

# **StorageWorks by Compaq RAID Array 4100 for Non-Compaq Servers**

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## **Installation Guide**

Part Number 174514-004

May 2002 (Fourth Edition)

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

***COMPAQ***

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RAID Array 4100 for use with Non-Compaq Servers Installation Guide

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# Contents

## About This Guide

Important Safety Information .....	vii
Symbols on Equipment .....	vii
Rack Stability.....	ix
Symbols in Text.....	ix
Text Conventions.....	ix
Getting Help.....	x
Compaq Technical Support.....	x
Compaq Website .....	xi
Compaq Authorized Reseller .....	xi

## Chapter 1

### Windows NT Installation

Before You Begin.....	1-1
Compaq Array Configuration Utility.....	1-2
Before You Install the Array Configuration Utility .....	1-2
Installing the Array Configuration Utility using the RA4100 SAN Solutions Support Software CD.....	1-3
Installing the Array Configuration Utility using the Compaq SmartStart and Support Software CD.....	1-3
Compaq Insight Manager .....	1-5
Before you Install Compaq Insight Manager .....	1-5
Installing Compaq Insight Manager.....	1-7
Installing Compaq Insight Manager Agents.....	1-9
SANworks Virtual Replicator.....	1-11
Installing SWVR.....	1-11
Compaq Redundancy Manager.....	1-13

Installing Redundancy Manager .....	1-16
Managing Redundancy Manager .....	1-18
Changing Paths .....	1-18
Expanding Capacity .....	1-19
Other Functions .....	1-20
Troubleshooting Redundancy Manager .....	1-21
Informational Messages .....	1-22
Warning Messages .....	1-24
Error Messages .....	1-24
Troubleshooting Potential Problems .....	1-28

## Chapter 2

### Windows 2000 Installation

Before You Begin .....	2-1
Compaq Array Configuration Utility .....	2-2
Before You Install the Array Configuration Utility .....	2-3
Installing the Array Configuration Utility .....	2-3
Secure Path .....	2-6
Before You Install Secure Path .....	2-6
Installing Secure Path Server Software .....	2-6
Installing Secure Path Client Software .....	2-7
Virtual Replicator .....	2-8
Installing SWVR .....	2-8

## Chapter 3

### NetWare Installation

Before You Begin .....	3-1
Compaq Array Configuration Utility .....	3-2
Before You Install the Array Configuration Utility .....	3-2
Installing the Array Configuration Utility using the RA4100 SAN Solution Support Software CD .....	3-3
Installing the Array Configuration Utility using the Compaq SmartStart and Support Software CD .....	3-3
Compaq Insight Manager .....	3-4
Installing Compaq Insight Manager .....	3-4
Secure Path .....	3-6

## Chapter 4

### Linux Installation

Before You Begin .....	4-1
Installing Linux Fibre Channel Driver for Red Hat 6.2 .....	4-2
Installing Linux Fibre Channel Driver for Red Hat 7.0 .....	4-3

## Index

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## About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

### Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

### Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:



**WARNING:** This symbol, in conjunction with any of the following symbols, indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

---



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

---



This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

**WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure

---



This symbol on an RJ-45 receptacle indicates a network interface connection.

**WARNING:** To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

---



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

**WARNING:** To reduce the risk of injury from a hot component, allow the surface to cool before touching.

---



These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

**WARNING:** To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

---



This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg  
Weight in lb

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

---

## Rack Stability



**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
  - The full weight of the rack rests on the leveling jacks.
  - The stabilizing feet are attached to the rack if it is a single-rack installation.
  - The racks are coupled in multiple-rack installations.
  - Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.
- 

## Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

---



**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

---

**IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

**NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Text Conventions

- *Italic type* is used for complete titles of published guides or variables. Variables include information that varies in system output, in command lines, and in command parameters in text.



- **Bold type** is used for emphasis, for onscreen interface components (window titles, menu names and selections, button and icon names, and so on), and for keyboard keys.
- Monospace typeface is used for command lines, code examples, screen displays, error messages, and user input.
- Sans serif typeface is used for uniform resource locators (URLs).

## Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

### Compaq Technical Support

In North America, call the Compaq Technical Support Phone Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored. Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website, [www.compaq.com](http://www.compaq.com).

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

## **Compaq Website**

The Compaq website has information on this product as well as the latest drivers and flash ROM images. You can access the Compaq website at [www.compaq.com](http://www.compaq.com).

## **Compaq Authorized Reseller**

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

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## Windows NT Installation

This chapter provides information for installing Compaq Array Configuration Utility, Compaq RA4100 SAN Solution Support Software, Compaq *Insight Manager*<sup>™</sup>, Compaq *SANworks*<sup>™</sup> Virtual Replicator, and Compaq Redundancy Manager on non-Compaq servers running Microsoft Windows NT.

For information on installing, configuring, and troubleshooting the RAID Array 4100 hardware, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*. For information on installing, configuring, and troubleshooting the 64-Bit/66-MHz Fibre Channel Host Adapter, refer to the *Compaq StorageWorks 64-Bit/66-MHz Fibre Channel Host Adapter Installation Guide*, *Compaq StorageWorks Fibre Channel Troubleshooting Guide*, and all other user documentation.

### Before You Begin

Before you begin installing Compaq software for use with your RA4100, make sure that your non-Compaq server meets the following requirements:

- Windows NT 4.0 with Service Pack 6.0 or later
- Microsoft Systems Management Server Launch Support

Microsoft Systems Management Server Launch Support is optional and is applicable only if you are performing an Enterprise rollout.

- Microsoft Internet Explorer version 5.0 or later

If you do not have Internet Explorer, you can download a free copy of the latest version of Internet Explorer from the Microsoft website at [www.microsoft.com](http://www.microsoft.com).

- 32-MB RAM

- 35-MB disk space
- VGA monitor or better
- TCP/IP protocol
- SNMP service

## Compaq Array Configuration Utility

This section provides instructions for installing the Compaq Array Configuration Utility (ACU). The Array Configuration Utility is located on the RA4100 SAN Solution Support Software CD-ROM.

**NOTE:** The Compaq *SmartStart*™ Software and Support CD with a higher revision number than the RA4100 SAN Solution Support Software may contain an updated version of RA4100 SAN Solution software.

The utility uses a graphic interface to help you configure the *StorageWorks*™ RAID Array 4000 Controller by Compaq. You can use the interface to configure the RA4000 controller initially, to add additional disk drives to an existing configuration, or to reconfigure an array controller.

The Array Configuration Utility is supported online for Windows NT.

## Before You Install the Array Configuration Utility

During a first-time installation and configuration of the RA4000 controller, complete the following:

1. Run Options *ROMPaq*™ (Version 2.62 or later) to update the controller firmware, option ROM, and drive firmware.

**NOTE:** To run the Options ROMPaq from the RA4100 Support Software CD, boot up the system using the RA4100 Support Software CD and select the option Run Options ROMPaq Utility from the menu that displays. This will launch the utility that will detect and update the firmware.

2. Determine which fault-tolerance method and array configuration to use.

3. If you plan to use Redundancy Manager:
  - a. Check to make sure that all RA4000 controllers are using the same firmware revision number, and that the firmware version is 2.58 or later. You can check this using the SCSI Adapter applet in the Windows NT Control Panel.
  - b. Verify that the cache boards on your array controllers are the same size. They must be of the same size for Redundancy Manager to function properly.

For more information on Options ROMPaq, fault-tolerance, and RAID levels, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

## Installing the Array Configuration Utility using the RA4100 SAN Solutions Support Software CD

To install the Compaq Array Configuration Utility from the RA4100 SAN Solution Support Software CD, follow the instructions found inside the CD-ROM sleeve.

**NOTE:** The Compaq SmartStart Software and Support CD with a higher revision number than the RA4100 SAN Solution Support Software may contain an updated version of RA4100 SAN Solution software.

## Installing the Array Configuration Utility using the Compaq SmartStart and Support Software CD

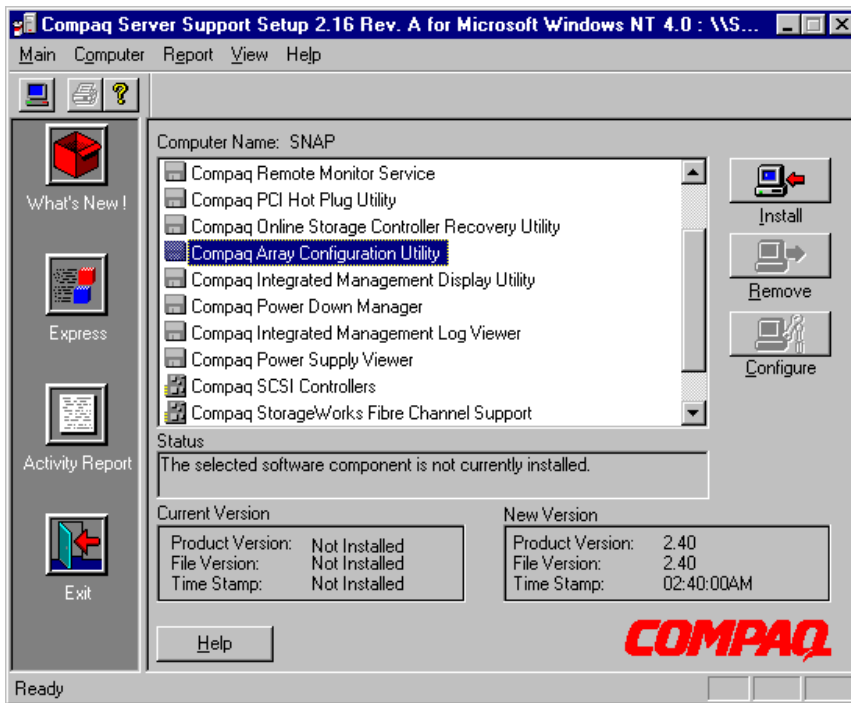
For information on configuring and running the Array Configuration Utility once you complete the installation, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

1. Insert the Compaq SmartStart and Support Software CD. If you have enabled AutoPlay, the Diskette Builder window appears. Select *I Agree*, then click OK to close the Diskette Builder window.
2. Click Start and click Run.
3. In the Open box, enter:

**X**: \CPQSUPSW\NTSSD\SETUP.EXE

where **X** is the letter of your CD-ROM drive.

The Compaq Server Support Setup window appears:



**Figure 1-1: Compaq Server Support Setup window**

4. Select *Compaq Array Configuration Utility* and click Install.
5. The Compaq Array Configuration Utility Information window appears. Click OK.
6. When the file copy is complete, the icons beside Compaq Array Configuration Utility and Compaq StorageWorks Fibre Channel Support appear green. Click Exit.
7. The Reboot Computer prompt appears. Remove the CD-ROM from the drive.
8. Click Reboot to restart the server.

For information on configuring and running the Array Configuration Utility, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

## Compaq Insight Manager

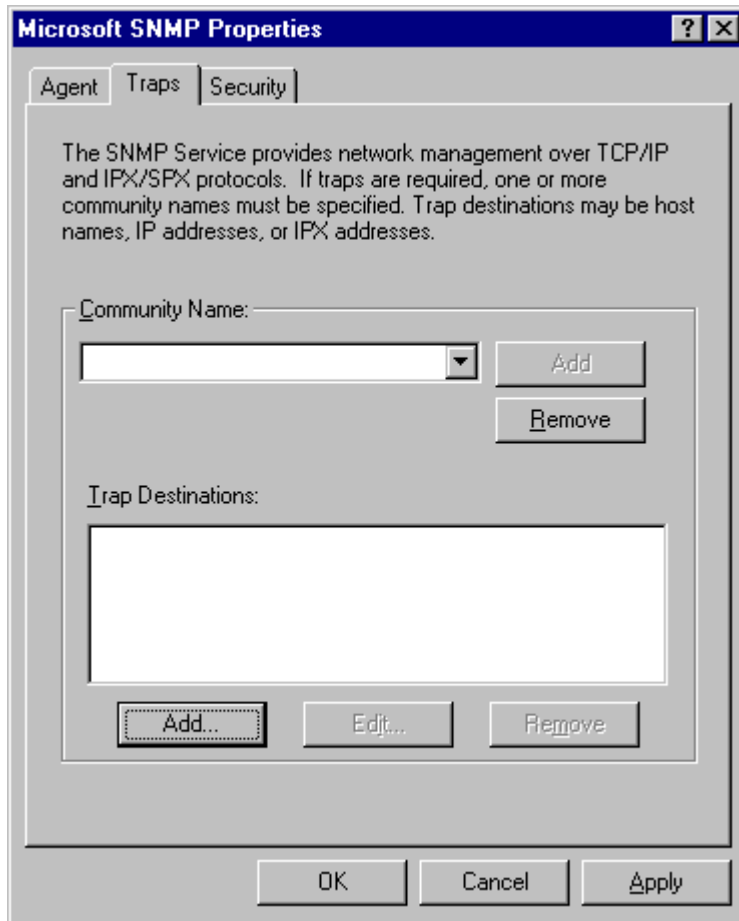
Compaq Insight Manager helps you manage network desktops and servers easily. It delivers intelligent monitoring and alerting (based on your preferences) as well as visual control of your RAID Array 4000 or 4100.

Compaq Insight Manager provides integration with leading management platforms including HP OpenView, IBM NetView, SunNet Manager, and Microsoft Systems Management Server.

### Before you Install Compaq Insight Manager

Before you install Compaq Insight Manager, make sure that the SNMP service is installed on your server.

1. Right-click the Network Neighborhood icon on the Windows NT desktop and choose *Properties*.
2. Click the Services tab.
3. If SNMP Service does not appear on the Network Services list, click Add. If SNMP Service does appear on the Network Services list, proceed to the next section, "Installing Compaq Insight Manager."
4. Choose *SNMP Service* from the Network Services list and click OK.
5. The Windows NT Setup window appears. Type the location of your Windows NT setup files and click OK.
6. When installation is complete, the Microsoft SNMP Properties window appears. Configure SNMP by entering the Community Name and Trap Destinations on the Traps tab.



**Figure 1-2: SNMP Properties Traps tab**

7. When you finish configuring SNMP Service, click OK.
8. The Network window reappears. Click Close.
9. Do not reboot. Reinstall your Windows NT Service Pack (version 6.0 or later).
10. Restart your server.

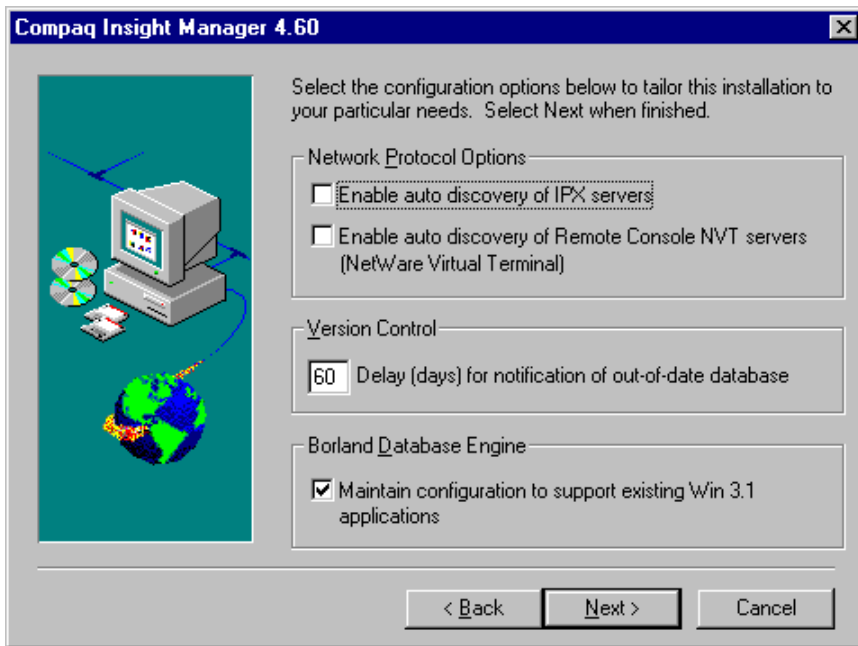


## Installing Compaq Insight Manager

Once you verify that the SNMP service is installed and configured properly, you can install Compaq Insight Manager.

1. Insert the Compaq Management CD.
2. The Compaq Management CD window appears. Click Compaq Insight Manager.
3. The Compaq Insight Manager window appears. Choose *Compaq Insight Manager* and click Open.
4. The Compaq Insight Manager Setup window appears. Click Next.
5. Enter the appropriate information when prompted during setup. When the Select Install Options window appears, select *Compaq Insight Manager* and click Next.
6. Enter the file location and click Next.

The Configuration Options window appears:



**Figure 1-3: Compaq Insight Manager Configuration Options window**

7. Configure as required and click Next.
8. Choose a Program Folder location and click Next.
9. When Setup is complete, click Finish.
10. The Compaq Insight Manager window reappears. Click Close.

The Compaq Management CD window reappears.

**IMPORTANT:** Do not close the Compaq Management CD window or reboot your server.

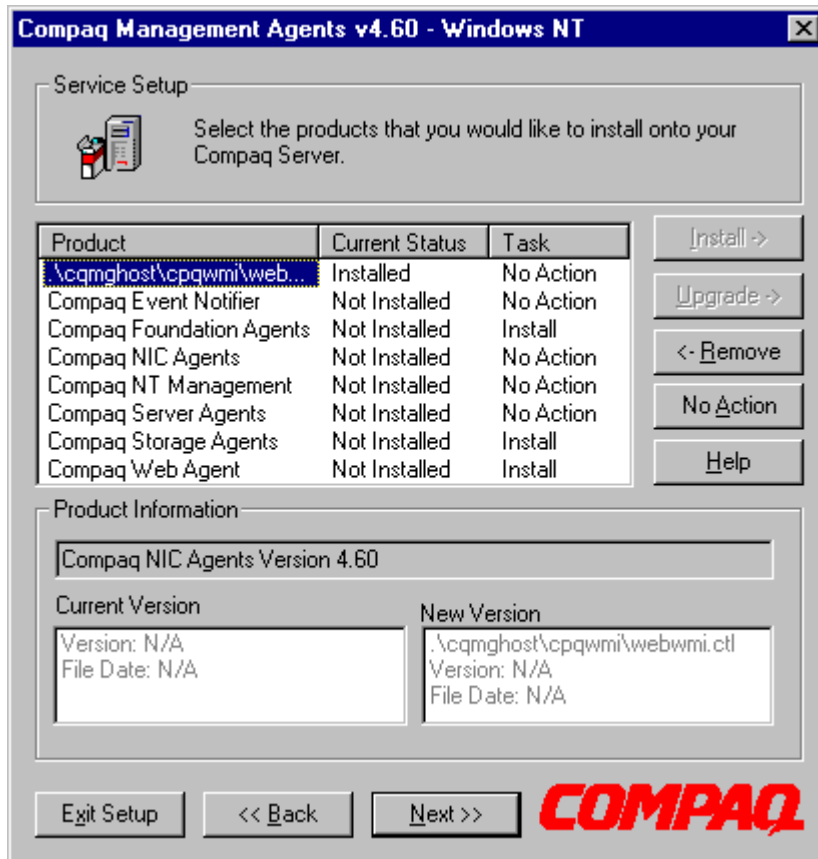
## Installing Compaq Insight Manager Agents

After installing Compaq Insight Manager, you must install the Compaq Insight Manager Agents for Compaq Insight Manager to function properly.

**IMPORTANT:** If you do not install the Compaq Insight Manager Agents by following the instructions below, Compaq Insight Manager may not function properly on your non-Compaq server.

1. Minimize the Compaq Management CD window.
2. Remove the Compaq Management CD from the CD-ROM drive.
3. Insert the Compaq SmartStart and Support Software CD. If you have enabled AutoPlay, the Diskette Builder window appears. **Do not** select I Agree, then click OK to close the Diskette Builder window.
4. Click Start and click Run.
5. In the Open box, enter:  
`X:\CPQSUPSW\NTSSD\SETUP.EXE`  
where **X** is the letter of your CD-ROM drive.
6. The Compaq Server Support Setup window appears. Minimize this window.  
  
**IMPORTANT:** Do not close the Compaq Server Support Setup window.
7. Remove the SmartStart and Support Software CD.
8. Reinsert the Management CD.
9. Restore the Management Agents for Servers window.
10. Choose *Compaq Management Agents for Servers* and click Open.
11. The Install Type window appears. Choose *Custom* and click Next.
12. Install only the Compaq Foundation Agents, Storage Agents, and Web Agent. All other items should display No Action, as shown in Figure 1-4. Highlight each agent and click No Action.

**IMPORTANT:** Install only the agents listed above. Installing agents other than those listed above may cause Compaq Insight Manager to function improperly on your non-Compaq server.



**Figure 1-4: Compaq Management Agents window with appropriate items selected for installation**

13. Click Next.
14. Click Finish.
15. Click OK to clear information messages.

16. The Compaq Management Agents window reappears. Click Close.
17. Remove the Compaq Management CD and restart your server.

**NOTE:** The only component of Compaq Insight Manager that will function on a non-Compaq server is storage monitoring and notification.

For information on configuring and running Compaq Insight Manager, refer to the *Compaq Insight Manager User Guide*.

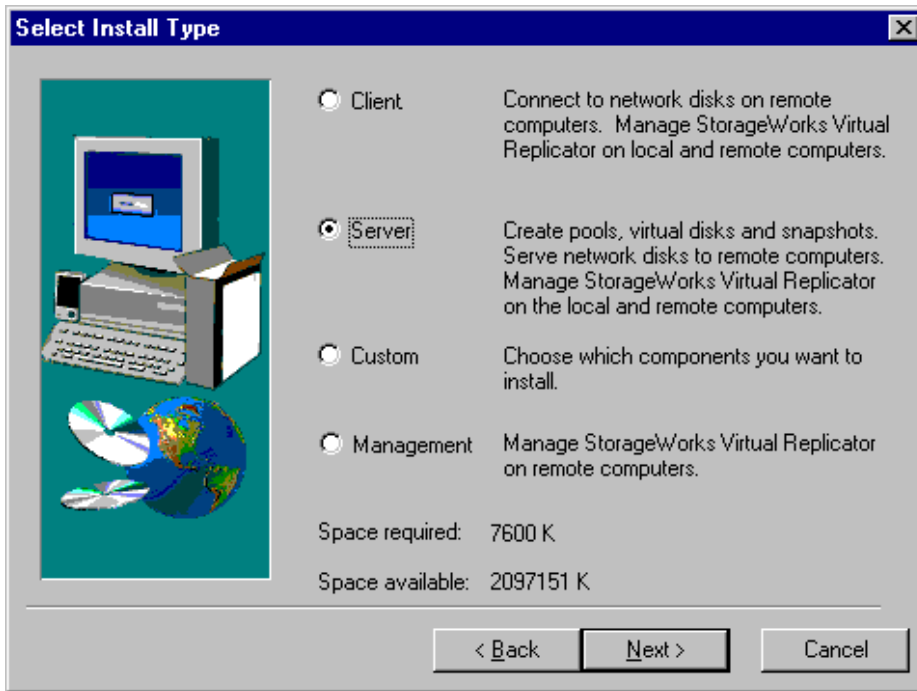
## SANworks Virtual Replicator

SANworks Virtual Replicator (SWVR) by Compaq provides advanced, centralized storage management capabilities for Windows NT computing environments. Its innovative storage management features simplify storage configuration and management, and enhance availability and scalability. You can use SWVR to create virtual disks, to create snapshots of your drive contents, and to back up your servers.

### Installing SWVR

1. Insert the SANworks Virtual Replicator CD. If you have disabled AutoPlay, click Start and click Run.  
In the Open box, enter:  
**X:** \SETUP.EXE  
where **X** is the letter of your CD-ROM drive.
2. The Virtual Replicator window appears. Click Virtual Replicator.
3. Click Next.
4. Click Yes to accept the License Terms.
5. Click Next to accept the default location or browse to the desired location and click Next.

The Select Install Type window appears:



**Figure 1-5: SWVR Select Install Type window**

6. Choose *Server* as shown in Figure 1-5 and click Next.
7. Click Install Microsoft Management Console.
8. Follow the on-screen installation instructions, then click Finish.
9. The Start Copying Files window appears. Click Next.
10. Choose *Yes* and click Finish to reboot your server.

For information on configuring and using Virtual Replicator, refer to the *Compaq SANworks Virtual Replicator System Administrator's Guide*.

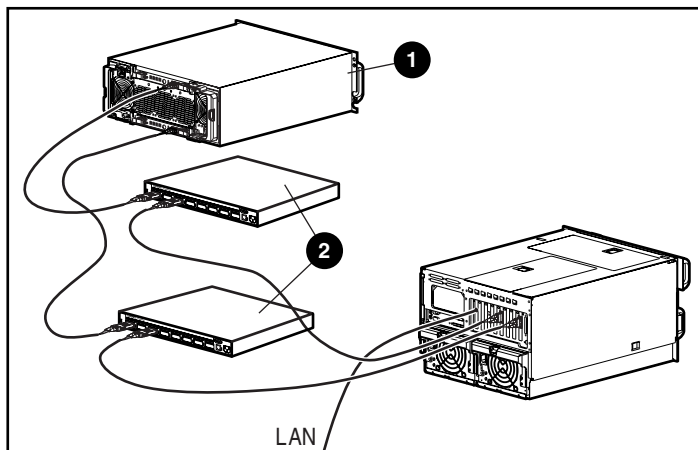
## Compaq Redundancy Manager

Compaq Redundancy Manager (Fibre Channel) is a software tool designed to increase the availability of single-server or clustered systems using a Compaq StorageWorks RAID Array 4100 storage system (formerly Compaq Fibre Channel storage system). Redundancy Manager detects failures of the StorageWorks Fibre Channel Host Adapter (host bus adapter) by Compaq, StorageWorks RA4000 Controller (array controller), and Fibre Channel cable paths, and then reroutes the I/O processing. Redundancy Manager is a monitoring tool; it is not a real-time management tool.

In a non-clustered environment, Redundancy Manager enables full utilization of the redundant hardware available for use with RA4100 storage systems. For example, a single server may be configured with multiple host bus adapters, and it may be connected to dual RA4100s containing redundant storage array controllers and two Fibre Channel Storage Hubs.

**IMPORTANT:** Cable your single-server and RA4100 systems according to Compaq-recommended guidelines. Redundancy Manager may appear to work if the system is cabled differently, but it will not function in failover mode correctly.

Figure 1-6 shows a single-server setup with an RA4100. This setup provides redundant paths to the RA4100.

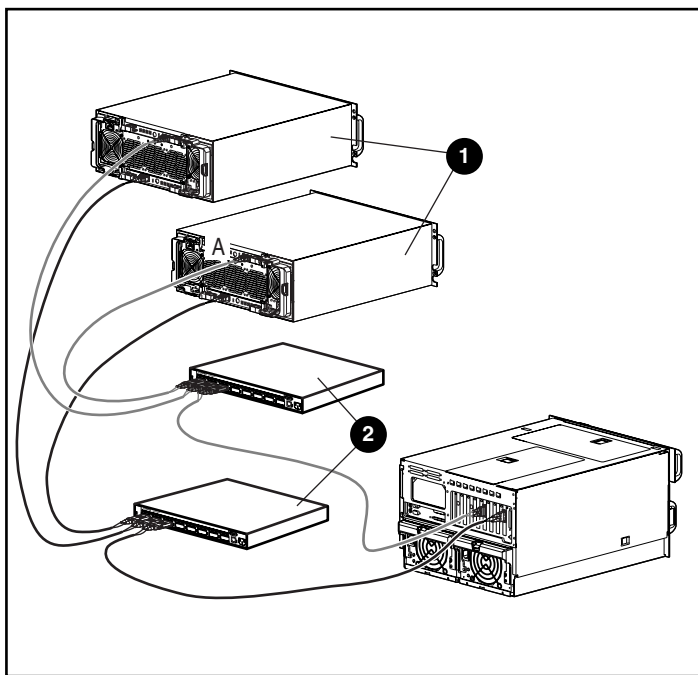


**Figure 1-6: Single-server setup with a single RA4100**

**Table 1-1: Single-server Setup with a Single RA4100**

Item	Description
①	RA4100 with RA4000 Controller and RA4000 Redundant Controller
②	Switches

Figure 1-7 shows a single-server setup with dual RA4100s. This setup provides redundant paths and I/O load balancing capability.



**Figure 1-7: Single-server setup with dual RA4100s**



**Table 1-2: Single-server Setup with Dual RA4100s**

Item	Description
①	RA4100 with RA4000 Controller and RA4000 Redundant Controller
②	Switches

Redundancy Manager can be configured with multiple paths to a particular storage device. Each path can be defined as an active path, enabling static I/O load balancing, or with one active and one or more standby paths for failover. The Compaq Redundancy Manager graphical user interface (GUI) enables sophisticated system configuration and control of each defined path.

Redundancy Manager is supported on all Intel-based servers in single-server configurations.

The following sections provide information about:

- Installing Redundancy Manager
- Managing Redundancy Manager
- Troubleshooting Redundancy Manager

Redundancy Manager for Windows NT helps you monitor and manage the data paths for redundant Compaq Fibre Channel Host Adapters connected to the RAID Array 4000/4100. Redundancy Manager works only in conjunction with redundant Compaq Fibre Channel Host Adapters and redundant Compaq RA4000 Controllers. In systems with only one Compaq Fibre Channel Host Adapter; do not use Redundancy Manager.

## Installing Redundancy Manager

Redundancy Manager is only supported in the Windows NT 4.0 operating system.

**NOTE:** The latest version of Redundancy Manager can also be downloaded from the Compaq website at [www.compaq.com/storageworks](http://www.compaq.com/storageworks).

1. Insert the Compaq Redundancy Manager 1.2 and 1.30 (Fibre Channel) CD. If you have disabled AutoPlay, click Start and click Run.

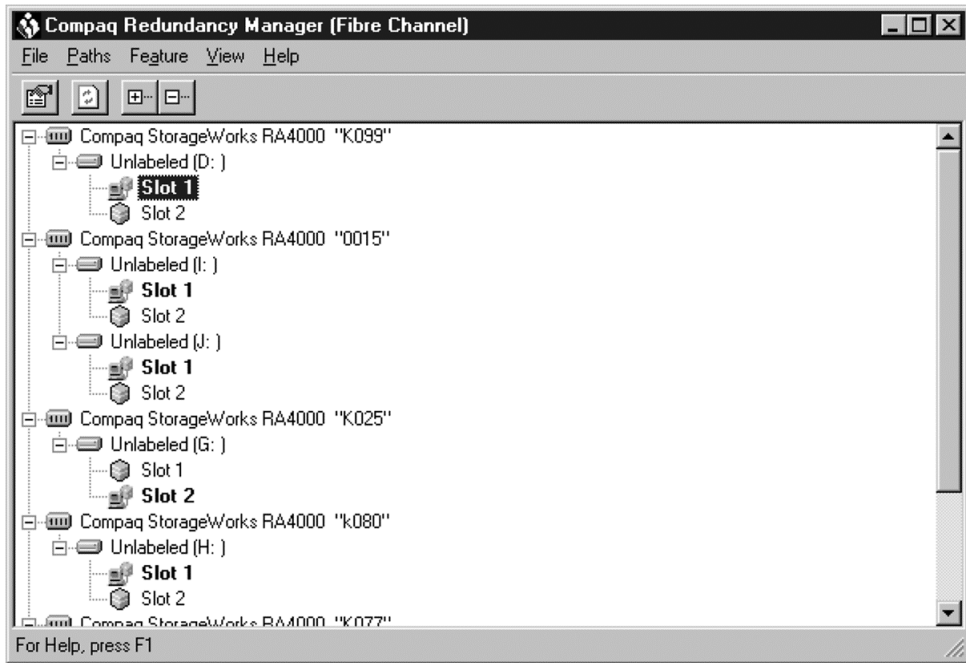
In the Open box, enter:

**X**: \SETUP.EXE

where **X** is the letter of your CD-ROM drive.

2. The Redundancy Manager Setup window appears. Click Next.
3. Click Next to accept the default location or browse to the desired location and click Next.
4. Choose *Yes* and click OK to reboot.
5. After rebooting, insert the floppy disk to install the Slot ID utility into drive a:.
6. Click Start and then Run. Select the *Setup.exe* file on the floppy disk.
7. Click Install in the dialog box that appears. At the end of the process, click Restart.

After Windows is restarted and Redundancy Manager is in operation, the Slot assignments will appear as shown in the following figure.



**Figure 1-8: Slot identification screen**

**NOTE:** The files for the Slot ID installation are included on the floppy disk and can also be downloaded from the Compaq website at [www.compaq.com/StorageWorks](http://www.compaq.com/StorageWorks).

## Managing Redundancy Manager

Redundancy Manager increases the availability of single-server (any Intel-based server) or clustered systems (Compaq ProLiant servers only) using the RA4100 storage system. Redundancy Manager can detect failures of the host bus adapters, array controllers, and Fibre Channel data paths. It then reroutes the I/O processing.

This section explains how to use Redundancy Manager to change and set active and standby paths.

## Changing Paths

The following information describes how to change paths using Redundancy Manager.

**NOTE:** Redundancy Manager will not change the configuration until you close the Redundancy Manager program or select Apply Changes. The Main Screen may not show the current system configuration. Use Refresh (**F5**) to see the current configuration.

## Changing from Standby to Active Paths

To change a path from Standby to Active mode:

1. Highlight the Standby path you want to change.
2. Select *Path* from the main screen menu bar.
3. Select *Set As Active* from the Path menu.

The selected Standby path will change to Active when you select Apply Changes or close Redundancy Manager.

### Shortcut method

The following is a shortcut method to change a path from Standby to Active:

1. Highlight the Standby path you want to change.
2. Click the right mouse button to display a pop-up menu.

3. Select *Set As Active* from the menu.

The selected Standby path will change to Active when you select Apply Changes or close Redundancy Manager.

### **Changing from Active to Standby Paths**

To change a path from Active to Standby mode:

1. Highlight the Active path you want to change.
2. Select *Path* from the main screen menu bar.
3. Select *Set As Standby* from the Path menu.

The selected Active path will change to Standby when you select Apply Changes or close Redundancy Manager.

#### **Shortcut method**

The following is a shortcut method to change a path from Active to Standby:

1. Highlight the Active path you want to change.
2. Click the right mouse button to display a pop-up menu.
3. Select *Set As Standby* from the menu.

The selected Active path will change to Standby when you select Apply Changes or close Redundancy Manager.

### **Expanding Capacity**

Redundancy Manager does not support the hot-add of logical drives. To add drives, you must:

1. Physically add the drives to the RA4100.
2. Restart Windows NT on the server to see the new drives. Shut down and reboot the server.
3. Run the Array Configuration Utility to configure the drives.

**NOTE:** You cannot increase the capacity of an existing Windows NT drive volume, but you can assign a new drive letter to the extra capacity furnished by the added drives.

4. Run Windows NT Disk Administrator to assign a drive letter to the newly created, unused capacity of your RAID volume.
5. While still running Disk Administrator, format the drives using Microsoft NTFS.
6. Run Redundancy Manager.

## Other Functions

Two helpful functions for using the Redundancy Manager GUI are Refresh and Rescan.

### Refresh

Refresh (**F5**) updates information on the GUI screen and checks for path failures and path changes, and displays the current configuration. The GUI will not update automatically. The changes that you have made will not be saved. Use Refresh to update the main screen to see the current configuration or to see if a failure has happened in the system. Refresh does not affect any processing or interrupt any of the system's functions.

### Rescan

Rescan is used to check for new host bus adapters and array controllers and after adding and removing physical drives. Use rescan after a hot-swap of host bus adapters or array controllers and after adding or removing physical drives. Follow these steps to run Rescan:

**NOTE:** For every hot replace, a rescan should be run on each machine.

1. Select *Features* from the Main screen.
2. Select *Rescan* from the Features menu.

**NOTE:** Reboot each server to clear the SCSI port after seven hot replaces.

## Troubleshooting Redundancy Manager

This section provides information on the Redundancy Manager event logging in the following areas:

- Informational messages
- Warning messages
- Error messages
- Troubleshooting potential problems

Redundancy Manager displays messages to inform you of possible changes and events in the system. When a message is displayed, click Help to receive more details about that particular message.

Redundancy Manager has three types of messages: informational, warning, and error. A green icon indicates an informational message; an amber icon indicates a warning message; and a red icon indicates an error message.

The Event Viewer for Windows NT Server displays additional information. For further information on using the Windows NT Event Viewer, refer to your Windows NT server documentation.

## Informational Messages

This section provides a list of the informational messages that Redundancy Manager may display and the action you can take. An informational message informs you of possible changes and events in the system.

**Table 1-3: Informational Messages**

Message	Description	Action
Another instance has locked the loop. This instance is running in Read Only mode.	This message indicates that another application has issued a lock management command to an array controller. The lock management command only allows you to view the data.	No action needed to view the data.
The lock could not be set.	This message informs you that the array controller board is in an unknown state that caused a failed connection to the array controller.	No action needed to view the data.
The loop has been locked by another application.	This message indicates that another application has issued a lock management command to an array controller. The lock management command only allows you to view the data.	No action needed to view the data.
This RA4100 is in Active/Standby mode. All the Logical disks in this Array must have same path assignments. Are you sure you want to continue?	This message indicates that you have made a request to change the status of a path in an Active/Standby configuration.	Proceed or click <b>Cancel</b> .
You have not selected all the Paths to the following logical disk(s):	This message indicates that the logical disk or drives shown are claimed but you did not assign all possible paths.	Click <b>OK</b> for the Redundancy Manager to automatically assign the paths for this logical disk;  Or, click <b>Cancel</b> to assign the paths yourself.

*continued*



**Table 1-3: Informational Messages** *continued*

Message	Description	Action
You have not selected an Active Path to <xxxxxx>.	This message indicates that you claimed a logical disk but did not select an Active Path.	Click <b>OK</b> for the Redundancy Manager to automatically assign the path for this logical disk;  Or, click <b>Cancel</b> to assign the path yourself.
You have not selected any Paths to <xxxxxx>.	This message indicates that you claimed a logical disk but did not assign any paths.	Click <b>OK</b> for the Redundancy Manager to automatically assign the paths for this logical disk;  Or, click <b>Cancel</b> to assign the paths yourself.
You have not selected a Standby Path to <xxxxxx>.	This message indicates that you claimed a logical disk but did not select a Standby path.	Click <b>OK</b> for the Redundancy Manager to automatically assign the path for this logical disk;  Or, click <b>Cancel</b> to assign the path yourself.

## Warning Messages

This section provides a list of the warning messages that Redundancy Manager may display and the action you can take. A warning message informs you of possible noncritical changes and events in the system.

**Table 1-4: Warning Message**

Message	Description	Action
The previous lock by another application has expired. Do you want to override the lock and take control of the loop?	This message indicates that the previous lock on an array controller has expired.	No action needed to view the data. Override to take control of the array controller.

## Error Messages

This section provides a list of the error messages that Redundancy Manager may display and the action you should take. An error message informs you of possible critical changes and events in the system.

**Table 1-5: Error Messages**

<b>Message</b>	<b>Description</b>	<b>Action</b>
Another instance has locked the loop. This instance is running in Read Only mode.	This message indicates that another application has issued a lock management command to an array controller. The lock management command only allows you to view the data.	No action needed to view the data.  To configure the data, close the other application to unlock the array controller. If the lock has expired, Redundancy Manager allows you to override the lock and take control of the array controller.
Another program has a lock on the Array Controller(s). This program is either still running or has exited improperly.  It is recommended that Compaq Redundancy Manager not be run while another program has a lock on the Array Controller(s). To stop this instance from starting, select the Cancel button. To start this instance select the Start button.	Another program has issued a lock management command to an array controller. The lock management command only allows viewing of the data.	No action needed to view the data.
Could not load resource DLL.	This message signifies that the file containing the configuration utility resources could not be loaded.	Reload Redundancy Manager from the CD.
Logical disk could not be reached in the following RA4100: <xxxxxx>.	This message indicates that Redundancy Manager found an RA4100 with no drives in it. A damaged RA4100 or a bad connection could cause this.	Check the RA4100 and all connections.

*continued*

**Table 1-5: Error Messages** *continued*

<b>Message</b>	<b>Description</b>	<b>Action</b>
The lock could not be set.	This message informs you that the array controller board is in an unknown state that caused a failed connection to the array controller.	No action needed to view the data.  To configure the data, check the array controller and all physical connections.
The loop has been locked by another application. Redundancy Manager is running in Read Only mode.	This message informs you that another application has issued a lock management command to an array controller. The lock management command only allows you to view the data.	No action needed to view the data.  To configure the data, close the other application to unlock the array controller. If the lock has expired, Redundancy Manager allows you to override the lock and take control of the array controller.
There was an error attempting to shut down Windows. Please close all applications and shut down now.	This message signifies that an error occurred while shutting down Windows.	Close all applications and shut down your computer immediately.
NT Event Log states: The Host Bus Adapter in slot %1 has averaged more than %2 Elastic Store Errors for the last five seconds. The loop has become unstable. The adapter has been taken offline.	GBIC laser has malfunctioned.	Refer to the “Replacing GBICs” chapter in the <i>Compaq StorageWorks RAID Array 4100 User Guide</i> for instructions about how to replace a GBIC.

*continued*

**Table 1-5: Error Messages** *continued*

Message	Description	Action
A version of the Compaq Fibre Channel Host Adapter SCSI Miniport Driver (cpqfcalm.sys) is being used that does not support redundancy. The minimum version for redundancy support is VX.X. The current version is VX.Z. Redundancy has been disabled.	This message informs you that the version of cpqfcalm.sys doesn't support redundancy.	You must make sure you have the correct version of <i>cpqfcalm.sys</i> .
NT Event Log states: The Host Bus Adapter in slot %1 has averaged more than %2 Soft PCI Errors for the last five seconds. The loop has become unstable. The adapter has been taken offline.	GBIC laser has malfunctioned.	Refer to the "Replacing GBICs" chapter in the <i>Compaq StorageWorks RAID Array 4100 User Guide</i> for instructions about how to replace a GBIC.
NT Event Log states: The Host Bus Adapter in slot %1 has averaged more than %2 Reset Login Primitives for the last five seconds. The loop has become unstable. The adapter has been taken offline.	GBIC laser has malfunctioned.	Refer to the "Replacing GBICs" chapter in the <i>Compaq StorageWorks RAID Array 4100 User Guide</i> for instructions about how to replace a GBIC.

## Troubleshooting Potential Problems

This section provides help for troubleshooting potential problems with the Redundancy Manager.

**Table 1-6: Troubleshooting Potential Problems**

Message	Description	Action
Could not find the resource DLL file.	The error message "Could not load resource DLL" indicates that the resource DLL file has been corrupted or is missing.	Reload the Redundancy Manager software from the CD.
Intercontroller Link Failure.	This indicates a hardware problem.	Replace the RA4100 storage array backplane or add a new array controller.
Illegal Drives.	This indicates that you are using the Micropolis 4/9 Gig drives. The firmware can't handle two array controllers talking to the drive.	Replace the drives.
Array controller firmware versions don't match.	This indicates that the array controllers have different firmware versions.	Run the Options RomPaq to update the firmware to the most current version.
Array controller hardware is not the same.	This indicates that the array controller models are different.	Make both array controllers the same model.
Both array controllers don't see all the drives.	This indicates the possibility that the backplane in the RA4100 storage array is faulty.	Replace the backplane or have it repaired.
Expand operation in progress.	This indicates that the cache is not mirrored during this operation.	Wait until the expand is complete.

For further information on configuring and using Compaq Redundancy Manager, refer to the Redundancy Manager online help.

---

## Windows 2000 Installation

This chapter provides information for installing Compaq Array Configuration Utility, RA4100 SAN Solution Support Software, Virtual Replicator, and Compaq Redundancy Manager with non-Compaq servers running Microsoft Windows 2000.

For information on installing, configuring, and troubleshooting the RAID Array 4100 hardware, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*. For information on installing, configuring, and troubleshooting the 64-Bit/66-MHz Fibre Channel Host Adapter, refer to the *Compaq StorageWorks 64-Bit/66-MHz Fibre Channel Host Adapter Installation Guide* and the *Compaq Fibre Channel Troubleshooting Guide*.

### Before You Begin

Before you begin installing Compaq software for use with your RA4000/4100, make sure that your non-Compaq server meets the following requirements:

- Windows 2000 Server or Advanced Server
- Microsoft Systems Management Server Launch Support

**NOTE:** Microsoft Systems Management Server Launch Support is optional and is applicable only if you are performing an Enterprise rollout.

If you do not have Internet Explorer, you can download a free copy of the latest version of Internet Explorer from the Microsoft website at [www.microsoft.com](http://www.microsoft.com)

- 64-MB RAM minimum; 128-MB RAM recommended
- 35-MB disk space

- VGA monitor or better
- TCP/IP protocol
- SNMP service

## Compaq Array Configuration Utility

This section provides instructions for installing the Compaq Array Configuration Utility (ACU). The Array Configuration Utility is located on the RA4100 SAN Solution Support Software CD-ROM.

**NOTE:** To install the Compaq Array Configuration Utility from the RA4100 SAN Solution Support Software CD, follow the instructions found inside the CD-ROM sleeve.

**NOTE:** The Compaq SmartStart Software and Support CD with a higher revision number than the RA4100 SAN Solution Support Software may contain an updated version of RA4100 SAN Solution software.

The utility uses a graphic interface to help you configure the RAID Array 4000 Controller. Use the interface to configure the RA4000 controller initially, to add additional disk drives to an existing configuration, or to reconfigure an array controller.

The Array Configuration Utility is supported online for Windows 2000.



## Before You Install the Array Configuration Utility

During a first-time installation and configuration of the RA4000 controller:

1. Run Options ROMPaq (Version 2.62 or later) to update the controller firmware, option ROM, and drive firmware

**NOTE:** To run the Options ROMPaq from the RA4100 Support Software CD, boot up the system using the RA4100 Support Software CD and select the option Run Options ROMPaq Utility from the menu that displays. This will launch the utility that will detect and update the firmware.

2. Determine which fault-tolerance method and array configuration to use.

For more information on Options ROMPaq, fault-tolerance, and RAID levels, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

3. If you plan to use Secure Path:

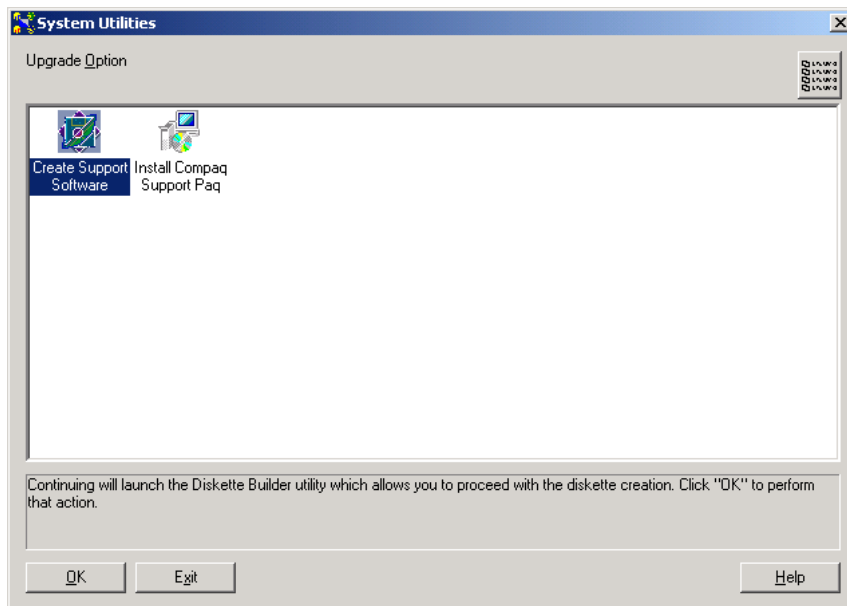
- a. Check to make sure that all RA4000 controllers are using the same firmware revision number, and that the firmware version is 2.58 or later. You can check this using the SCSI Adapter applet in the Control Panel.
- b. Verify that the cache boards on your array controllers are the same size. They must be the same size for Secure Path to function properly.

For more information on Options ROMPaq, fault-tolerance, and RAID levels, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

## Installing the Array Configuration Utility

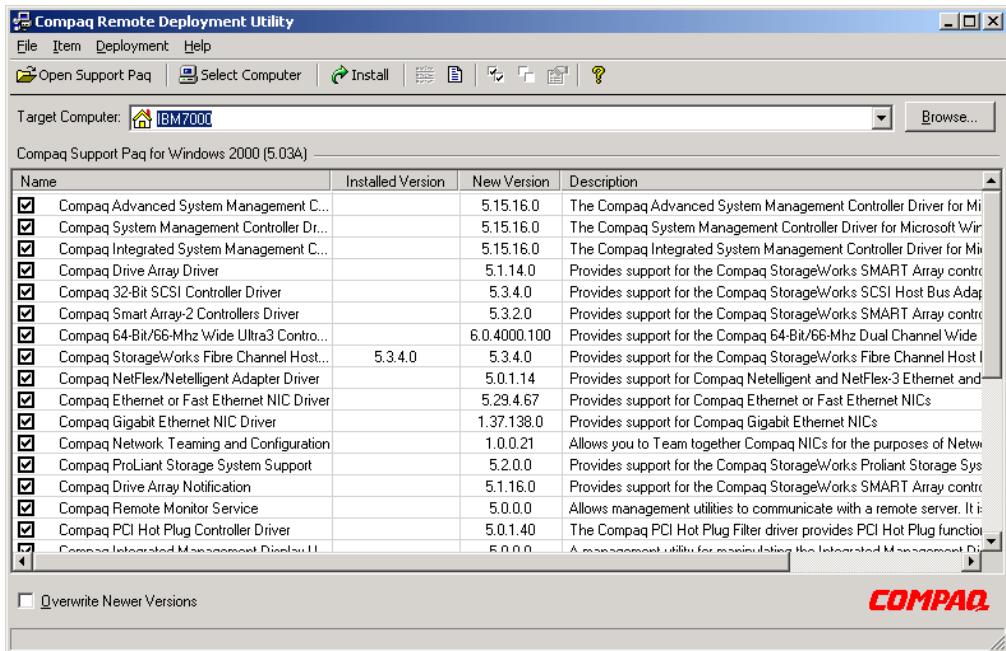
For information on configuring and running the Array Configuration Utility once you complete the installation, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

1. Insert the Compaq SmartStart and Support Software CD. If you have enabled AutoPlay, the Diskette Builder window appears.
2. Select *I Agree* box and click the OK button.
3. The pop-up System Utilities window appears with 2 options, as shown in the next figure.



**Figure 2-1: System Utilities window**

4. Select option 2, *Install Compaq Support Paq*, and click the OK button.
5. The Compaq Remote Deployment Utility dialog box appears, as shown in the following figure.



**Figure 2-2: Compaq Remote Deployment utility**

6. Click the Item menu and select *Deselect All*.
7. Click the checkmark next to Compaq Array Configuration Utility and any other software you want to install.
8. Click the Install button at the top of the window.

**NOTE:** If you are installing a newer version over a former version of the selected software, click the checkbox at the bottom left of the window that says Overwrite Newer Versions.

When the file copy is complete, you will receive a message that the installation was successful.

9. Close the Compaq Remote Deployment Utility dialog box.
10. Close the System Utility menu (click OK if the system prompts you to restart).
11. Open the Array Configuration Utility; it will show the updated version 2.50 A.

For information on configuring and running the Array Configuration Utility, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

Results of the installation are logged to the  
<BOOT DRIVE LETTER>:\CPQSYSTEM\LOG\CPQSETUP.LOG file.

## Secure Path

SANWorks Secure Path for Windows 2000 on RA4000/4100 is a high-availability software product that manages and maintains continuous data access to the StorageWorks RAID Array 4000 or RAID Array 4100.

### Before You Install Secure Path

During a first-time installation and configuration of the RA4000 controller:

- Install all of the new RA4000 or RA4100 storage system and Fibre Channel interconnect hardware (hubs/switches) and cabling according to the instructions provided with the installation documentation shipped with the Fibre Channel equipment.
- Install all Windows servers and all Host Bus Adapters (HBA). Using Chapter 1 of the *Compaq StorageWorks RAID Solution Software for Windows Installation Reference Guide*, run the Fibre Channel software setup (included with the RA4000/4100 platform kit) on the host server(s) to set HBA parameters.

**NOTE:** Do not connect HBAs to any switches/hubs at this time.

### Installing Secure Path Server Software

1. Insert the SANworks Secure Path Software CD, version 3.2 or later, into your CD-ROM drive.
2. If you have AutoRun enabled on your server, the Secure Path setup program will start automatically. Otherwise, choose Run from the Start menu and enter:

```
drive_letter:\spinstal\setup.exe
```

where **drive\_letter** is the drive letter assigned to the CD-ROM.

3. When the setup starts, choose the destination path. Then choose the Secure Path Server Install option to install the required drivers and Agent on your server. The Server Install option prompts you to designate clients permitted to manage the host. Setup, by default, lists the proper DNS name to use for accessing the local host from a client (Secure Path Manager) running on the local host. For cluster configurations, setup will include the local hostnames for each cluster member.

**NOTE:** Check with your system administrator to assure proper TCP/IP network configurations and protocols.

4. Enter a valid password. For cluster configurations, make sure the password is the same for each member of the cluster.
5. When setup is completed, select the option to restart the computer.

## Installing Secure Path Client Software

Install Secure Path Client software on either the same Windows host system as the Server software, or any Windows (TCP/IP-capable) workstation. Install the Secure Path Client software as follows:

1. Insert the SANworks Secure Path Software CD, version 3.2, into your CD-ROM drive.
2. If you have AutoRun enabled, the Secure Path setup program will start automatically. Otherwise, Choose *Run* from the Start menu and enter the following command:

```
x:\spinstal\setup.exe
```

where **x**: is the drive letter assigned to the CD-ROM.

3. When the setup starts, choose the destination folder. Choose the *Secure Path Client Install* option to install the Secure Path Client software.
4. Shut down the server(s).
5. Connect all HBAs to the loop switches/hubs.
6. Restart the server(s) one at a time, performing each step below. Repeat this step until all servers have been brought online.

Create storagesets and provide unit attributes for LUNs on this server or cluster, including Preferred Path assignments using ACU.

7. Shut down the controllers in all RAID Array cabinets. Refer to RA4000/4100 documentation for any timing restrictions that may apply to storageset creation and controller shutdown. Shut down all servers and turn off power. Power-cycle all RAID Array storage systems.
8. Restart all servers and verify the configuration.

Following system reboot, check the Windows system Event Log for a successful RaiDisk driver start event.

Check the Windows application Event Log for a successful Secure Path Agent start event.

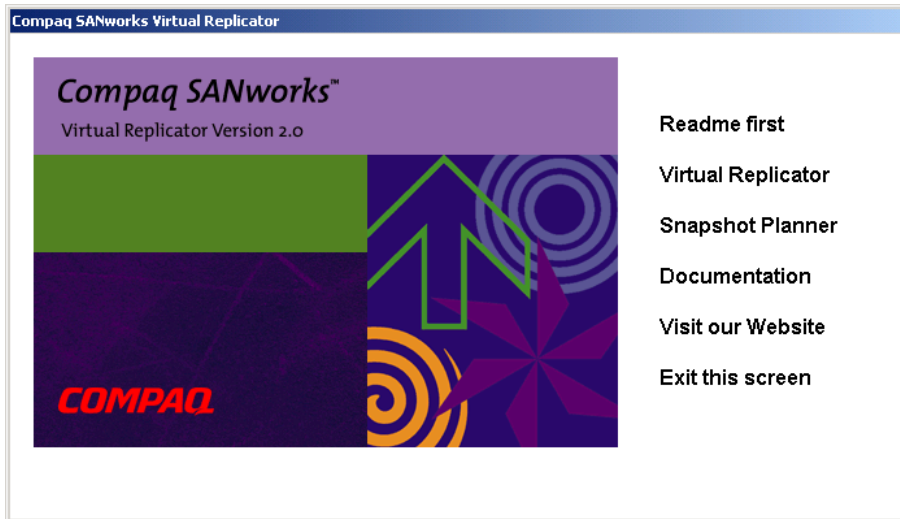
You have now completed the software installation procedures required to support the Secure Path environment. For information on configuring and using Secure Path, refer to the *Compaq SANworks Secure Path for Microsoft Windows 2000 on RA4000/4100 Installation and Reference Guide*.

## Virtual Replicator

Virtual Replicator (SWVR) provides advanced, centralized storage management capabilities Windows 2000 computing environments. Its innovative storage management features simplify storage configuration and management, and enhance availability and scalability. You can use SWVR to create virtual disks, create snapshots of your drive contents, and back up your servers.

### Installing SWVR

1. Insert the Virtual Replicator CD. If you have disabled AutoPlay, click Start and then click Run.  
  
Locate the SANworks VR 2.0 TRM folder (located under the SWVR/Kits folder. Double-click the file:  
  
SETUP . EXE
2. The Virtual Replicator window appears. Click Virtual Replicator.



**Figure 2-3: Compaq SANworks Virtual Replicator screen**

3. Click Next on the Install Shield Wizard screen.
4. Click I Accept to accept the License Terms.
5. Click Next to accept the default location or browse to the desired location and click Next. The Select Install Type window appears.
6. Choose *Complete* and click Next.
7. Click Install to begin the installation.
8. Follow the on-screen installation instructions, then click Finish at the Install Shield Wizard Completed window.
9. Choose *Restart* and click the Yes button.

For information on configuring and using SANworks Virtual Replicator, refer to the *Compaq SANworks Virtual Replicator System Administrator's Guide*.

---

## NetWare Installation

This chapter provides information for installing the Array Configuration Utility, Compaq Insight Manager, and SANworks Secure Path on non-Compaq servers running Novell NetWare 5.1.

For information on installing, configuring, and troubleshooting the RAID Array 4100 hardware, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*. For information on installing, configuring, and troubleshooting the 64-Bit/66-MHz Fibre Channel Host Adapter, refer to the *Compaq StorageWorks 64-Bit/66-MHz Fibre Channel Host Adapter Installation Guide* and the *Compaq Fibre Channel Troubleshooting Guide*.

### Before You Begin

Before you begin installing Compaq software for use with your RA4100, make sure that your non-Compaq server meets the following requirements:

- Novell NetWare 5.1 or later
- 128-MB RAM
- A DOS partition with at least 50-MB disk space
- VGA monitor or better
- IP or IPX protocol
- SNMP service



## Compaq Array Configuration Utility

This section provides instructions for installing the Array Configuration Utility (ACU). The Array Configuration Utility is located on the RA4100 SAN Solution Support Software CD-ROM.

**NOTE:** To install the Compaq Array Configuration Utility from the RA4100 SAN Solution Support Software CD, follow the instructions found inside the CD-ROM sleeve.

**NOTE:** The Compaq SmartStart Software and Support CD with a higher revision number than the RA4100 SAN Solution Support Software may contain an updated version of RA4100 SAN Solution software.

The utility uses a graphic interface to help you configure the StorageWorks RAID Array 4000 Controller. You can use the interface to configure the RA4000 controller initially, to add additional disk drives to an existing configuration, or to reconfigure an array controller.

### Before You Install the Array Configuration Utility

During a first-time installation and configuration of the RA4000 controller, complete the following:

1. Run Options *ROMPaq* (Version 2.62 or later) to update the controller firmware, option ROM, and drive firmware

**NOTE:** To run the Options ROMPaq from the RA4100 Support Software CD, boot up the system using the RA4100 Support Software CD and select the option Run Options ROMPaq Utility from the menu that displays. This will launch the utility that will detect and update the firmware. .

2. Determine which fault-tolerance method and array configuration to use.
3. If you plan to use redundant controllers:
  - a. Make sure that all controllers are using the same firmware revision number, and that the firmware version is 2.58 or later.
  - b. Verify that the cache boards on your array controllers are the same size.

4. If you plan to use Secure Path, please refer to the *Compaq SANWorks Secure Path Version 3.0 for Novell NetWare Installation and Reference Guide* (part number, AA-RN72A-TE).

For more information on Options ROMPaq, fault-tolerance, and RAID levels, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

## Installing the Array Configuration Utility using the RA4100 SAN Solution Support Software CD

To install the Compaq Array Configuration Utility from the RA4100 SAN Solution Support Software CD, follow the instructions found inside the CD-ROM sleeve.

## Installing the Array Configuration Utility using the Compaq SmartStart and Support Software CD

For information on configuring and running the Array Configuration Utility once you complete the installation, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

1. Insert the Compaq SmartStart and Support Software CD.
2. Type:  

```
LOAD CDROM
```

Make a note of the volume name.
3. Type:  

```
LOAD <VOLUME>:\CPQSUPSW\NSSD\PINSTALL
```
4. The Compaq Support Software Utility application appears. Press **Enter** to continue.
5. Select *Compaq NWPA Storage Support*, then press **Enter** to expand the list.
6. Select *CPQFC.HAM*, then press **F5** to mark.
7. Select *CPQSHD.CDM*, then press **F5** to mark.
8. Select *Compaq On-Line Configuration Utility*, then press **Enter** to expand the list.

9. Select *CPQONLIN.NLM*, then press **F5** to mark.
10. Press **Tab** to install the marked components.
11. The Main Menu appears. Choose *Install Selected Files*, then press **Enter** to begin installation.
12. The Install Results screen appears. Press **Enter** to continue.
13. An information message appears. Choose *Reboot Server*, then press **Enter**.
14. Choose *Yes*, then press **Enter**.
15. Remove the CD from the drive, then press **Enter** to restart the server.

For information on configuring and running the Array Configuration Utility, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*.

## Compaq Insight Manager

Compaq Insight Manager helps you manage your network desktops and servers easily. Compaq Insight Manager delivers intelligent monitoring and alerting (based on your preferences) as well as visual control of your RAID Array 4100

Compaq Insight Manager provides integration with leading management platforms including HP OpenView, IBM NetView, SunNet Manager, and Microsoft Systems Management Server.

## Installing Compaq Insight Manager

After you verify that the SNMP service is installed and configured properly, you can install Compaq Insight Manager.

1. Insert the Compaq SmartStart and Support Software CD.
2. Type:

LOAD CDROM

Make a note of the volume name.

### 3. Type

```
LOAD <VOLUME>:\AGENTS\NETWARE\ENG\COMPAQ\CPQAGIN.NLM
```

The following message appears:

```
CPQHLTH.NLM is not running on this system. CPQHLTH provides
extensive management functionality and is necessary to
support the advanced features of your Compaq Server.
CPQHLTH.NLM is available on the Novell Support Software
Diskettes from Compaq.
```

Disregard this message. CPQHLTH is only available on Compaq servers.

4. Press **Enter** to continue.
5. Choose *Copy All New Compaq Management Agents to SYS:SYSTEM*, then press **Enter**.
6. The following message appears:  
The following files are being copied to SYS:  
Press any key to continue.
7. The Agents to Be Loaded screen appears. Change the status on CPQHTHSA, CPQFCASA, AND CPQWEBAG to *Yes*. Verify that all other agents are set to *No*, then press **Esc**.
8. Select *Yes*, then press **Enter** to keep your changes.
9. The Global Agent Configuration screen appears. Press **Esc**.
10. Select *Yes*, then press **Enter** to keep your changes.
11. The CPQ Host and CPQNCSA Specific Settings screen appears. Choose the settings that apply for your environment, then press **Esc**.
12. Select *Yes*, then press **Enter** to keep your changes.
13. Select *Yes*, then press **Enter** to write your changes to CPQSNMP.NCF.
14. Choose *Exit*, then press **Enter**.

**NOTE:** The only component of Compaq Insight Manager that will function on a non-Compaq server is storage monitoring and notification.

For information on configuring and running Compaq Insight Manager, refer to the *Compaq Insight Manager User Guide*.

## Secure Path

Compaq SANWorks Secure Path for Novell NetWare 5.1 on RA4000/4100 is a high-availability software product that manages and maintains continuous data access to the StorageWorks RAID Array 4000 or RAID Array 4100.

For information on installation, configuration, and troubleshooting Secure Path, refer to the *Compaq SANWorks Secure Path Version 3.0 for Novell NetWare Installation and Reference Guide* (part number, AA-RN72A-TE).

---

## Linux Installation

This chapter provides information for installing the Linux Fibre Channel driver on non-Compaq servers running Linux 6.2 and 7.0. If you are setting up a new system, download the drivers from the Compaq website at [www.compaq.com/linux](http://www.compaq.com/linux).

**NOTE:** In order to configure and assign the drive/volumes, you must use Windows NT or Windows 2000 systems.

For further information on installing, configuring, and troubleshooting the RAID Array 4100 hardware, refer to the *Compaq StorageWorks RAID Array 4100 User Guide*. For information on installing, configuring, and troubleshooting the 64-Bit/66-MHz Fibre Channel Host Adapter, refer to the *Compaq StorageWorks 64-Bit/66-MHz Fibre Channel Host Adapter Installation Guide* and the *Compaq Fibre Channel Troubleshooting Guide*.

### Before You Begin

Before you begin installing Compaq software for use with your RA4100, make sure that your non-Compaq server meets the following requirements:

- Linux Red Hat 6.2 or Red Hat 7.0
- 128-MB RAM
- A DOS partition with at least 50-MB disk space
- VGA monitor or better
- IP or IPX protocol
- SNMP service

## Installing Linux Fibre Channel Driver for Red Hat 6.2

**NOTE:** The FC-AL driver (*cpqfc.o*) will install on all servers using the StorageWorks 64-Bit/66-MHz Fibre Channel Host Adapter.

To install the fibre channel driver, follow the instructions below:

1. Insert the floppy disk containing the driver and type the following instructions onto the command screen:

```
mount -t msdos/dev/fd0/mnt/floppy
```

2. Type:

```
cp cpqfc.o /lib/modules/*/scsi
```

**NOTE:** The asterisk denotes the kernel version number 2.2.14-5.

3. Type:

```
cd /lib/modules/*/scsi
```

Press **Enter**.

4. Type:

```
insmod cpqfc.o
```

Press **Enter**.

Depending on your configuration, the driver requires up to thirty seconds to initialize.

### To create a file system:

1. At the /root directory prompt, type:

```
mke2fs /dev/sdb
```

Press **Enter**. Answer Yes to the question that appears.

2. Make a directory at the /root prompt by typing:

```
mkdir /(your directory name)
```

Press **Enter**.

3. At the `/root` prompt, type:  

```
mount /dev/sdb/(your directory name)
```
4. Repeat this step for each volume or logical drive (the next volume will be `sd`, `sdd`, `sde`, and so on).

## Installing Linux Fibre Channel Driver for Red Hat 7.0

**NOTE:** The FC-AL driver (*cpqfc.o*) is already installed in the operating system.

To install the fibre channel driver, follow the instructions below:

1. Type the following instructions onto the command screen:

```
cd /lib/modules/2.2.16-22/scsi
```

Press **Enter**.

2. Type:

```
insmod cpqfc.o
```

Depending on your configuration, the driver requires up to thirty seconds to initialize.

### To create a file system:

1. At the `/root` directory prompt, type:

```
mke2fs /dev/sdb
```

Press **Enter**. Answer Yes to the question that appears.

2. Make a directory at the `/root` prompt by typing:

```
mkdir /(your directory name)
```

Press **Enter**.



3. At the /root prompt, type:  
`mount /dev/sdb /(your directory name)`
4. Repeat this step for each volume or logical drive (the next volume will be sdc, sdd, sde, and so on).

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# Index

## A

ACU *See* Array Configuration Utility  
Array Configuration Utility  
    installing 1-3, 2-3, 3-3  
    running 1-3, 2-3, 3-3

## C

CIM  
    description 1-5, 3-4  
    installing 1-5, 1-7, 1-8, 3-4  
    integration 1-5, 3-4  
community name 1-5  
Compaq  
    Redundancy Manager  
        configurations 1-13  
        description 1-13  
        in a non-clustered environment 1-13  
        in a single-server environment 1-13  
        troubleshooting 1-21  
        using and configuring 1-18  
Compaq Insight Manager *See* CIM. *See*  
    CIM  
Compaq Management CD 1-7  
Compaq Server Support  
    setup 1-4  
Compaq SmartStart and Support Software  
    CD *See* SmartStart

## configuration

RAID Array 4000 Controller 1-2, 2-2,  
    3-2  
RAID Array 4100 hardware 1-1, 3-1,  
    4-1

## D

disk space  
    requirements 1-2, 2-1, 3-1, 4-1  
Diskette Builder 1-3, 2-3  
display  
    requirements 1-2, 2-2, 3-1, 4-1  
driver installation  
    Linux 4-2  
    NetWare 3-4  
    Windows 2000 2-3  
    Windows NT 1-2  
dual RA4100 setup, illustrated 1-14

## E

error messages 1-24  
event log 1-21  
event logging  
    error messages 1-21  
    informational messages *See*  
        informational messages  
    overview 1-21  
    warning messages *See* warning  
        messages

## F

- fault-tolerance 1-2, 2-3, 3-2
- Fibre Channel Support
  - setup 1-4
- firmware 1-2, 2-3, 3-2

## H

- hard drive
  - requirements 1-2, 2-1, 3-1, 4-1

## I

- increasing storage capacity 1-19
- informational messages 1-22
- Insight Manager *See* CIM
- installation
  - Array Configuration Utility 1-3, 2-3, 3-3
  - CIM 1-5, 1-7, 1-8, 3-4
  - RAID Array 4100 hardware 1-1, 3-1, 4-1
  - requirements 1-1, 2-1, 3-1, 4-1
  - software 1-1, 2-1, 3-1, 4-1
- installing
  - drivers
    - Linux 4-2
    - NetWare 3-4
    - Windows 2000 2-3
    - Windows NT 1-2
- Internet Explorer 1-1
- IP 3-1, 4-1
- IPX 3-1, 4-1

## L

- Linux
  - driver installation requirements 4-1
  - driver location 4-1
  - installing driver for Red Hat 6.2 4-2
  - installing driver for Red Hat 7.0 4-3

- load balancing
  - example configuration 1-14

## M

- memory
  - requirements 1-1, 2-1, 3-1, 4-1
- messages
  - error 1-24
  - icons 1-21
  - informational 1-22
  - warning 1-24
- Microsoft
  - Internet Explorer 1-1
  - Systems Management Server Launch Support 1-1, 2-1
  - web site 1-1, 2-1
  - Windows 2000 2-1
  - Windows NT 1-1
- monitor
  - requirements 1-2, 2-2, 3-1, 4-1

## N

- NetWare
  - driver installation requirements 3-1
  - installing Array Configuration Utility 3-2
  - installing Compaq Insight Manager 3-4
  - installing drivers 3-4
  - installing Secure Path 3-6
- Novell NetWare *See* NetWare

## O

- Options ROMPaq
  - running from RA4100 Support Software CD 1-2, 2-3, 3-2

**P**

- paths
  - changing 1-18
  - changing from active to standby 1-19
  - changing from standby to active 1-18
  - managing 1-18
- protocols
  - IP 3-1, 4-1
  - IPX 3-1, 4-1
  - TCP/IP 1-2, 2-2

**R**

- RA4100 SAN Solution Support Software CD
  - Array Configuration Utility 1-2, 2-2, 3-2
  - Options ROMpaq 1-2, 2-3, 3-2
- RAID 1-2, 2-3, 3-2
- RAID Array 4000 Controller
  - configuring 1-2, 2-2, 3-2
- RAID Array 4100 hardware
  - configuring 1-1, 3-1, 4-1
  - installing 1-1, 3-1, 4-1
- Red Hat
  - Linux 4-1
- requirements
  - disk space 1-2, 2-1, 3-1, 4-1
  - display 1-2, 2-2, 3-1, 4-1
  - hard drive 1-2, 2-1, 3-1, 4-1
  - installation 1-1, 2-1, 3-1, 4-1
  - memory 1-1, 2-1, 3-1, 4-1
  - monitor 1-2, 2-2, 3-1, 4-1
- rescanning the loop
  - how to 1-20
  - when to 1-20

**S**

- screen refresh
  - how to 1-20
- services
  - SNMP 1-2, 1-5, 2-2, 3-1, 4-1
  - single RA4100 setup, illustrated 1-13
  - Smart Array drivers
    - NetWare 3-4
  - SmartStart 1-3, 2-3, 3-3
  - SNMP service 1-2, 1-5, 2-2, 3-1, 4-1
    - configuring 1-5
  - software
    - installing 1-1, 2-1, 3-1, 4-1
  - static load balancing
    - example 1-15
  - storage capacity
    - increasing 1-19
  - Systems Management Server Launch Support 1-1, 2-1

**T**

- TCP/IP 1-2, 2-2
- trap destinations 1-5
- troubleshooting
  - Compaq Redundancy Manager 1-21
  - potential Redundancy Manager
    - problems 1-28

**W**

warning messages, Redundancy  
Manager 1-24

Windows 2000

driver installation requirements 2-1

installing Array Configuration  
Utility 2-2

installing Secure Path 2-6

installing Virtual Replicator  
(SWVR) 2-8

Windows NT

driver installation requirements 1-1

installing Array Configuration  
Utility 1-2

installing CIM agents 1-9

installing Compaq Insight Manager 1-5

installing Redundancy Manager 1-13

[www.microsoft.com](http://www.microsoft.com) 1-1, 2-1