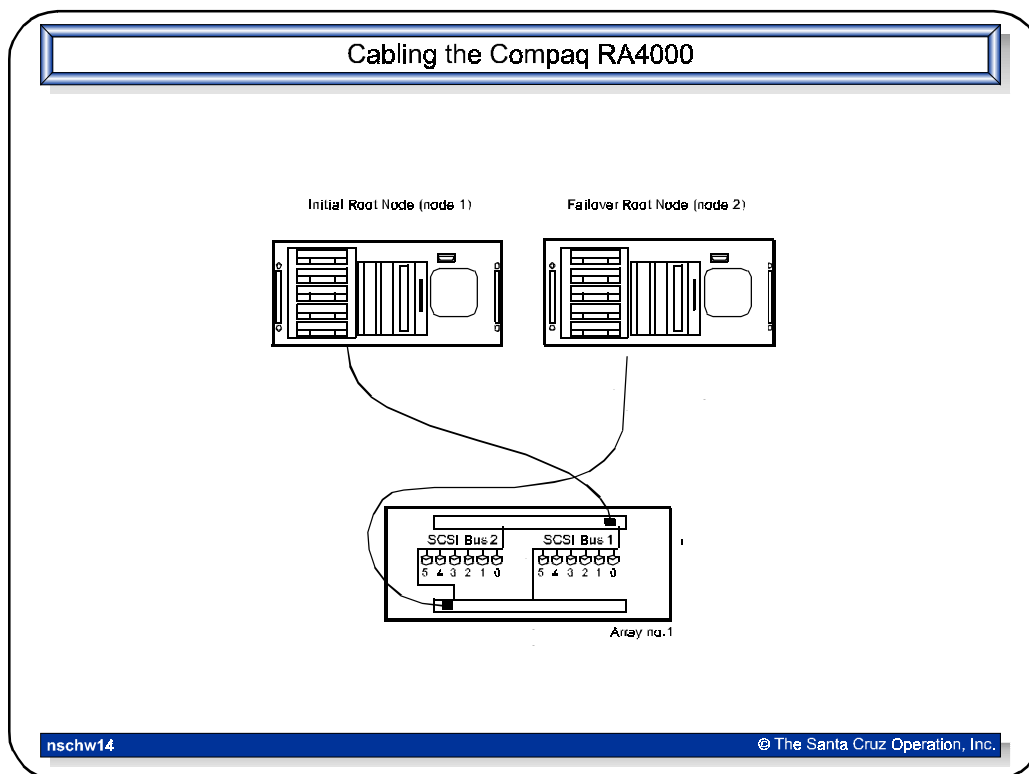
To install the FibreChannel controller:

- Step 1. Disconnect the power.
- Step 2. Remove the cover.
- Step 3. Position card at 180 degrees (with respect to the first controller).
- Step 4. Install controller in the lower slot.
- Step 5. Install the GBIC.

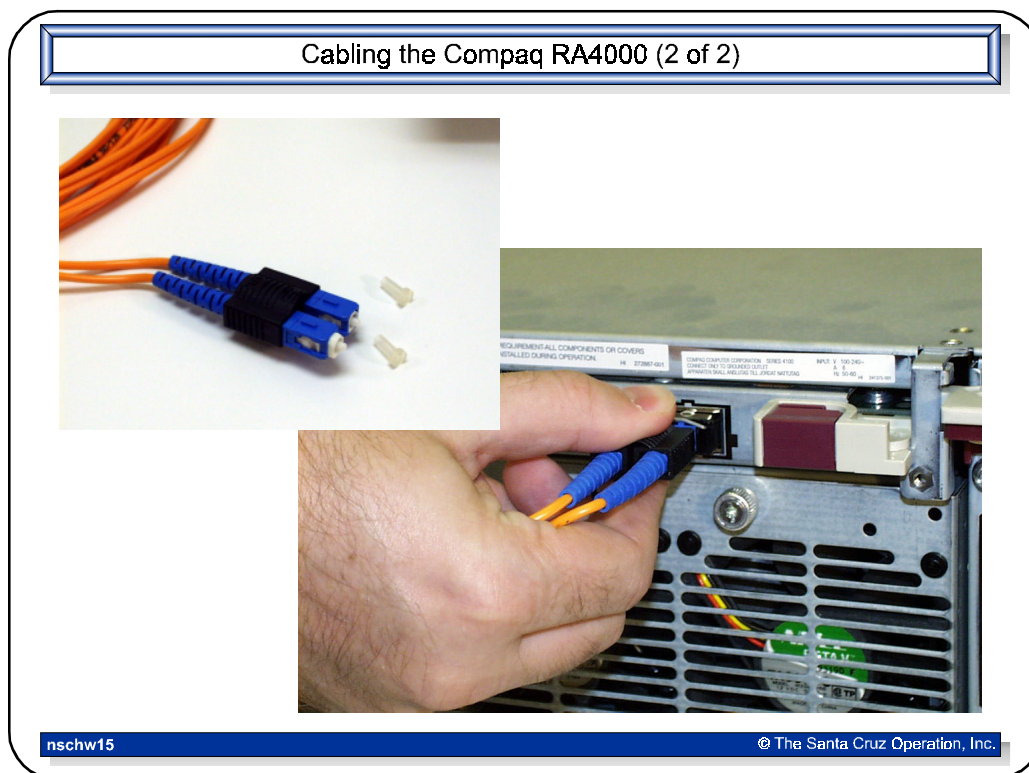
To install the redundant power supply:

- Step 1. Disconnect the power.
- Step 2. Remove the cover plate.
- Step 3. Insert the power supply.

AV 1-10



AV 1-11



1.6.1 Adding disks to Compaq RAID arrays

The disk drives for the FibreChannel Storage System are hot-pluggable drives packaged in standard *Compaq* hard drive modules, with the wide-ultra-SCSI electrical interface.

There is no need to power down the FC array when adding the drives. Refer to the FC array front bezel for slot numbers on SCSI buses 1 and 2. Add the drives in pairs for RAID 1 mirroring. The disks must be in the same slot numbers in the same FC array chassis (for example, slot 1 on bus 0 and slot 1 on bus 1), and must be the same size.

Refer to Installing the Hot-Pluggable Hard Drives in Chapter 2 of *Compaq FibreChannel Storage System User Guide* for physical details of module orientation and drive latch operation.

1.6.2 Cabling the RA4x00

Each RA4x00 FibreChannel RAID array has two controllers, top and bottom. Note these requirements:

- Each array is connected to a consecutively-numbered, odd-even node pair, for example 1-2.
- Node 1 (odd nodes) must be connected to the top (right from rear) controller
- Node 2 (even nodes) must be connected to the bottom (left from rear) controller
- Alternately, multiple RA4x00s can be connected using a FibreChannel hub.

Note these precautions about handling fibre optic cables:

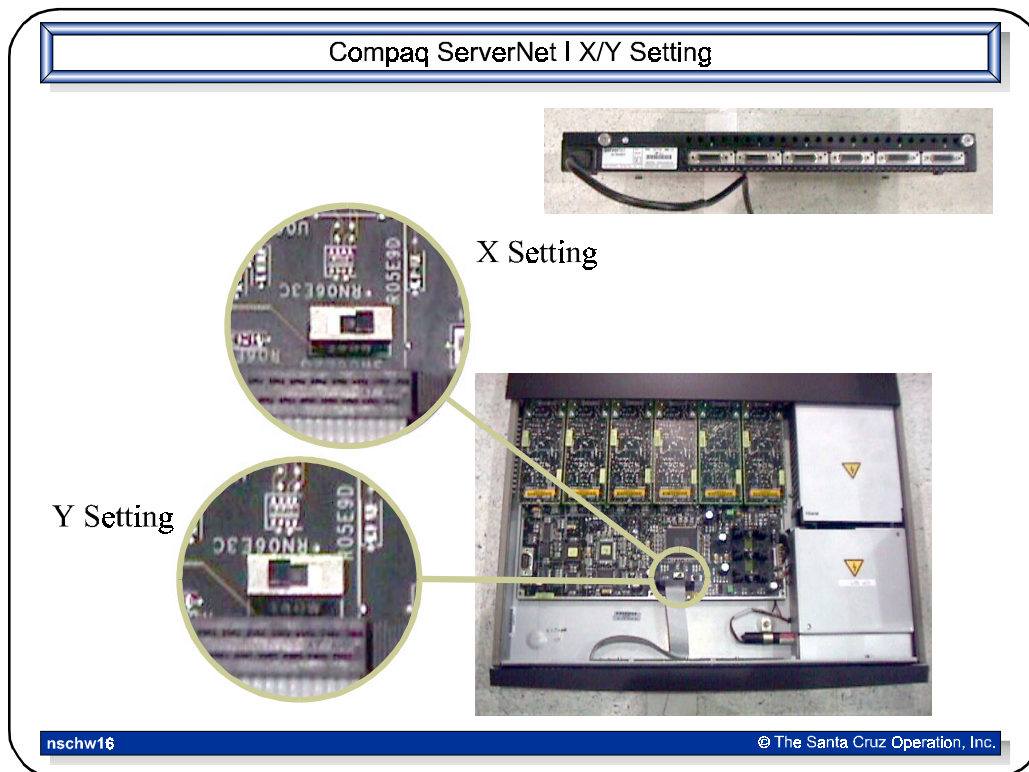
- Do not bend the fiber optic cable into an arc tighter than the minimum allowable bend radius specified by the cable manufacturer. The minimum bend radius is usually 10 to 20 times the cable's outer diameter.
- Protect the cables from pinching, abrasion, excess tension, and any other mechanical stress.
- When inserting or removing fiber optic connectors, handle the fiber optic cable only by the connector body, not by the strain relief or by the cable body. Even moderate amounts of tension or pressure on the fiber optic cable body can destroy the connector.



- Type SC connectors include a white stripe along each side.
- Verify that the connectors mate with a positive click and the white stripe is invisible. If the white stripe is visible, the connectors are not properly mated.
- Do not subject fiber optic connectors to abrasion, chemical contaminants, or rough handling. Fiber optic mating surfaces are cut, polished, and aligned to extremely close tolerances, and are much more sensitive to mishandling than conventional electrical signal connectors.

When finished, return to Section 3.5.2, “Fibre Channel/JBOD/RSO procedure,” in the ***UnixWare 7 NonStop Clusters Installation*** course guide.

AV 1-12



1.7 Assembling Compaq SAN Switches

Compaq ServerNet I switches must be configured as either X or Y. First, determine the current configuration, then reconfigure the switch if necessary. See AV 1-12 on page 1-48 for an example.

To determine the current configuration:

- Step 1. Power on the switch.
- Step 2. Examine the green LEDs to determine if the switch is set to X or Y.

To reconfigure a switch:

- Step 1. Loosen the two thumb screws.
- Step 2. Slide back the cover.
- Step 3. Set one switch to the X setting.
- Step 4. Set the other switch to the Y setting.

When finished, return to Section 3.5, “Lab: Assembling Cluster Hardware,” in the ***UnixWare 7 NonStop Clusters Installation*** course guide.

1.8 Initializing Compaq Cluster Nodes

You must initialize each *Compaq ProLiant* node in a cluster with the *SmartStart* utility. In addition, you may need to reconfigure with *SmartStart* if your system loses configuration information or if you have added new hardware to the system.

Configure Compaq nodes before configuring any Compaq shared storage units you are using in your cluster.

The first time you configure the server, *SmartStart* automatically creates a System partition and installs the Compaq System Configuration Utility (and other *Compaq* utilities) in that partition.

Note *ProLiant* servers attached to a FibreChannel storage subsystem must be configured with *SmartStart* 4.30 or later.

You must check that some *SmartStart* values are set as required for the *Compaq NonStop* Clusters environment. This table contains a list of *SmartStart* features or components and the values required for those items for *Compaq NonStop* Clusters functionality

The detailed procedure for making changes is included in Section 1.8.1, “Using *SmartStart* to initialize Compaq nodes,” on page 51.

Table 2: Compaq SmartStart Values for the SCO NSC 7.1.1

SmartStart Feature or Component	Required Value
Operating System	UnixWare 7
ServerNet PCI Adapter (SPA)	IRQ 15 trigger-level
PCI Function 1 (under Slot # — PCI Network Controllers)	Enabled
HBA boot order	1. First embedded Compaq SCSI controller 2. Embedded IDE controller (CD-ROM) 3. Compaq FibreChannel Array controller
F1 boot prompt	Disabled
APIC Mode	Full Table-Mapped

1.8.1 Using SmartStart to initialize Compaq nodes

Configure each Compaq node in the cluster using this procedure:

- Step 1. Insert the *SmartStart* CD-ROM into the drive of the initial installation node.
- Step 2. Turn off the failover root node, the initial installation node, and the external disk subsystem, if any, in that order.
- Step 3. Power up the external disk subsystem (if any).
- Step 4. Power up the initial installation node.

The node boots from the *SmartStart* CD-ROM and displays the **System Utilities** window.
- Step 5. Erase any previous configuration information. Double-click on the **Run System Erase Utility** icon.
- Step 6. Click on **Yes** to confirm that all data on the hard drive will be deleted.
- Step 7. Cycle power when a message is displayed that the system has been erased.
- Step 8. Boot again using the *SmartStart* CD-ROM.
- Step 9. Click the appropriate box to select a language.
- Step 10. Configure regional settings. Click on **Next**.
- Step 11. Review regional settings and click on **Continue**.
- Step 12. Read the license agreement. Select “I agree” and click on **OK**.
- Step 13. Select “Manual Configuration” as the installation path.
- Step 14. Click on **Begin**.
- Step 15. Select the operating system. Double-click on the **SCO** folder icon.
- Step 16. Click to select the icon for the SCO product you will install. For example, **SCO UnixWare 7.1.X**.
- Step 17. Click on **Next**.

- Step 18. Click on **Continue** to confirm your operating system selection. Wait while configuration files are loaded.
- Step 19. Select “Review or Modify Hardware Settings” using the  key. Press .
- Step 20. Select “Step 3: View or edit details” using the  key. Press .

Note The field names may vary depending on the version of SmartStart in use. This procedure is based on SmartStart 4.40.

- Step 21. Verify that the IDE controller allows booting from the CD-ROM.
- a. Scroll to the “Embedded IDE Controller” section using the  key.
 - b. Select the “Standard Interface” field using the  key. The entry should be set to “Enabled as Second Controller.”
 - c. To change the setting, press .
 - d. Select “Enabled as Second Controller” using the  key.
 - e. Press .

- Step 22. Set the IRQ value and type for the ServerNet PCI card to “15 Trigger:level.”
- Scroll to the “Slot # PCI Network Controller” field using the **↓** key.
 - Select “PCI Function 1” using the arrow key. The entry “Enabled” is highlighted.
 - Press **ENTER**. Select “Enabled.”
 - Press **F6** to set the IRQ value.
 - Set the IRQ value to “15 Trigger:level” using the **+** key to scroll through the list of values
 - Press **F10**. If you have made changes, you are prompted to confirm. Review your settings and press **ENTER** to accept.
- Step 23. Set the controller order, if the node has more than one disk controller. This specifies which controller is used to boot the system.
- Scroll to the “Embedded - Compaq Wide-Ultra SCSI Controller (Port 1)” section using the **↓** key.
 - Select the “Controller Order” field using the **↓** key. The entry should be set to “First.”
 - To set to first, press **ENTER**.
 - Select “First” using the **↑** key.
 - Press **F10**. If you have made changes, you are prompted to confirm. Review your settings and press **ENTER** to accept.
- If using RSO, scroll to the “Embedded - Compaq Wide-Ultra SCSI Controller (Port 2)” section and set the “Controller Order” field to “Third.”
- If using an RA4000, scroll to the “Slot # Compaq Fibre-Channel Array “Controller” section and set the “Controller Order” field to “Third
- Step 24. Press **F10** when you have completed your changes.
- Step 25. The **View or edit details** window is displayed again.
- Step 26. Select “Step 5: Save and exit” using the **↓** key. Press **ENTER**.

Step 27. Select the option to “Save the configuration and restart the computer.” Press  .

Step 28. When the **Reboot** window is displayed, press  .

The node reboots several times and SmartStart partitions the system. The status of the partitioning process is displayed.

The System Partition contains Compaq configuration files and utilities that can be accessed during boot up by pressing  at the prompt. These utilities are used to reconfigure hardware after the system is initialized.

Step 29. SmartStart prompts you to create support software. Do NOT create support software. Click on **Next**.

SmartStart displays a message that the operating system can now be installed.

Step 30. Remove the SmartStart CD-ROM. Click on **Continue**.

The node starts to reboot.

Step 31. Press  during boot when prompted to run the configuration utility. The Compaq System Configuration screen is displayed.

Note If you miss the prompt, a warning is displayed that a non-system disk is unable to boot. Press any key to reboot the system and this time press  when prompted.

Step 32. Press any key to continue.

The **Main Menu** window is displayed.

Step 33. Press   to enable Advanced mode.

This mode is only available when the node is booted from the hard disk. Although the next steps appear to repeat the configuration process just performed, new options are now available.

Step 34. Select “System Configuration.” Press  .

- Step 35. Select “Configure Hardware.” Press . Wait while the configuration information is loaded.
- The **Configuration Complete** window is displayed.
- Step 36. Select “Review or Modify Hardware Settings” using the  key. Press .
- The **Modify Hardware Settings** window is displayed.
- Step 37. Select “Step 3: View or edit details” using the  key. Press .
- The **View or edit details** window is displayed.
- Step 38. Disable the F1 boot prompt so the node does not require user intervention to boot.
- Scroll to the “Advanced Features” section using the  key.
 - Select the “F1 Boot Prompt” field using the  key. The entry should be set to “Disabled - skip prompt.”
 - To change the setting, press .
 - Select “Disabled - skip prompt” using the  key.
 - Press .
- Step 39. Set the APIC mode to “Full Table - Mapped”
- Scroll to the “Advanced Features” section using the  key.
 - Select the “APIC Mode” field using the  key. The entry should be set to “Full Table - Mapped.”
 - To change the setting, press .
 - Select “Full Table - Mapped” using the  key.
 - Press .
- Step 40. Press  when you have completed the Advanced settings changes.
- The **View or edit details** window is displayed again.
- Step 41. Select “Step 5: Save and exit” using the  key. Press .

- Step 42. Select the option to “Save the configuration and restart the computer.” Press  .
- Step 43. When the **Reboot** window is displayed, press  .
- Step 44. Power off the node.
- Step 45. Insert the *SmartStart* CD-ROM into the drive of the failover root node, power it on, and repeat Step 5 through Step 45.
- Step 46. After setting up the root nodes, turn off both root nodes and the external disk subsystem, if any.
- Step 47. Set up the dependent nodes similarly. Place the *SmartStart* CD-ROM into the drive of each dependent node, turn on the power, and perform Step 5 through Step 44.
- Step 48. Power off dependent nodes.

When finished, return to Section 3.5, “Lab: Assembling Cluster Hardware,” in the ***UnixWare 7 NonStop Clusters Installation*** course guide.

1.9 Initializing Compaq Shared Storage Units

After you have assembled your Compaq shared storage unit(s), initialize each unit using this basic procedure:

1. Verify that the controller order is set so the external unit is third on the nodes to which the storage unit is connected. This should have been done during the node initialization procedure.

Note Be sure you have initialized your Compaq server nodes before the shared storage units. See Section 1.8, “Initializing Compaq Cluster Nodes,” on page 50.

2. Check the firmware revisions on both the ProLiant system ROM BIOS and each FibreChannel controller in the RA4x00. Update them if older than 2.40 or 12/99 (for NSC 7.1.1). See Section 1.9.1, “Checking Compaq firmware revisions,” on page 58.
3. Create logical volumes using the Array Configuration Utility (ACU). See Section 1.9.2, “Creating a logical volume for Compaq disk subsystems,” on page 63.

After UnixWare is installed, and *before* NSC is installed, perform the software configuration needed to allow NSC to recognize the array. This is described in Section 1.9.3, “Stamping disks in a Compaq Fibre array,” on page 65.

1.9.1 Checking Compaq firmware revisions

In order to use the Compaq FibreChannel RA4x00 units with UnixWare 7 NonStop Clusters 7.1.1, you must verify that the firmware is version 2.40 or later on both:

- ProLiant system ROMs
- The FibreChannel controllers in the RAID array

Some ProLiant models identify the ROM firmware revision by date. You must have a ROM version later than 12/99. If the firmware is an older revision, you must update it.

1.9.1.1 Checking the Compaq ProLiant ROM BIOS firmware revision

You must verify that each node in your cluster contains updated BIOS firmware. For UnixWare 7 NonStop Clusters Release 7.1.1, you must have version 2.40 or later.

To check the ROM BIOS firmware version:

- Step 1. Shut down all nodes, beginning with the failover root, followed by the initial installation node, and then the dependent nodes (in any order).
- Step 2. Insert the *SmartStart* CD-ROM into the drive of the initial installation node.
- Step 3. Power up the initial installation node. The node boots from the *SmartStart* CD-ROM and brings up the *SmartStart* utility.
- Step 4. Click on the Run ROMPaq icon.
- Step 5. Check the current version of the ROM. If your current ROM version is 2.40 or later, you are not required to perform the update. Use the Esc key to quit without updating the ROM.

If the ROM version is older than 2.40, or 12/99, update the ROM by following the online instructions.
- Step 6. Repeat Step 2 through Step 5 for the failover root node and the dependent nodes.

1.9.1.2 Checking the FibreChannel firmware revision

You must verify that the FibreChannel controllers in the RAID array have firmware revision 2.40 or later for use with UnixWare7 NonStop Clusters 7.1.1. If older, you must update the firmware.

To check the FibreChannel controller firmware version:

- Step 1. Insert the *SmartStart* CD-ROM into the drive of the initial installation node.
- Step 2. Turn off the failover root node and the initial installation node (in that order).
- Step 3. Power up the initial installation node. The node boots from the *SmartStart* CD-ROM and brings up the *SmartStart* utility.
- Step 4. Start the **Array Configuration Utility (ACU)**.
- Step 5. Double-click on the first RA4x00 controller. A window displays information about the controller.
- Step 6. Scroll through the list of configuration information to the CONTROLLER IDENTIFICATION section.
- Step 7. Check the Adapter Firmware entry to view the revision number.
- Step 8. Repeat Steps 4 through 6 for the second RA4x00 controller.
- Step 9. If the revision is 2.40 or later, exit from the ACU and power off the equipment.

If the revision is older than 2.40, update the firmware as described in Section 1.9.1.3, “Updating the FibreChannel firmware,” on page 60.

When finished, return to Section 3.5.2, “Fibre Channel/JBOD/RSO procedure,” in the **UnixWare 7 NonStop Clusters Installation** course guide.

1.9.1.3 Updating the FibreChannel firmware

The Options *ROMPaq* diskettes are used to update firmware of the disks and array controllers for clusters with a FibreChannel Storage System. You must:

- Create the bootable *ROMPaq* diskettes
- Boot from the *ROMPaq* diskettes and update the firmware

Creating *ROMPaq* diskettes

If you create all the Options *ROMPaq* diskettes, you will need ten blank formatted diskettes; however, you need only create the Options *ROMPaq* diskettes that include firmware for the disks and arrays that are part of your cluster. You can skip creating any diskettes that do not contain firmware for your system's devices:

If your cluster has a FibreChannel Storage System, choose to generate all Options *ROMPaq* diskettes that contain RA4000 software.

To create the Options *ROMPaq* diskettes:

- Step 1. Insert the *SmartStart* CD-ROM into the drive of the initial installation node.
- Step 2. Turn off the failover root node and the initial installation node (in that order).
- Step 3. Power up the initial installation node. The node boots from the *SmartStart* CD-ROM and brings up the *SmartStart* utility.
- Step 4. Click on the Create Support Software icon.
- Step 5. Click to expand the *Compaq* folder.
- Step 6. Select the Options *ROMPaq version* item and click on Next.
- Step 7. Follow the online instructions and save the Options *ROMPaq* software to floppy.

Skip the steps to make diskettes that do not apply to the RA4x00.
- Step 8. When you finish saving all the Options *ROMPaq* to floppy, proceed to Section , "Updating the FibreChannel controller firmware," on page 61.

Updating the FibreChannel controller firmware

Perform the steps discussed in this section on each node in your cluster that is connected to a FibreChannel controller. These steps ensure that the controller firmware is current. Each controller needs to use the same firmware revision.

Although the nodes in your cluster are not yet actually numbered, perform the steps in this section first on node 2. Then update the firmware on node 1.

- Step 1. Turn on the external disk array.
- Step 2. Insert the first Options *ROMPaq* diskette into the diskette drive of the first even-numbered node connected to a FibreChannel controller.
- Step 3. Cycle power to the node so that it boots from the Options *ROMPaq* diskette.
- Step 4. Press  at the first Options *ROMPaq* utility screen. The Select a Device screen appears.
- Step 5. Select ALL COMPAQ RA4000 Controller(s) from the list of programmable devices and press the Enter key.
- Step 6. If the ROM firmware in the RA4000 controller is the same or newer than that on the Options *ROMPaq* diskette, the utility displays the following message:


```
ROM image files found for the device selected are not newer
than the current ROM image
```

In this case, press  to skip the update for this controller. Proceed to Step 10.
- Step 7. If the firmware in the controller is older than that on the Options *ROMPaq* diskette, the Select an Image screen appears and displays the following message:


```
Device to reprogram:    ALL COMPAQ RA4000 Controller(s)
Current ROM revision:   COMPAQ RA4000 Controller x.xx
Select Firmware Images: COMPAQ RA4000 Controller y.yy
```

Press the Enter key. The Caution screen appears.

Step 8. Review the information on the Caution screen:

Device to reprogram: ALL COMPAQ RA4000 Controller(s)

Current ROM revision: COMPAQ RA4000 Controller x.xx

Selected ROM revision: COMPAQ RA4000 Controller y.yy

Press  to update the controller's firmware or press the Esc key to quit. If you press the Enter key, a screen appears, informing you that the update is in progress and warning you not to interrupt the program or recycle power while the update is in progress.

A firmware update takes approximately 8 minutes per controller.

Step 9. When the upgrade completes, press the Esc key to exit the Options *ROMPaq* utility.

Step 10. Remove the Options *ROMPaq* diskette and turn off power to the node. Do not reboot the node at this time.

Step 11. Repeat Step 1 through Step 10 for each of the nodes connected to a FibreChannel controller, following the order described at the beginning of this section.

If the Options *ROMPaq* utility returns an error, reboot the affected node from your *SmartStart* CD-ROM, and run the FibreChannel and Array diagnostics software. You may have a bad HBA, bad controller, a bad hub, incorrectly cabled hardware, or you may need to turn on the array.

When you have finished verifying and updating the firmware on all nodes connected to a FibreChannel controller, proceed to Section 1.9.2, "Creating a logical volume for Compaq disk subsystems," on page 63.

1.9.2 Creating a logical volume for Compaq disk subsystems

If your cluster has a FibreChannel Storage System, perform the steps described in this section to create at least one disk-subsystem logical volume for the *root* filesystem on your cluster. A disk subsystem logical volume is not the same thing as a Veritas logical volume.

The disk-subsystem logical volume must be at least as large as the internal disk for node 1 (the initial installation node). If you are preparing your system to take advantage of the OSU feature for future releases, create the disk-subsystem logical volume at least twice as large as the *root* filesystem.

Perform these steps for each disk subsystem to create the disk-subsystem logical volume:

- Step 1. Insert the *SmartStart* CD-ROM into the drive of the initial installation node.
- Step 2. Turn off the failover root node, the initial installation node, and the external disk subsystem, in that order.
- Step 3. Power up the external disk subsystem.
- Step 4. Power up the initial installation node. The node boots from the *SmartStart* CD-ROM.
- Step 5. Select `Run Array Configuration Utility` and specify the information for your disk-subsystem logical volume:
 - a. At the opening screen, click on `OK`. The `Unconfigured Controller` screen appears.
 - b. Click on `Next`.
 - c. Click on `Next`. The `Select A Configuration` screen appears.

Depending on the number of disks in your array, some options may or may not be available.

- d. Select type RAID 1. Type RAID 1 provides the level of fault tolerance needed to insure no single point of failure in the disk subsystem.

On the RA4100, select RAID 0 + 1.

- e. When you finish specifying the information for your disk subsystem logical volume, click on Save Configuration.

Step 6. Select Exit after you save the configuration, remove the CD-ROM, and press any key to reboot.

When finished, return to Section 3.5.2, “Fibre Channel/JBOD/RSO procedure,” in the ***UnixWare 7 NonStop Clusters Installation*** course guide.

1.9.3 Stamping disks in a Compaq Fibre array

If your cluster uses the FibreChannel Storage System, you must verify the array's hardware connections and stamp its logical volumes with a SCSI nexus.

A nexus is a unique identifier for each disk. It is the name of the device in the `/dev/dsk` and `/dev/rdisk` directories and has the form `c#b#t#d#` where:

- The # after the 'c' is a controller number
- The # after the 'b' is a bus number
- The # after the 't' is a target-id (sometimes called TID) number
- The # after the 'd' is a logical unit (sometimes called LUN) number

Note This must be done after UnixWare 7 is installed on the initial root node, but before the NSC software is installed.

If you are adding hot-plug disks after the cluster is installed and running, skip the steps to shut down the cluster and go to Step 6.

To stamp the logical volumes:

- Step 1. If they are not already off, turn off the failover root node and all the dependent nodes.
- Step 2. Shut down the initial installation node by entering:

`/etc/shutdown -i0 -g0 -y`
- Step 3. Turn off the initial installation node.
- Step 4. Cycle power on the FibreChannel array.

Step 5. Turn on the initial installation node.

When the initial installation node finishes booting, switch to the command-line login prompt by pressing the Alt-Print Scrn-h key combination, and log in as **root**.

Step 6. Run **casacfg** (1M) on the active node controlling the storage unit. Enter:

/usr/bin/compaq/diags/casa/casacfg -T 1

The MAIN MENU appears:

COMPAQ Fibre Channel Array Configuration

MAIN MENU

1. Select Controller (Loop)
2. Select Fibre Array
3. Unconfigure Driver
- q. Quit

Please select one of the above options []

Step 7. Choose item 2 (Select Fibre Array). All the arrays attached to this node are displayed.

Step 8. This screen appears:

COMPAQ Fibre Channel Array Configuration

Ctlr	Chassis Name	Array Set Name	Serial Num
1. 0	internalcab1	Array1	D009HUQ10022

Please select an item from the list or 'q' for the previous menu []

- Step 9. Choose one of the arrays. The drive tray LEDs blink to indicate which array you have selected.

This screen appears:

COMPAQ Fibre Channel Array Configuration

FIBRE ARRAY MENU

Array Set : Array1
Chassis : internalcab1
Serial Num : D009HUQ10022

1. Select Drive
2. Run disk setup (diskadd) on all Drives
3. Autostamp
4. Clear stamp
5. Modify Array Set / Chassis name
6. Take offline
7. Bring online
- q. Return to previous menu

Please select one of the above options []

- Step 10. At the FIBRE ARRAY MENU, select item 3, Autostamp. This selection allows you to stamp all logical drives on the array automatically.

Note If the autostamping utility returns an error message, some drives may already be stamped, go to Step 11.

If you are autostamping, you can change the autostamping parameters using the screen displayed

To modify a parameter, enter the new value and then press . To leave value unchanged, simply press . Also press to save your changes.

The controller field should remain unchanged—it is based on the actual controller number, and must match in order for stamping to work. The bus parameter normally has a range of 0 to 7, and can remain as set. The next value is the ID, which can range from 0 to 31. Set ID to the next available ID. If you have already stamped drives in another array (on the same node) with ID 0, then enter ID 1, and so on.

After you have accepted or modified all the parameters, you then have a choice of entering **q** to cancel, **r** to re-enter all data, or any other key to save. Press  if the parameters are correct.

The `casacfg` utility prints an error message if the nexus is already in use and sends you back to enter the correct autostamp parameters.

If there are no conflicts, the utility displays the following choices:

a — Begin auto-stamping

q — Quit

Select **a**, and respond with a **y** to the prompt for bringing the drives online after stamping them.

When finished, quit from **casacfg** and go to Step 12.

- Step 11. If you cannot use autostamp because some of the drives are already stamped, select a drive—option 1 in the FIBRE ARRAY MENU—and stamp each logical drive individually.

After you choose option 1 to select a drive, this screen appears showing the drives on your array:

COMPAQ Fibre Channel Array Configuration

	Seq	STAMP	Drive Name	DriveSet	Offline
1.	0	2 0 0 0	0CF1P218C0RBFJ1LNCB15E	Array1	
2.	1	- - - -	cab1u1	Array1	X

- a. Select the drive from the list.

The DRIVE MENU appears:

COMPAQ Fibre Channel Array Configuration

DRIVE MENU

Drive Name : cablu1
 Nexus : - - - - [Offline]
 Sequence Num : 1

1. Run disk setup (diskadd) on all Drives
2. Stamp Drive
3. Clear Stamp
4. Modify Drive Name
5. Take offline
6. Bring online
- q. Return to previous menu

Please select one of the above options []

- b. Select option 2, Stamp Drive.

The STAMP LOGICAL DRIVE (NEXUS) menu appears:

COMPAQ Fibre Channel Array Configuration

STAMP LOGICAL DRIVE (NEXUS)

Slot No : 2
Chassis :
Sequence No : 1

Controller : [-]

Bus : [-]

ID : [-]

LUN : [-]

Please update the fields or enter q to quit

- c. Enter the values corresponding to the device name you are creating.
For example, to stamp the drive as *c2b0t1d0*, enter:

COMPAQ Fibre Channel Array Configuration

STAMP LOGICAL DRIVE (NEXUS)

Slot No : 2
Chassis :
Sequence No : 1

Controller : [2]

Bus : [0]

ID : [1]

LUN : [0]

Please enter q to cancel, r to re-do or any other key to save[
]

- d. Save your entry by pressing any key other than **q** or **r**.

A message is displayed that your drive has been stamped successfully.

- e. Enter **y** to bring the drive online, when prompted.
- f. Quit from **casacfg** when finished.

Step 12. Make sure that the logical volume for the *root* filesystem is online and available by checking the `/dev/rdisk` directory for device entries that correspond to the SCSI nexus of the logical volume you just created. For example, the disk device associated with nexus `2:0:0:0` is `c2b0t0d0`.

After the disks have been stamped, return to Section 5.6.3, “Procedure for shared-storage clusters,” in the ***UnixWare 7 NonStop Clusters Installation*** course guide.

If adding disks to a running cluster during the lab in Section 4.8.1, “Procedure for FibreChannel clusters” in the ***UnixWare 7 NonStop Cluster Administration*** course, return to the next step in that lab.

1.10 Powering Down Compaq Clusters

Perform the following steps to power down a Compaq NonStop Integrity XC system. This procedure assumes that the system is initially operating as a cluster.

Step 1. Press the Print Screen (Prt Scr) key on the keyboard to bring up the K/M/M switch box display, and select the node.

Step 2. Log in as root and shut down the cluster operating system:

shutdown -i0 -g0 -y

Step 3. Upon completion of the shutdown, turn off the front panel power switch on every node.

Step 4. Turn off the ServerNet SAN switches.

Step 5. Turn off the storage expansion modules (PSS/U1 or FibreChannel Array).

WARNING! For power-down operations, always leave the storage expansion power and the ServerNet SAN switch and hub power on until after power is removed from the server nodes.

Step 6. Turn off the UPS units (if any).

WARNING! The UPS will continue to supply ac power to the rack components unless the UPS is shut down at its front panel (or by an EPO input).

Step 7. Turn off the monitor.

Step 8. Remove ac power from the system by disconnecting the ac input power cord(s) at the wall outlet(s).

WARNING! Systems with dual power cords are not fully off until both ac power cords are disconnected and all UPS units (if any) are turned off.

1.11 Testing Compaq ServerNet SAN Interconnect

The Compaq ServerNet Verification Utilities verify proper installation and cabling of the Compaq ServerNet System Area Network (SAN) prior to UnixWare software installation. The Compaq ServerNet Verification Utilities are stand-alone utilities run from a bootable diskette inserted into each cluster node.

A bootable DOS diskette can be created using the Compaq ProLiant Clusters for SCO UnixWare 7 Cluster Enhancements CD.

The ServerNet Verification Utilities test these aspects of Compaq ServerNet SAN:

- The Compaq ServerNet PCI Adapter is installed and functioning properly within the server.
- All nodes in the cluster can communicate over both X and Y ServerNet paths.

1.11.1 Creating the ServerNet Verification Utilities Diskettes

You can create diskettes on a Win32 PC or a UNIX system. You need a blank, IBM-formatted diskette for each node in the cluster.

To create ServerNet Verification Utilities Diskettes on a Win32 PC:

- | | |
|---------|---|
| Step 1. | Insert the Cluster Enhancements CD into the CD-ROM drive of the PC. |
| Step 2. | Display the contents of the CD, double-click on the <i>svu</i> folder, and drag the <i>svu-v1_0.exe</i> file onto the hard drive. |
| Step 3. | Double click on <i>svu-v1_0.exe</i> on the hard drive to begin creating the ServerNet Verification Utilities diskette. |
| Step 4. | At the first screen, page down to view the license agreement. Enter AGREE to begin the diskette creation process. |
| Step 5. | At the Status screen, enter the drive letter of the diskette drive, and insert a blank, IBM-formatted diskette when prompted. The diskette is created at this point. |
| Step 6. | When the diskette creation process has finished, remove the diskette and write-protect it. |
| Step 7. | Label the diskette appropriately. For example: |

Compaq ProLiant Clusters for SCO UnixWare 7 ServerNet
Verification Utilities Diskette, Version 1.0

Step 8. Repeat these steps to make a diskette for each node in the cluster.

To create ServerNet Verification Utilities Diskettes on a UNIX System:

Step 1. Insert the Cluster Enhancements CD into the CD-ROM drive of the UNIX system.

Step 2. Insert a blank, IBM-formatted diskette into the diskette drive of the UNIX system.

Step 3. Mount the CD-ROM with a command similar to the following:

```
mount -F cdfs -r /dev/cdrom/cdrom1 /mnt
```

Step 4. Copy the image to a diskette using the **dd** command as follows:

```
dd if=MountPoint/svu/svu-v1_0.image bs=18k of=/dev/dsk/xx
```

For example:

```
dd if=/mnt/svu/svu-v1_0.image bs=18k of=/dev/dsk/f03ht
```

Step 5. When the diskette creation process has finished, remove the diskette and write-protect it.

Step 6. Label the diskette appropriately. For example, label it as follows:

```
Compaq ProLiant Clusters for SCO UnixWare 7 ServerNet  
Verification Utilities Diskette, Version 1.0
```

Step 7. Repeat these steps to make a diskette for each node in the cluster.

After you have made a ServerNet Verification Utilities diskette for each node, you can begin the ServerNet verification tests.

1.11.2 Running the ServerNet Tests

The utilities diskette you created contains two utilities:

- The **spaf**(1M) ServerNet PCI Adapter functional test utility tests the local PCI adapter and the ServerNet connections between two-node, directly connected clusters.
- The **swift**(1M) ServerNet Switch functional test utility tests ServerNet connections between nodes in clusters that use the 6-port ServerNet switch.

To test the connections between nodes, you must use a diskette in each node.

To verify that the local ServerNet adapter is properly installed and functional, perform these steps on each node that has a ServerNet adapter:

Step 1. Insert a ServerNet Verification Utilities diskette into the node for which you want to test the local adapter. Reboot the node from the diskette.

Step 2. At the DOS prompt, enter **spaf**. A title screen appears.

Step 3. Press to start the test of the ServerNet links. The following messages should display:

LINK X IS ALIVE

LINK Y IS ALIVE

If either link is reported NOT ALIVE, there is a problem with the adapter. Try reseating the card and repeating the test.

Step 4. After the link test has completed, press to start the loopback test. Loopback test status appears. If a loopback error occurs, the error is displayed and the test fails.

Step 5. Press to stop the test.

To verify node-to-node communication on a directly-connected two-node cluster:

Step 1. Insert ServerNet Verification Utilities diskettes into nodes 1 and 2, and reboot the nodes from the diskettes.

Step 2. At the DOS prompt on node 1, enter:

```
spaf 1 2
```

A title screen appears.

Step 3. Press  to start the link test. You should see these messages:

```
LINK X IS ALIVE
```

```
LINK Y IS ALIVE
```

If any errors appear, they indicate a problem with the cabling between the nodes. Exit the test and resolve the problem before continuing.

Step 4. At the DOS prompt on node 2, enter:

```
spaf 2 1
```

A title screen appears.

Step 5. Press  to start the link test. You should see these messages:

```
LINK X IS ALIVE
```

```
LINK Y IS ALIVE
```

A few errors may appear at first, but they should clear up. If any persistent errors appear, they indicate a problem with the cabling between the nodes. Exit the test and resolve the problem before continuing.

Step 6. On node 1, press  to begin the loopback test. If a loopback error appears, the test fails and reports an error. Failure indicates that there is a problem with the cabling between the two nodes. Exit the test and resolve the problem before continuing.

Step 7. On node 1, press  to exit the test.

Step 8. On node 2, press  to start a loopback test. Ignore the output for this test. This test must run before you can quit the program.

Step 9. On node 2, press  to exit the second loopback test.

To verify the node-to-node communication on a switch-connected cluster:

Step 1. Insert a ServerNet Verification Utilities diskette into each node and reboot the nodes from the diskettes.

Step 2. At the DOS prompt on each node, start the **swift** utility using the following command:

```
swift local_node_number total_number_of_nodes
```

The command should look similar to the following:

```
swift 1 6
```

In this example, the command is entered on node 1 of a 6-node cluster.

Step 3. License and copyright information displays. Press  to display the **swift** menu.

Step 4. Repeat steps 1 - 3 on each node, so they all display the menu.

Step 5. The **swift** program defaults to the X ServerNet fabric identifier, Port=X. If necessary, change the **swift** port setting at each node by entering X or Y at the prompt.

Step 6. On each node, run the external transfer test by entering **E** at the prompt.

A graphical display appears, showing the local node on the left. The display pauses, and the message **LINK ALIVE** shows on the local link graphic.

Step 7. When all the nodes are in this pause state and showing **LINK ALIVE**, press any key at each node to start the external transfer test.

Each node's graphical cluster representation shows the number of transfers and errors at each node. The graphic representation shows the local node, the switch, and the other nodes. Each box representing a node contains the information about the node's transfers and errors.

Step 8. When the tests have run to your satisfaction, press any key to return to the main menu and enter **Q** to exit the test. Perform this step on each node.

Step 9. Repeat Step 8 to exit the test at each node.

When finished, return to Section 3.5, "Lab: Assembling Cluster Hardware," in the *UnixWare 7 NonStop Clusters Installation* course guide.

1.12 Compaq-Supplied Software

The Compaq Extended Feature Supplement (EFS) diskettes contain UnixWare drivers needed to support Compaq hardware platforms. You must have EFS version 7.27nsc, 7.28B, or later for NSC servers.

Create the EFS diskettes before you begin the UnixWare 7 installation. If you have *SmartStart* version 4.40 or later, you can create the *Compaq* EFS diskettes from the CD-ROM. Alternately, you can ensure that you have the latest version of the EFS by downloading the EFS Softpaq from this web page:

<http://www.compaq.com/support/files/server/UNIX/index.html>

Always use the most recent version of EFS.

The Compaq EFS contains four or five disks, depending on the version you use:

- Compaq HBA diskette
- Compaq EFS; 2 or more diskettes
- Bootable documentation diskette

The HBA disk contains drivers needed during UnixWare 7 installation. It is important that you use HBA disks in the proper sequence during installation:

1. Insert the Compaq HBA diskette when UnixWare 7 prompts for the HBA disk the *first* time.
2. Insert the SCO UnixWare 7 HBA diskette at the second prompt during installation.

The other EFS diskettes must be installed *after* UnixWare 7 is installed, but *before* NSC is installed.

1.12.1 Creating Compaq EFS diskettes from the web

To generate the EFS diskettes from a Windows PC using the downloaded *SoftPaq* file:

- Step 1. Downloading the SoftPaq applicable to your server model and operation system release.
- Step 2. Copy it to an empty directory and change to that directory.
- Step 3. From that drive and directory, execute the SoftPaq file. Double-click on the *SP10623.exe* file.
- Step 4. The set of files created depends on the EFS version. These files are created for version 7.32:

EFS732._01
EFS732._02
EFS732._03
EFS732._04
EFS732._05
QRST5.EXE
Readme.txt

The number after EFS is the release number, and will be different when there is a newer version available when you download the SoftPaq.

- Step 5. Obtain 5 DOS formatted 1.44 MB diskettes.

IMPORTANT: Only 1.44 MB, DOS formatted diskettes can be used, other types of media cannot be substituted.

- Step 6. Execute the **QRST5** program Enter:

QRST 

- Step 7. When the "Select Diskettes in this set" prompt appears, choose the highlighted, default selection "Do ALL of the diskettes in this set" by pressing .

- Step 8. The "Enter Destination Drive" prompt is given.

Either A or B will be included in the prompt, depending on where your 3.5 inch diskette drive is located. If the drive shown in the prompt is not the one you wish to use, change the value by pressing either A or B. At this point, you can optionally print a label (if your printer is attached) by pressing .

- Step 9. Press  to accept the diskette drive letter. The same screen will reappear. Press  again to extract and decompress the diskette image.
- Step 10. The "Ready to copy diskette" prompt appears. It is asking for one 1.44 MB diskette. Verify that you have a formatted 1.44 MB diskette in the appropriate disk drive and press  to begin diskette creation.
- A counter box will be displayed during creation showing status. The number of cylinders will count up to 80.
- Step 11. Repeat from step 6 until all five diskettes have been created.
- When **QRST** has completed, it will exit back to DOS.

At this point, the EFS diskettes have been created and are ready to use. Please read all information in the README.EFS file on the documentation diskette before installing the EFS.

To verify that you have valid EFS diskettes, use the UNIX **sum -r** command and compare the values with those provided in the *Readme.txt* file.

sum -r /dev/fd0

For example, the sum values for EFS version 7.32 are:

```
EFS DISK1:    40697
EFS DISK2:    64787
EFS DISK3:    22438
HBA DISK:     39165
```

The documentation diskette is not a UNIX diskette, therefore does not need a sum.

1.12.2 Creating Compaq EFS diskettes from SmartStart

To generate the EFS diskettes from the SmartStart CD-ROM:

- Step 1. If they are not already off, turn off the failover root node, the dependent nodes, and the external disk subsystem (if any).
- Step 2. Turn off the initial installation node.
- Step 3. Insert the *SmartStart* 4.40 (or later) CD-ROM into the drive of the initial installation node.
- Step 4. Power up the external disk subsystem (if any).
- Step 5. Power up the initial installation node. The node boots from the *SmartStart* CD-ROM and brings up the *SmartStart* utility.
- Step 6. Click on the **Create Support Software** icon.
- Step 7. Select the **Create EFS diskettes** item and click on OK.
- Step 8. Follow the online instructions to create the EFS diskettes.

1.12.3 Installing the Compaq EFS

The Compaq EFS disks are installed on the initial root node using **pkgadd** after UnixWare 7 is installed and running. The exception is the Compaq HBA disk, which is the first disk of EFS set. The HBA disk is used during UnixWare 7 installation.

Note The Compaq EFS must be installed *before* NSC is installed.

To install the Compaq EFS:

- Step 1. Log in as **root** to the initial root node.
- Step 2. Identify which packages you need from these lists. The packages might not be listed by **packadd** in the order shown here. They are distributed across the multiple EFS disks. To simplify selection, put a box next to the packages you need, and use this as a check list as you select it on screen when running **pkgadd**.

Always install these packages:

cpqdoc	Documentation
ptfcled	<i>ProLiant</i> LED driver
ptfcpqsmu	SCSI Maintenance Utilities
ptfcultra	cpqultra Utility

Install these if your cluster has a FibreChannel Storage System:

ptfcasa	FibreChannel Array Driver
ptfcasau	FibreChannel Utilities

Install this if your cluster has a PSS/U storage system with RSO:

ptfidamnu	Integrated Device Array menu
-----------	------------------------------

Install the Ethernet drivers for all of the types of NICs in your cluster:

ptfcnet Compaq NetFlex Driver

ptfn100c Intel NIC Driver

Install this only if your cluster has a server with hot-plug PCI slots (such as the ProLiant 6400R):

cpqhpcd Hotplug Driver

Step 3. Enter this command line:

pkgadd -d diskette1

Step 4. When prompted to insert a diskette, insert the first EFS diskette into the drive of the initial installation node and press . A list of packages included on this diskette appears.

Step 5. When the list appears, select the packages on your list from Step 2 and press  to install those packages.

Note Although the list includes packages other than those included in Step 2, only install the packages you selected.

Step 6. Respond to any prompts from the packages you are installing.

Step 7. Replace the diskette in the drive with the next EFS diskette, and press .

Step 8. Repeat Step 5 for each EFS diskette, or until you have installed all the drivers from the list you made in Step 2.

Step 9. Remove the last EFS diskette from the drive.

Step 10. Press **q** to exit from **pkgadd**.

Step 11. Reboot the server. Enter:

cd /

shutdown -i6 -g0 -y

Depending on the drivers installed, an extra rebuild/reboot cycle may occur automatically. This is expected.

After the EFS has been installed, return to Section 4.10.2, “Post-installation tasks,” in the *UnixWare 7 NonStop Clusters Installation* course guide.