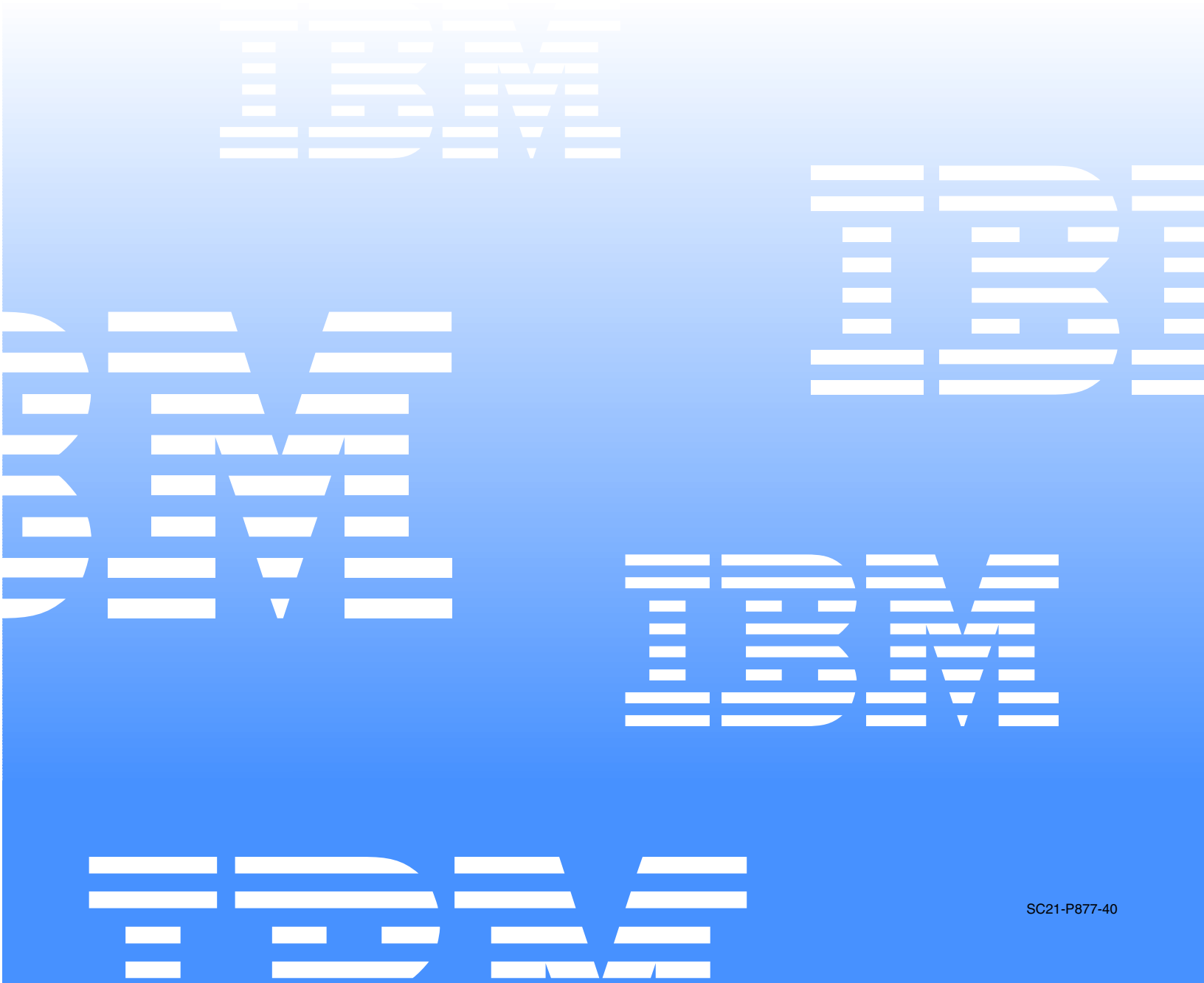
IBM® Netfinity® FAStT Storage Manager
Version 7.02 for Windows NT®

Installation and Support Guide



SC21-P877-40

IBM® Netfinity® FAStT Storage
Manager Version 7.02 for Windows NT®

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NOTE

Before using this information and the product it supports, be sure to read the general information in Appendix A, “Notices,” on page 77.

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About this book

This book provides information about installing, setting up, and working with IBM® Netfinity® FAStT Storage Manager Version 7.02 in a Microsoft® Windows NT® operating system environment. This *Installation and Support Guide* is written for system administrators. Use this guide to:

- Determine the hardware and software that are required to install the storage-management software.
- Integrate the necessary hardware components into your network.
- Install the storage-management software.
- Upgrade controller firmware, if necessary.
- Identify storage-management features that are unique to Windows NT.

How this book is organized

Chapter 1, “Introduction,” on page 1 provides an overview of IBM Netfinity FAStT Storage Manager Version 7.02 and describes storage-subsystem management methods, configuration types, types of installations, and installation requirements.

Chapter 2, “Preparing for installation,” on page 15 discusses preparing for a network installation, including setting up a Microsoft DHCP server or a UNIX BOOTP server, and describes other setup tasks.

Chapter 3, “Installing software in a standard configuration,” on page 29 gives the procedure for installing the software in a standard (noncluster) environment.

Chapter 4, “Installing software in a cluster server environment,” on page 39 gives the procedure for installing the software in a cluster server environment and upgrading from a previous version of the storage-management software.

Chapter 5, “Completing the installation,” on page 55 describes Enterprise Management and Subsystem Management, changing NVSRAM configuration settings, and completing the installation tasks.

Chapter 6, “Migration process,” on page 61 provides the procedure for upgrading storage-management software version 6.22 to IBM Netfinity FAStT Storage Manager Version 7.01, updating RDAC on the host computer, installing MSVM and SM7agent on the host computer, and migrating from firmware 3.x to 4.x on the RAID controllers.

Chapter 7, “Operating-system support,” on page 73 discusses Windows NT restrictions and using the Hot Add utility, SM7devices utility, and other software features.

Appendix A, “Notices,” on page 77 provides product notices and trademark information.

Appendix B, “Storage subsystem/controller information record,” on page 79 provides a data sheet that you can copy and record information about your hardware devices.

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Notices used in this book

This book contains notices to highlight information or provide safety information:

- **Notes**

  These notices provide important tips, guidance, or advice.

- **Important**

  These notices provide information that might help you avoid inconvenient or problem situations.

- **Attention**

  These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.

Related publications

The following publications are available in Adobe Acrobat Portable Document Format (PDF) on the IBM Netfinity FAStT Storage Manager CD and on the World Wide Web at http://www.ibm.com/pc/support/

Note: The items that are denoted by an asterisk (*) in the list indicate publications that are printed and come with the IBM FAStT200 and FAStT200 High Availability (HA) Storage Servers.

- *IBM Netfinity FAStT Storage Manager Version 7.02 for Windows NT Installation and Support Guide (this book)*
- *IBM Netfinity FAStT Storage Manager Version 7.02 for Windows 2000 Installation and Support Guide*
- *IBM FAStT200 and FAStT200 HA Storage Servers Installation and User's Guide**
- *IBM Netfinity FAStT500 RAID Controller Enclosure Unit Installation Guide*
- *IBM Netfinity FAStT500 RAID Controller Enclosure Unit User's Reference*
- *IBM Netfinity Fibre Channel Storage Manager Concepts Guide*
- *IBM Netfinity Fibre Channel RAID Controller Unit User's Handbook*

When you complete the tasks in this Installation and Support Guide, refer to the following online Help systems.

- IBM Netfinity FAStT Storage Manager Version 7.02 Enterprise Management online Help. Use this help system for more information about working with the management domain.
- IBM Netfinity FAStT Storage Manager Version 7.02 Subsystem Management online Help. Use this help system for more information about managing storage subsystems.

You can access the help systems from the Enterprise Management and Subsystem Management windows in Netfinity FAStT Storage Manager Version 7.02. Click **Help** on the toolbar or press F1.

The help systems contain operating information that is common to all operating environments. Refer to this Installation and Support Guide for information that is specific to Windows NT.

Additional publications are available for purchase from IBM. For a list of publications available in your country:

- In the U.S. and Puerto Rico, call 1-800-426-7282.
- In the United Kingdom, call 01705-565000 or 0161-9056001.
- In Canada, call 1-800-465-1234.
- In other countries, contact the IBM support organization that services your area, your IBM marketing representative, or your IBM reseller.

Chapter 1. Introduction

IBM Netfinity FAStT Storage Manager Version 7.02 for Windows NT is a Java-based tool that simplifies the management of the Netfinity Fibre Array Storage Technology (FAStT)200 and FAStT200 HA Storage Servers, Netfinity FAStT500 RAID Controller Enclosure Unit, and Netfinity Fibre Channel RAID Controller Unit. Netfinity FAStT Storage Manager Version 7.02 was formerly known as Netfinity Fibre Channel Storage Manager 7.

The Netfinity FAStT Storage Manager Version 7.02 software presents an interface for storage management based on information supplied by the storage subsystem controllers. You can install the storage-management software on a management station, which is the system that is responsible for managing all, or a portion of, a network. The management station communicates with network management agents that reside in the managed node by means of a network management protocol, such as Simple Network Management Protocol (SNMP). When you manage a storage subsystem using the client software that is installed on a management station, commands are sent to the storage subsystem controllers. The controller firmware contains the necessary information to carry out the storage-management commands. The controller is responsible for validating and running the commands and providing status and configuration information back to the client software.

Throughout this book, the terms storage-management software and Storage Manager 7.02 refer to the IBM Netfinity FAStT Storage Manager Version 7.02 for Windows NT software. Individual components of the storage-management software are identified by name.

Terms to know

If you are upgrading from a previous version of the storage-management software, you will find that some of the terms you are familiar with have changed. It is important that you familiarize yourself with the new terminology. Table 1 on page 2 provides a list of some of the old and new terms. For more information, refer to the *IBM Netfinity Fibre Channel Storage Manager Concepts Guide*.

Product name	Product release firmware version	Released storage-management software version	Machine type	Model
IBM FAStT200	4.x	7.02	3542	1RU
IBM FAStT200 HA	4.x	7.02	3542	2RU
Netfinity Fibre Channel RAID Controller Unit	3.x, 4.x	6.22, 7.0, 7.01, 7.02	3526	1RU
Netfinity FAStT500 RAID Controller Enclosure Unit	4.x	7.01, 7.02	3552	1RU

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Table 1. Old and new terminology

Term used in previous versions	New term
RAID module	Storage subsystem
Drive group	Array
Logical Unit (LUN)[1]	Logical drive

[1] In Storage Manager 7.02, the term Logical Unit Number (LUN) designates a logical address used by the host to access a particular logical drive.

It is important to understand the distinction between the following two terms when reading this document.

Management station
A system that is used to manage the storage subsystem. This system does not need to be attached to the storage subsystem through the Fiber Channel I/O path.

Host/Host computer
The terms host and host computer are used interchangeably throughout this document. Both terms refer to a system that is directly attached to the storage subsystem through a Fibre Channel I/O path. This system is used to serve data (normally in the form of files) from the storage subsystem.

Note: A system can be both a management station and a host server at the same time.

Software components

Storage Manager 7.02 contains the following software components:

- Client software
- Host-agent
- RDAC package
- Migrate utility

Client software

The Storage Manager 7.02 client (SM7client) component provides the graphical user interface for managing storage subsystems through the Ethernet network or from the host. The SM7client contains two main components:

- Enterprise Management for adding, removing, and monitoring storage subsystems within the management domain.
- Subsystem Management for managing the components of an individual storage subsystem.

Host-agent package

The Storage Manager 7.02 Agent (SM7agent) consists of two software components:

- **Host-agent software.** You can use the host-agent software to manage storage subsystems through the host Ethernet connection. The host-agent software takes requests from a management station that is connected to the host through an Ethernet connection and passes the requests to the storage subsystem controllers through the Fibre Channel I/O path. For more information about managing storage subsystems through the host-agent, see “Host-agent managed method” on page 4.

- **SM7device utility.** You can use the SM7devices utility to associate storage subsystem logical drives with operating system device names. For more information about using SM7devices, see “Using the SM7devices utility” on page 76.

RDAC package

The Redundant Disk Array Controller (RDAC) package contains two software components:

- **RDAC multipath device driver.** The RDAC multipath device driver provides failover support to the other controller if a component along the Fibre Channel I/O path fails.
- **Hot Add utility.** You can use the Hot Add utility to register newly created logical drives with the operating system. For information on using the Hot Add utility, see “Using the Hot Add utility” on page 75.

Migration package

You can use the Storage Manager 7.02 migrate utility (SM7migrate) to upgrade controller firmware for model 3526 and download default configuration settings to NVSRAM so you can manage existing storage subsystems with Storage Manager 7.02.

Important: Storage Manager 7.02 operates with only controllers using firmware version 4.x. If you want to manage controllers with Storage Manager 7.02, you must upgrade the firmware to version 4.x. You must use version 6.22 of the storage-management software to manage storage subsystems with controllers using firmware version 3.x. For more information, see “Installation types” on page 10.

You can use the migration procedure to perform the following tasks:

- Migrate from storage-management software version 6.22 to Netfinity FAStT Storage Manager Version 7.02 on one or more management stations.
- Update RDAC on one or more host computers.
- Install Microsoft Virtual Machine (MSVM) and SM7agent on one or more host computers.
- Migrate from firmware 3.x to 4.x on the Redundant Array of Independent Disks (RAID) controllers in an IBM Netfinity Fibre Channel RAID Controller Unit, model 3526-1RU.

For more information, see Chapter 6, “Migration process,” on page 61.

Storage subsystem management methods

The storage-management software provides two methods for managing storage subsystems — the host-agent managed method and the directly managed method. Depending on your specific storage subsystem configurations, you can use either or both methods.

Host-agent managed method

When you use this method, you manage the storage subsystems through the Fibre Channel I/O path to the host. The storage subsystem can be managed from the host computer or management station that is attached to the host through an Ethernet connection.

The advantages of managing storage subsystems through the host-agent include:

- You do not have to run Ethernet cables to the controllers.
- You do not need a BOOTP server to connect to the network.
- You do not need to perform the controller network configuration tasks that are described in Chapter 2, “Preparing for installation,” on page 15.
- When adding devices, you have to specify a host name or IP address only for the host instead of for the individual controllers in a storage subsystem. Storage subsystems that are attached to the host are automatically discovered.

The disadvantage of using the host-agent method include:

- You are limited to configuring one less Logical Unit Number (LUN) than the maximum number that is allowed by the operating system and the host adapter that you are using.
- The host-agent requires a special logical drive, called an *access volume*, to communicate with the controllers in the storage subsystem.

Note: The access volume uses one of the logical unit numbers (LUNs). Windows NT allows a maximum number of LUNs depending on which Service Pack is installed and which host adapter you are using. For more information, see “Number of supported logical drives” on page 74.

If you are upgrading controllers from firmware version 3.x to version 4.x and your host system has already configured its maximum number of LUNs, you must give up a LUN to be used as an access volume.

Figure 1 shows a system in which storage subsystems are managed through the host-agent.

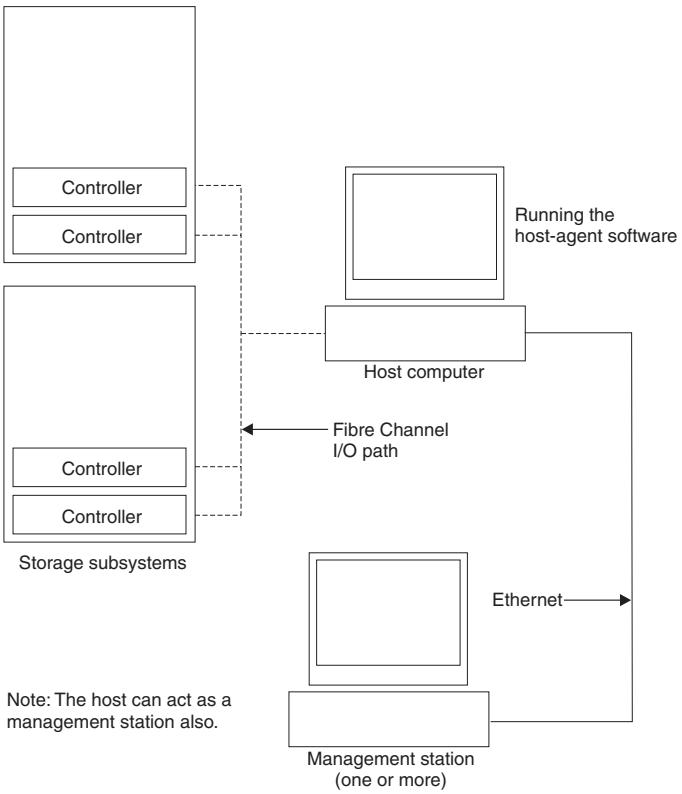

Figure 1. Host-agent managed storage subsystems

Directly managed method

When you use this method, you manage storage subsystems directly over the network through the Ethernet connection to each controller. To manage the storage subsystem through these Ethernet connections, you must define the IP address and host name for each controller and attach a cable to the Ethernet connectors on the storage subsystem controllers.

The advantages of managing storage subsystems directly include:

- The Ethernet connections to the controllers enable a management station running Windows NT to manage storage subsystems that are connected to a host with an operating system other than those that are supported by Storage Manager 7.02.
- You do not need to use an access volume to communicate with the controllers as you do if you are running the host-agent software. You can configure the maximum number of LUNs that are supported by the operating system and the host adapter that you are using.

The disadvantages of managing storage subsystems directly include:

- It requires two Ethernet cables to connect both storage subsystem controllers to a network.
- When adding devices, you must specify an IP address or host name for each controller.

  Note: Controller machine type 3526 requires an attachment unit interface (AUI) transceiver to attach to an RJ-45 connector.
- A BOOTP server and network preparation tasks are required. For a summary of the preparation tasks, see Table 8 on page 16.

Figure 2 shows a system in which storage subsystems are managed directly.

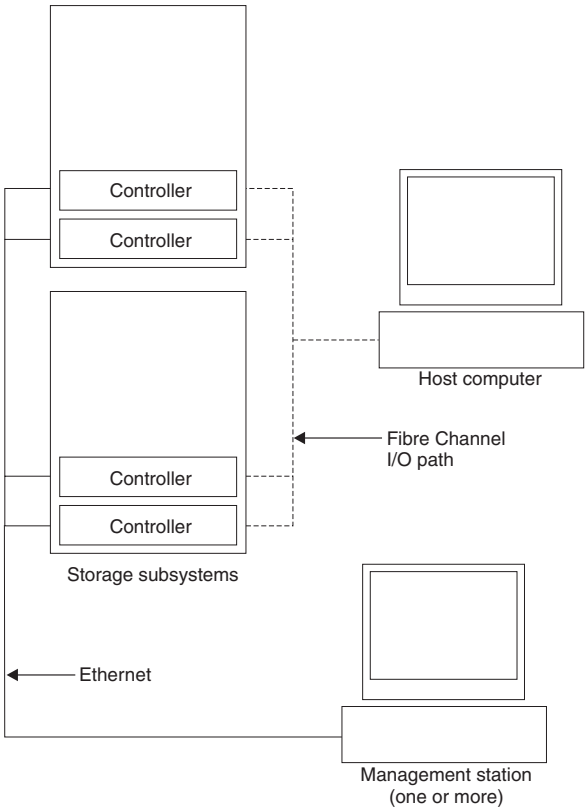

Figure 2. Directly managed storage subsystems

Configuration types

You can install Storage Manager 7.02 in either of two configurations:

- Standard (noncluster) configuration
- Cluster server configuration

Standard (noncluster) configuration

Table 2 describes where the storage-management software components are installed in a standard configuration (not a cluster server configuration).

Table 2. Where to install software components in a standard (noncluster) configuration

Software component	Where installed	Notes
Storage Manager 7.02 client (SM7client)	You can install the SM7client package on either of the following: • Management station (for direct or host-agent management) • Host computer (for a non-network configuration similar to previous versions of the storage-management software)	• **Management stations** If you install the SM7client software on one or more management stations, you can choose to manage storage subsystems directly through Ethernet connections to the controllers, over the network through the host-agent, or a combination of both methods. • **Host computer** If you install the SM7client software on the host computer, the host computer does not need to be connected to a network as long as the host-agent software is installed. However, the host computer must have the TCP/IP software installed and you must assign a static IP address to the host.
RDAC	Host computer	The RDAC component is required for controller failover support and for installing and using the host-agent software. Make sure that you install RDAC on each host connected to the storage subsystem.
Microsoft Virtual Machine (MSVM)	Host computer	The Microsoft Virtual Machine is a required component for installing and using the software that is contained in the host-agent package.
Storage Manager 7.02 agent (SM7agent)	Host server	You must install the SM7agent software even if you choose not to manage storage subsystems with the host-agent software. The host-agent contains important utilities that are necessary for operating the storage-management software.

The following figure shows an example of a standard (noncluster) configuration, including a management station. You can install the SM7client on a stand-alone host computer if that host has the Transmission Control Protocol/Internet Protocol (TCP/IP) software installed and the host has a static IP address. If you want to manage storage subsystems with the host-agent software, you must also install the Microsoft Virtual Machine (MSVM) on the host.

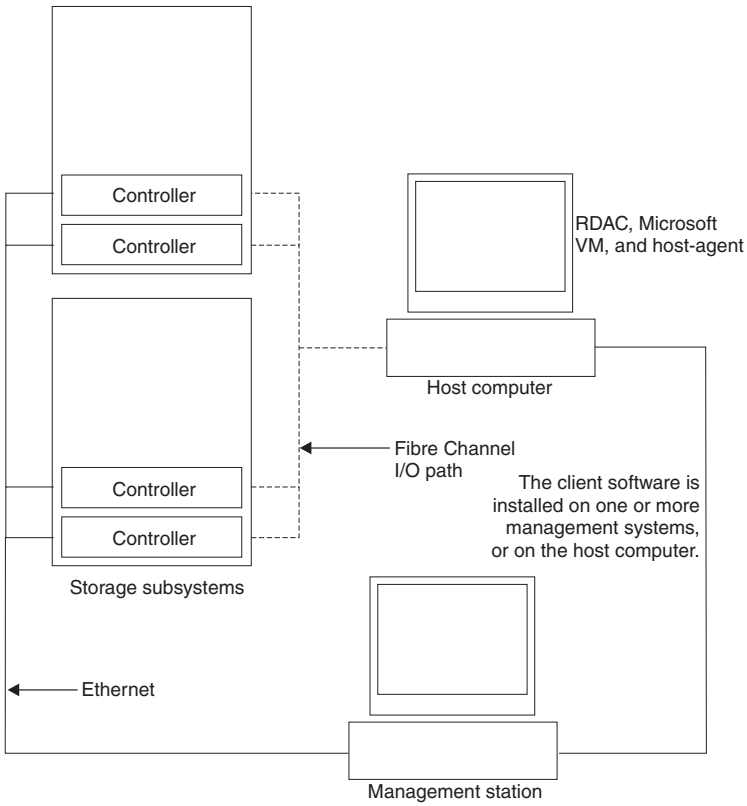

Figure 3. Sample standard (noncluster) configurations

Cluster server configuration

Table 3 on page 9 describes the storage-management software components that you can install in a cluster server environment.

Important: Be sure to install all storage-management software components on each server in your cluster.

Table 3. Where to install software components in a cluster server configuration

Software component	Where installed	Notes
Storage Manager 7.02 client (SM7client)	You can install the SM7client package on either of the following: • Management station (for direct or host-agent management) • Nodes A and B (for direct or host-agent management)	• **Management stations** If you install the SM7client software on one or more management stations, you can choose to manage storage subsystems directly through Ethernet connections to the controllers, over the network through the host-agent, or a combination of both methods. • **Nodes A and B** If you install the SM7client on the cluster servers (nodes A and B), the server does not need to be connected to a network as long as the host-agent software is installed. However, the host computer must have the TCP/IP software installed, and you must assign a static IP address to the cluster server.
RDAC	Nodes A and B	The RDAC component is required for controller failover support and for installing and using the host-agent software. Make sure that you install RDAC on each host connected to the storage subsystem.
Microsoft Virtual Machine (MSVM)	Nodes A and B	The Microsoft Virtual Machine is a required component for installing and using the software that is contained in the host-agent package.
Storage Manager 7.02 agent (SM7agent)	Nodes A and B	You must install the host-agent even if you choose not to manage storage subsystems with the host-agent software. The host-agent contains important utilities that are necessary for operating the storage-management software.

The following figure shows an example of a cluster server configuration.

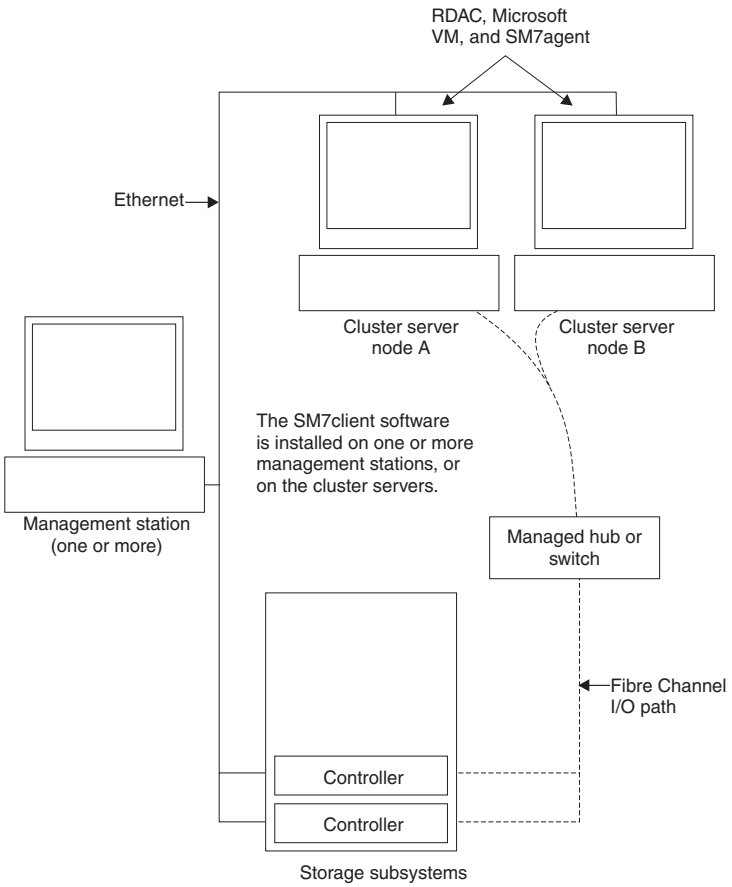

Figure 4. Sample cluster server configuration (single loop)

Installation types

To install Storage Manager 7.02, choose the installation type in the following list that represents the setup of your enterprise.

- **New storage subsystem environment.** You do not have existing storage subsystems. In this case, you are installing new storage subsystems with machine type 3526, 3552, or 3542 controllers using firmware version 4.x and intend to manage these new storage subsystems using Storage Manager 7.02. To proceed with this installation, go to “System requirements” on page 13.
- **Existing storage subsystem environment.** You have existing storage subsystems. Table 4 on page 11 explains your options for managing these existing storage subsystems.

Table 4. Configurations for existing storage subsystems

Existing storage subsystems with:	Options
Machine type 3526 controllers running firmware version 3.x	**Option 1 —**Upgrade the controller firmware to version 4.x and manage the storage subsystems with Storage Manager 7.02. Go to “System requirements” on page 13. **Option 2 —**Install new storage subsystems and attach them to the same host as the existing storage subsystems. These existing and new storage subsystems are referred to as coexisting storage subsystems. See “Managing new and existing storage subsystems attached to the same host” for more information. **Option 3 —**Continue to use version 6.22 of the storage-management software to manage these storage subsystems if they are attached to separate hosts from those that are attached to storage subsystems managed with Storage Manager 7.02. Go to “System requirements” on page 13.
Machine type 3526 and 3552 controllers running firmware versions from 4.00.00 through 4.00.01	**Option 1 —** Uninstall the previous version of the storage-management software; then, install Storage Manager 7.02. After you install Storage Manager 7.02, upgrade the controller firmware from versions 4.00.00 through 4.00.01 to version 4.00.02 and manage these existing storage subsystems with Storage Manager 7.02. Go to “System requirements” on page 13. **Option 2 —** Continue using your existing version 4.00.00 through 4.00.01 controller firmware. Uninstall the previous version of the storage-management software; then, install Storage Manager 7.02. You can manage these existing storage subsystems through Storage Manager 7.02, which includes components that are compatible with these older firmware versions. The functional differences between your existing controller firmware and controller firmware 4.00.02 are provided on the installation CD. For more information, refer to the README file located in the \NT\ directory on the installation CD. Go to “System requirements” on page 13.

Managing new and existing storage subsystems attached to the same host

When installing Storage Manager 7.02, you must determine how you will use any existing storage subsystems. Existing storage subsystems are coexisting storage subsystems when they are attached to the same host as storage subsystems managed with Storage Manager 7.02, and when the conditions in Table 5 are met.

Table 5. Coexisting storage subsystems requirements

Existing storage subsystems	New or upgraded storage subsystems
• Use 3.01.x firmware • Are managed with version 6.22 of the storage-management software **Note:** Firmware and software levels are the minimum levels required for machine type 3526 controllers to coexist with new or upgraded storage subsystems.	• Use 4.x firmware • Are managed with Storage Manager 7.02

Figure 5 shows an example of an environment that includes coexisting storage subsystems.

Important: The RDAC software packaged with Storage Manager 7.02 overwrites the RDAC driver associated with version 6.22 of the storage-management software. Figure 5 shows an example of coexisting storage subsystems (new and previously installed storage subsystems attached to the same host); the two versions of the storage-management software that are installed will use the newly installed RDAC driver.

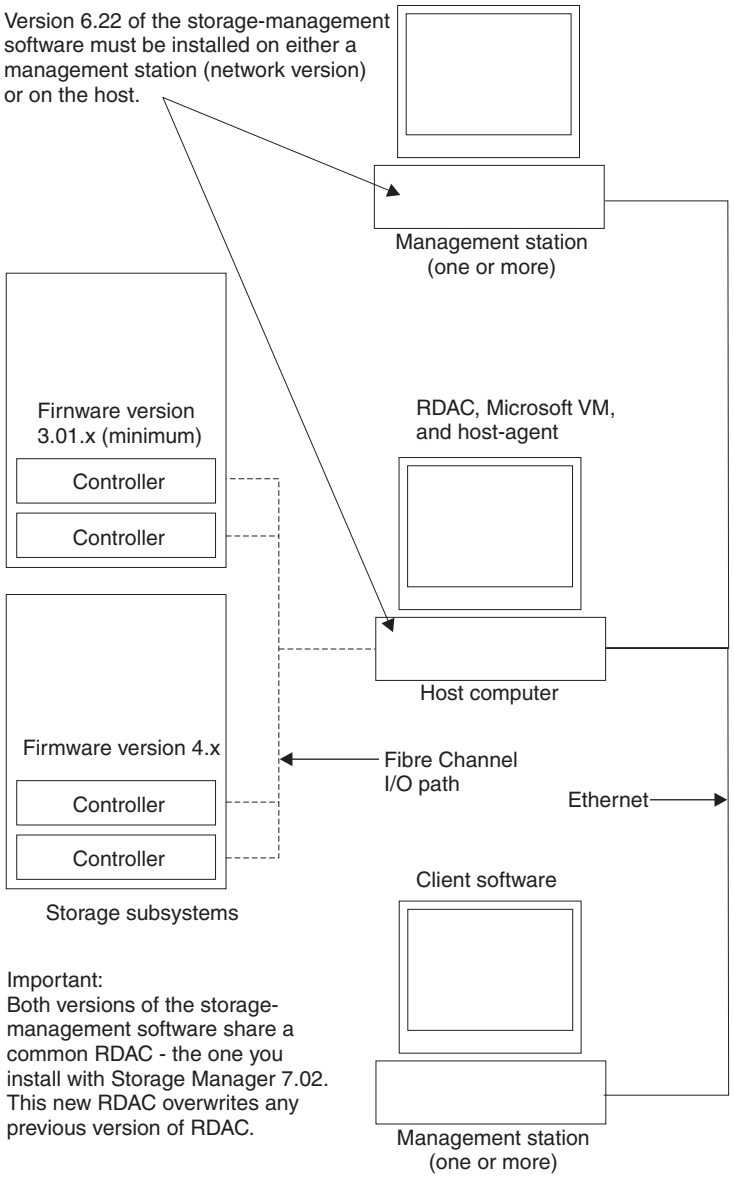

Figure 5. Sample coexistence installation

System requirements

This section provides detailed information about the hardware, software, and operating requirements for Storage Manager 7.02.

Hardware requirements

The following table lists the hardware required for installing Storage Manager 7.02.

Table 6. Hardware requirements for the storage-management software

Hardware component	Requirements
A BOOTP server (for directly managed storage subsystems only).	• Microsoft BOOTP-compatible DHCP server for Windows NT • UNIX® BOOTP server
Storage subsystems (one or more).	Storage subsystems with controllers running firmware version 4.00.00 through 4.00.02 **Note:** Make sure that you read “Installation types” on page 10 for information on managing these storage subsystems when existing storage subsystems are physically connected to the same host that you will connect to the new storage subsystems.
Fibre Channel (FC) host adapters.	The following Fibre Channel host adapters were tested with the storage-management software: • IBM Netfinity FAStT Host Adapter (part number: 00N6881) For information on specific host adapter requirements: • Refer to the README file in the \NT\Host_Adapter directory on the installation CD. • Read the host adapter documentation. • Refer to the IBM Web site, http://www.ibm.com/pc/support
Fibre Channel (FC) fabric switches (if needed for the desired configuration).	The following Fibre Channel fabric switches were tested with the storage-management software: • IBM 8-port Fibre Channel switch (machine type: 2109-S08) • IBM 16-port Fibre Channel switch (machine type: 2109-S16) For specific Fibre Channel switch setup requirements: • Read the switch documentation. • Refer to the IBM Web site, http://www.ibm.com/products
Fibre Channel (FC) managed hub (if needed for the desired configuration).	The following managed hub was tested with the storage-management software: • IBM Fibre Channel managed hub (machine type: 3534) For specific Fibre Channel managed hub setup requirements: • Read the managed hub documentation. • Refer to the IBM Web site, http://www.ibm.com/products

Firmware requirements

Storage Manager 7.02 operates only with controller machine type 3526, 3552 or 3542 and firmware version 4.00 or later. If you want to manage controllers with Storage Manager 7.02, you must upgrade the firmware to version 4.00 or later. You must use version 6.22 of the storage-management software to manage storage subsystems with controllers using firmware version 3.x.

Software requirements

The following table contains the installation requirements for each of the software packages.

Table 7. Installation requirements by software package

Requirement	Software				
	SM7client	**RDAC**	**Microsoft VM**	**SM7agent**	**SM7 migrate**
Available disk space	20 MB	1 MB	1 MB	1 MB	10 MB
Administrator privileges	Not required	Required	Required	Required	Required
Minimum display settings	800 x 600 pixels, 256 colors	640 x 480 pixels, 256 colors[1]	640 x 480 pixels, 256 colors[1]	640 x 480 pixels, 256 colors[1]	640 x 480 pixels, 256 colors[1]

[1] These settings are for the Install Shield installation of the software.

Operating system requirements

For management stations, install one of the following operating systems:

- Windows NT Server 4.0 with Service Pack 5 or greater
- Windows NT Workstation 4.0 with Service Pack 5 or greater

For hosts, install one of the following operating systems:

- Windows NT Server 4.0 with Service Pack 5 or greater
- Windows NT 4.0 Enterprise Edition with Service Pack 5 or greater

For cluster servers, install Windows NT 4.0 Enterprise Edition with Service Pack 5 or greater.

Chapter 2. Preparing for installation

This chapter helps you plan and prepare for installing the storage-management software.

Deciding how to manage storage subsystems

If you have not already done so, see Chapter 1, “Introduction,” on page 1 for information about the following two methods for managing storage subsystems:

- Direct management through an Ethernet connection to each controller on the storage subsystem
- Host-agent management through the host-agent software that is installed on the host computer that is connected to the storage subsystem

You can use one or both methods. However, because many of the preparation tasks for installation depend on which method you use, before you begin, decide how you want to manage the storage subsystems on your network

Reviewing a sample network

Figure 6 on page 16 shows an example of a directly managed storage subsystem network setup (see network A). This network contains the following components:

- BOOTP server
- Management station for Simple Network Management Protocol (SNMP) traps
- Host that is connected to a storage subsystem through a Fibre Channel I/O path
- Management station connected by Ethernet cable to the storage subsystem controllers

Figure 6 on page 16 shows an example of a host-agent managed storage subsystem network setup (see network B). This network contains the following components:

- A host that is connected to a storage subsystem through a Fibre Channel I/O path
- A management station that is connected by Ethernet cable to the host

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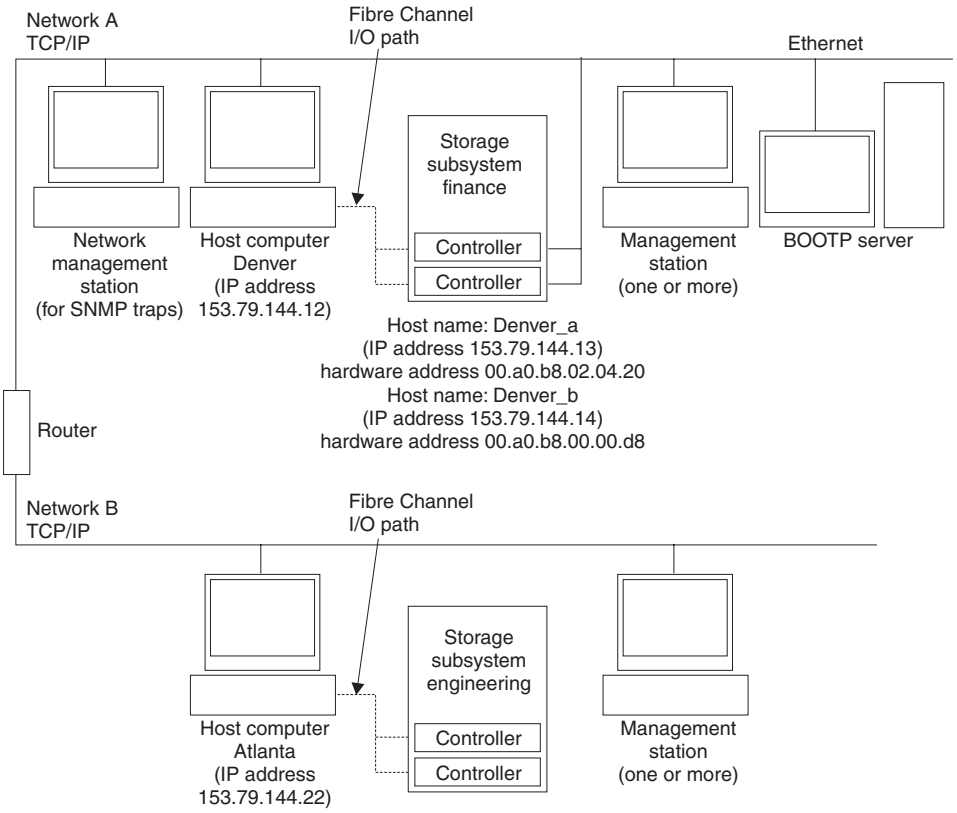

Figure 6. Sample network

Preparing for a network installation

Before you install the storage-management software, make sure that the network components are set up and operating properly, and that you have all the host and controller information that is needed for the software to operate correctly. To do this, perform the tasks that are summarized in Table 8 (referring to the appropriate procedures). Use Table 14 on page 79 as a data sheet to record storage subsystem and controller information.

Table 8. Network preparation task summary

Task to perform	For direct or host-agent?	Why perform this task?	For instructions, see
Step 1- Install all hardware components (host computers, storage subsystems, cables, and so on) that you want to connect to the network.	Both	To ensure that the network hardware is present.	The installation guide that is specific to the hardware components.
Step 2 - Establish and record a naming convention for the storage subsystems that are connected to the network.	Both	To add the storage subsystems to the management domain after installing the software.	“Deciding how to name the storage subsystems” on page 18.

Table 8. Network preparation task summary

Task to perform	For direct or host-agent?	Why perform this task?	For instructions, see
Step 3 - Determine the hardware Ethernet address for each controller in all storage subsystems that are connected to the network.	Direct	To set up the BOOTP server to provide network configuration information to the controllers.	"Identifying the hardware Ethernet address for each controller" on page 19.
Step 4 - Obtain IP addresses and host names from the network administrator.	Both	For host-agent management, you need the IP addresses and host names of the host on which the host-agent software will run. For direct management, you need the IP addresses of each controller in the storage subsystems. The IP addresses are used to configure the BOOTP server so that it can provide network configuration information to the controllers. Also, you use the IP addresses of the controllers to set up the host or Domain Name System (DNS) table.	"Obtaining IP addresses for hosts and controllers" on page 20.
Step 5 - Set up the BOOTP server to provide network configuration information for a specific controller.	Direct	To provide network configuration information to the controllers, using the BOOTP server.	"Setting up the BOOTP server" on page 21.
Step 6 - Verify that the TCP/IP software is installed, and set up the host or DNS table.	Direct	Installing the client software on a management station ensures that the management station is configured to reach the controllers over the network. If the client software is installed on the host, the TCP/IP software is still necessary for successful communication between the client software and the controllers.	"Verify the TCP/IP software and set up the host or DNS table" on page 26.
Step 7 - Power on the devices that are connected to the network.	Both	To ensure that all devices and links are operational.	The installation guide that is specific to the hardware components.

Table 9 shows a sample information record with entries for a directly managed storage subsystem and a host-agent managed storage subsystem.

Table 9. Sample information record

Storage subsystem name (see page 18)	Management type (see page 15)	Controllers—Ethernet and IP addresses, and host name (see pages 19 and 20)		Host—IP address and host name (see page 20)
Storage Subsystem Finance	Direct	Hardware Ethernet address = 00a0b8020420	Hardware Ethernet address = 00a0b80000d8	
		IP address = 153.79.144.13	IP address = 153.79.144.14	
		Host = Denver_a	Host = Denver_b	
Storage Subsystem Engineering	Host-agent			IP address = 153.79.144.22
				Host = Atlanta

Table 14 on page 79 provides a data sheet on which you can record storage subsystem names, management types, hardware Ethernet addresses, and IP addresses. Make a copy of this table and complete the information for your storage subsystems and controllers. Use the information that is recorded in Table 14 on page 79 to set up the BOOTP table for the network server and the host or Domain Name System (DNS) table. The information in Table 14 on page 79 helps you add storage subsystems after initial installation. The column headings show a page reference for detailed instructions about obtaining the information. For a sample information record, see Table 9.

Deciding how to name the storage subsystems

As you set up your network, decide on the naming convention for the storage subsystems. After you install the storage-management software and start it for the first time, all storage subsystems in the management domain display as <unnamed>. Use the Subsystem Management window to rename the individual storage subsystems.

The following list provides tips for naming storage subsystems:

- There is a 30-character limit. All leading and trailing spaces are deleted from the name.
- Use a unique, meaningful naming scheme that is easy to understand and remember.
- Avoid arbitrary names or names that would quickly lose their meaning in the future.
- The software displays storage-subsystem names with the prefix Storage Subsystem. Therefore, if you rename a storage subsystem to Engineering, it displays as Storage Subsystem Engineering.

After you decide on a naming scheme, record the storage subsystem names in the information record (Table 14 on page 79).

If you are directly managing your storage subsystem, go to “Identifying the hardware Ethernet address for each controller” on page 19. If you are going to manage your

storage subsystem through the host-agent, go to “Obtaining IP addresses for hosts and controllers” on page 20.

Identifying the hardware Ethernet address for each controller

Use the following procedure if you plan to directly manage storage subsystems through Ethernet connections to each controller. If you plan to manage storage subsystems using the host-agent software, skip this procedure and go to “Obtaining IP addresses for hosts and controllers” on page 20.

1. Remove the front bezel (machine types 3526 and 3552), from the controller unit, as shown in Figure 7. Carefully pull the bottom of the bezel out to release the pins **1** ; then slide the bezel down **2** .

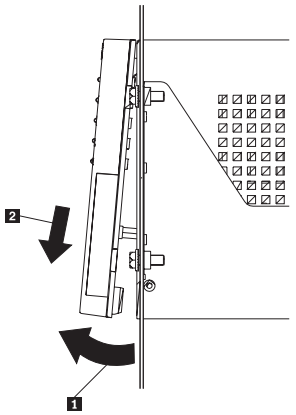

Figure 7. Removing the controller-unit bezel (machine types 3526 and 3552)

2. Unlock and open the levers on the RAID controllers, models 3526 and 3552.

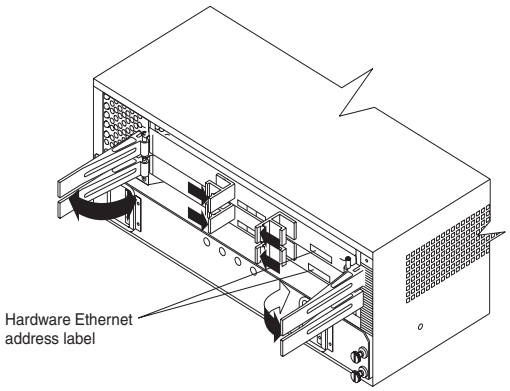

Figure 8. Location of the hardware Ethernet address (machine types 3526 and 3552)

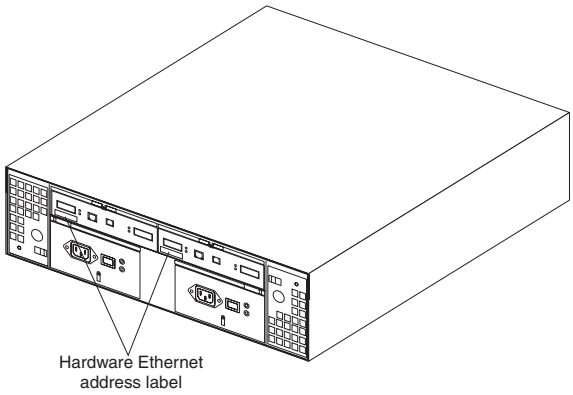

Figure 9. Location of the hardware Ethernet address (machine type 3542)

3. The controller hardware Ethernet address labels are located on the front of each controller, as shown in Figure 8 on page 19 and Figure 9.

   The number will be in the form xx.xx.xx.xx.xx.xx (for example, 00.a0.b8.00.00.d8).
4. Record each Ethernet address in the information record (Table 14 on page 79).
5. To replace the bezel (machine types 3526 and 3552), slide the top edge under the lip on the chassis **1** ; then push the bezel bottom until the pins snap into the mounting holes **2** , as shown in Figure 10.

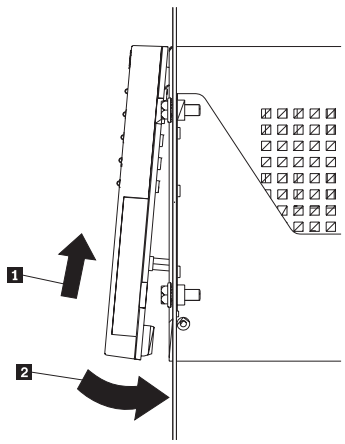

Figure 10. Replacing the controller-unit bezel on models 3526 and 3552

6. Continue with “Obtaining IP addresses for hosts and controllers”.

Obtaining IP addresses for hosts and controllers

If you want to	Go to
Manage storage subsystems directly	Step 1
Manage storage subsystems with the host-agent	Step 2
Note: If you intend to manage some storage subsystems directly and others with the host-agent software, complete both of the following steps.	

1. Assign (or obtain from your network administrator) a unique IP address and associated host name for each controller in every storage subsystem on the network. Record the IP address and host name for each controller in the information record (Table 14 on page 79). Then, go to “Setting up the BOOTP server”.
2. Contact your network administrator to obtain the IP address and host name for each host on which you plan to install the host-agent software for managing storage subsystems. Record the IP address and host name for the host in the information record (Table 14 on page 79). Then, go to “Verify the TCP/IP software and set up the host or DNS table” on page 26.

Setting up the BOOTP server

If you plan to directly manage storage subsystems through the Ethernet connection to each controller, select the procedure you plan to use for setting up the BOOTP server:

- When using a Microsoft BOOTP-compatible DHCP server, go to “Using Microsoft DHCP as a BOOTP-compatible server”.
- When using a UNIX BOOTP server, go to “Using a UNIX BOOTP server” on page 25.

If you plan to manage storage subsystems using the host-agent software, go to “Verify the TCP/IP software and set up the host or DNS table” on page 26.

Using Microsoft DHCP as a BOOTP-compatible server

You must use a version of DHCP that supports BOOTP static addressing. To use a DHCP server, you must have a DHCP Manager installed. If a DHCP Manager is installed on the system, go to “Setting up a DHCP server”. If a DHCP Manager is not installed, use the following installation procedure.

Installing the DHCP manager

Use the following procedure to install the DHCP Manager:

1. Click **Start** → **Settings** → **Control Panel**.
2. Double-click the **Network** icon.
3. In the Network window that opens, click the **Services** tab.
4. Click **DHCP Server Network Services** → **Add**.
5. Reinstall Windows NT Service Pack 5 or greater to get new DHCP settings or information that is associated with the respective service pack.
6. Continue with “Setting up a DHCP server”.

Setting up a DHCP server

Use the following procedure, along with Table 14 on page 79, to set up the DHCP server.

Note: The following steps and window examples assume that you are configuring a Windows NT DHCP server using its DHCP Manager.

1. Click **Start** → **Programs** → **Administrative Tools** → **DHCP Manager**.

   The DHCP Manager window opens.
2. Create a scope. A scope defines a group of controllers that you want to configure using the DHCP server.
   a. Click **Local Machine**.
   b. Click **Scope** → **Create**.

      The Create Scope window opens.

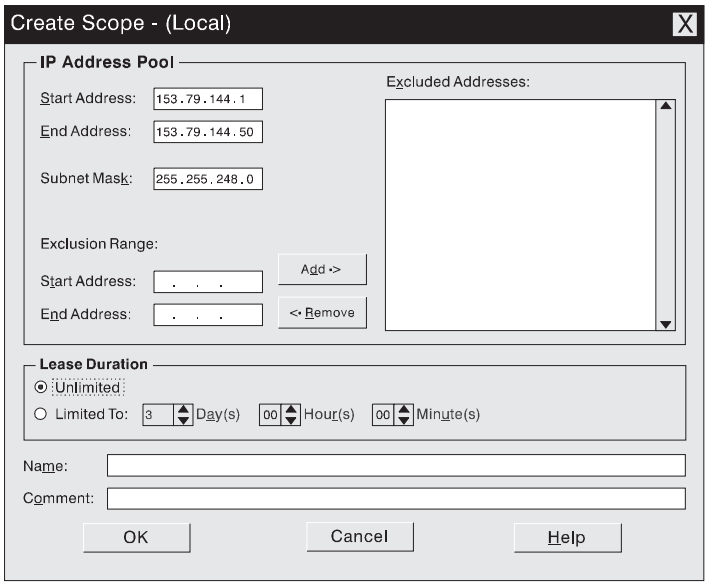

Figure 11. Create scope - (Local) window

c. Type the starting and ending IP addresses of the controllers that you are configuring on the network.

   For example, if you are configuring 50 controllers on a 153.79.144.0 subnet, set the starting address to 153.79.144.1, and set the ending address to 153.79.144.50.

   Note: If each field does not contain at least three characters, press the period (.) key to advance to the next field. If you have only one controller, type its address for both the starting and ending addresses.

d. Type the subnet mask (obtained from your network administrator).

e. Set the Lease Duration to **Unlimited**. This makes the DHCP connection permanent.

f. Type a scope name and comment.

g. Click **OK**.

h. When the scope has successfully completed, click **Yes** to activate it.

   You return to the DHCP Manager window.

3. Use the following procedure to configure global scope options. You can use the scope options to configure settings that are applicable to all controllers. To determine which parameters to apply to the entire group, see Table 8 on page 16.

   Note: You can apply options to specific controllers later using step 5 on page 24.

   a. Click **DHCP Options** → **Global**.

      The DHCP Options: Global window opens.

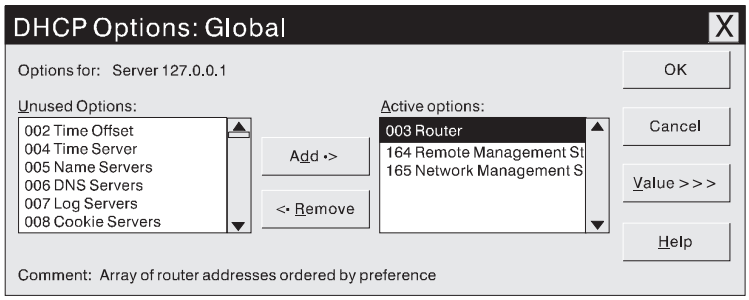

Figure 12. DCHP options window

b. Select an item in the Unused Options list, and click **Add** to move it to the Active options list. Each option is preceded by its tag number.

c. Click **Value** to assign a value to the active option.

   If **Value** is not selectable, the Edit Array option window opens in the lower part of the window.

d. If you need to add an IP address, click **Edit Array**.

   The IP Address Array Editor window opens.

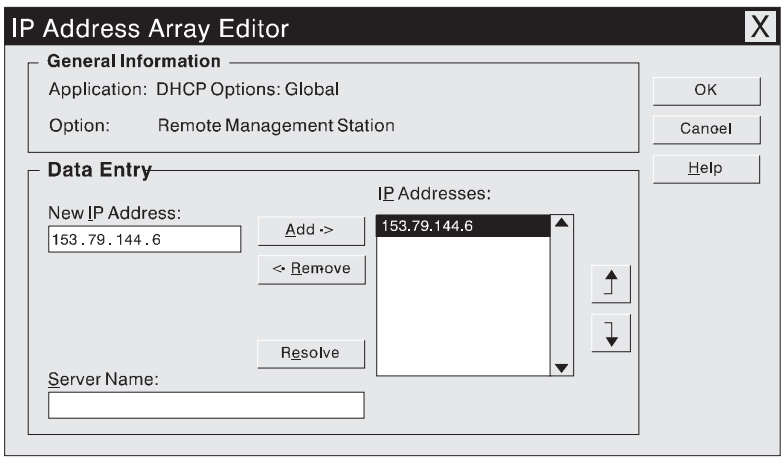

Figure 13. IP address array editor window

   Figure 13 shows an example of adding the IP address for a management station.

   If you do not need to add an IP address, go to step 3g.

e. Type the unique IP address for the option that you added.

f. Click **Add** to move the New IP Address to the IP Addresses list.

g. Click **OK**.

   You return to the DHCP Options: Global window.

h. Repeat step 3b through step 3g until all global options are added.

i. When you finish adding the Global Scope Options, click **OK** at the DHCP Options: Global window.

   You return to the DHCP Manager window.

4. Use the following procedure to create a reservation for each controller. Use the data sheet that you created from Table 14 on page 79 to make sure that you include all of the controllers for every storage subsystem on the network.
   a. Click **Scope** → **Add Reservations**.
   b. In the **IP Address** field, type the IP address for the first controller on your data sheet.
   c. In the **Unique Identifier** field, type the controller hardware Ethernet address.
   d. In the **Client Name** field, type the controller eight-character name.
   e. Click **Add**.
   f. Repeat step 4b through step 4e for each controller that is listed in your data sheet. See Table 14 on page 79.
   g. When you finish typing the information for all of the controllers, click **Close**.

      You return to the DHCP Manager window.
5. Use the following procedure to configure controller-specific options. By creating a controller-specific option, you can associate a controller configuration entry with a specific controller that you added in step 4.

   Note: If you set an option as **Global Scope**, it applies to every controller in this group and does not need to be added again.

   a. Click **Scope** → **Active Leases**.

      The Active Leases window opens.

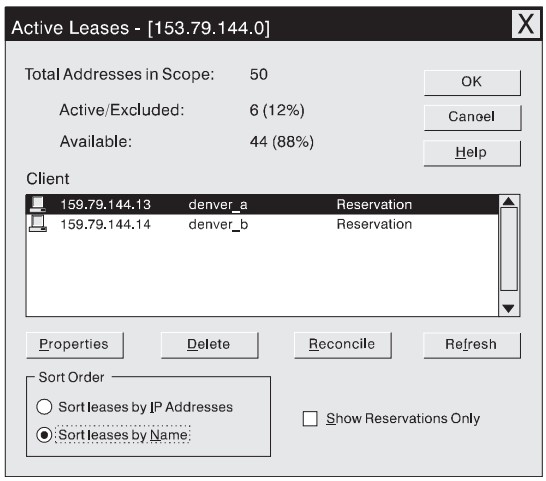

Figure 14. Active Leases window

   b. Select a controller in the list.
   c. Click **Properties**.

      The Add Option Type window opens. The Unique Identifier is the hardware Ethernet address that you added in step 4c.

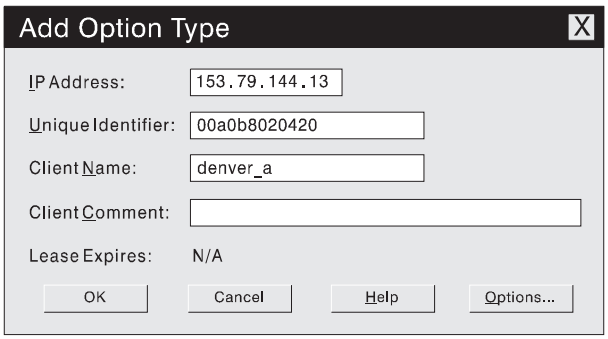

Figure 15. Add option type window

d. Click **Options**.

   The DHCP Options: Reservations window opens.

e. Select an entry in the Unused Options list, and click **Add** to move it to the Active Options list.

f. Click **Value** to assign a value to the active option.

g. Type the information for the value of the option.

   For example, for Host Name, type the host name for the controller (from your data sheet, see Table 14 on page 79) in the String field. Click **Edit** if the value that you need to add is an IP address for a router.

h. Repeat step 5e through step 5g until you finish adding specific options for this controller.

i. Click **OK**.

   You return to the Add Option Type window.

j. Click **OK.**

   You return to the Active Leases window.

k. Repeat step 5b on page 24 through step 5j until you finish adding controller-specific options for every controller.

l. When you finish adding specific options for all controllers, click **OK** at the Active Leases window. You return to the DHCP Manager window.

6. Continue with “Verify the TCP/IP software and set up the host or DNS table” on page 26.

Using a UNIX BOOTP server

Table 10 and Table 14 on page 79 provide information for setting up the BOOTP table and making the required entries to support the controllers in the storage subsystems. Use a text editor to edit the bootptab file in the /etc directory.

Table 10. Required entries for setting up the UNIX BOOTP server

Entry	Description	Sample format in BOOTP server
Subnet mask	Mask that is used to route packets to defined subnets.	dot notation (sm=255.255.248.0)
Router	IP address of the host computer that routes packets to networks.	dot notation (gw=153.79.144.2)

Table 10. Required entries for setting up the UNIX BOOTP server

Entry	Description	Sample format in BOOTP server
Host name for the controller	Host name that is associated with the controller (see Table 14 on page 79).	host name (Denver_a)
IP address	IP address of the controller (see Table 14 on page 79).	dot notation (ip=153.79.144.13)
Ethernet address	The Ethernet address of the controller hardware (see Table 14 on page 79).	hexadecimal notation (ha=00a0b8020420)

Note: The RMS and NMS entries used in previous versions of storage-management software version 6.22, are not required when using Storage Manager 7.02 to manage storage subsystems with controllers running firmware version 4.x.

Example for editing a UNIX BOOTP table

The following example of a BOOTP table assumes that you are configuring a UNIX BOOTP server, such as a server on Network A, as shown in Figure 6 on page 16. The s4.default:\ entry denotes settings that are common to all controllers. The tc=s4.default:\ entry associates this common setting group to a specific controller.

s4.default:\ (common settings)

ht=ether:\

sm=255.255.248.0:\

gw=153.79.144.2:\

hn:

denver_a:\

tc=s4.default:\ (refers to common settings)

ip=153.79.144.13:\

ha=00a0b8020420:

denver_b:\

tc=s4.default:\

ip=153.79.144.14:\

ha=00a0b80000d8:

When you finish setting up the BOOTP table, do the following:

1. Turn on power to the storage subsystems so that the parameters in the BOOTP table take effect.
2. After you finish setting up the BOOTP table, go to “Verify the TCP/IP software and set up the host or DNS table”.

Verify the TCP/IP software and set up the host or DNS table

Make sure that the host names for the controllers correspond to the appropriate internet protocol addresses for the controllers. Use the following procedure to verify

that the TCP/IP software is installed on the management station and to set up the host or Domain Name System (DNS) table.

Note: You might choose to use the Windows Internet Name Service (WINS) rather than DNS.

1. Click **Start** → **Settings** → **Control Panel** → **Network** → **Protocols** to verify that the TCP/IP software is installed and configured property.

   Note: If the TCP/IP software did not install properly, install it from the Windows NT 4.0 installation CD. Click **Start** → **Settings** → **Control Panel** → **Network** → **Protocols** → **Add** → **Have Disk**.

2. Update either the host or DNS table to specify a host name to associate with an IP address. If you do not have a DNS, edit the two host tables that are found in the following directories.

   c:\winnt\system32\drivers\etc\hosts

   c:\winnt\system32\drivers\etc\imhosts

   For example, to set up the host tables for the controllers that are connected to Network A (Figure 6 on page 16), use a text editor to create the following IP address and controller-name entries.

IP Address	Host name for the controller
127.0.0.01	localhost
153.79.144.13	denver_a
153.79.144.14	denver_b

3. If you want to manage storage subsystems through a firewall, continue with "Enabling ports for operation through a firewall". Otherwise, go to "Preparing to install the storage-management software"

Enabling ports for operation through a firewall

If you plan to manage storage subsystems through a packet-filtering firewall, configure the firewall to open port 2463 to TCP data.

Preparing to install the storage-management software

You have completed the preparation tasks and are now ready to install the storage-management software. The installation process that you follow depends on how you want to configure the system.

If you want to	Go to
Install the software in a standard (non-cluster) configuration	Chapter 3, "Installing software in a standard configuration," on page 29.
Install the software in a cluster server environment	Chapter 4, "Installing software in a cluster server environment," on page 39.

Chapter 3. Installing software in a standard configuration

This chapter describes how to install the storage-management software in a standard (noncluster) configuration.

Important: Always check for a README file on any installation media. This README file might contain important information that was not available when this *Installation and Support Guide* was prepared.

Pre-installation process

There are two configurations in which you can install the storage-management software:

- You do *not* have existing storage subsystems. In this situation, you are installing new storage subsystems with machine type 3526, 3542, or 3552 controllers using firmware version 4.x and will manage these new storage subsystems using Storage Manager 7.02. If this is your situation, go to “New installation process” on page 30.
- You do have existing storage subsystems with machine type 3526, 3552, or 3542 controllers. In this situation, you can do one of the following:
  - — Upgrade the controller firmware on the existing storage subsystems to version 4.x and manage them with Storage Manager 7.02.
  - — Continue to manage the storage subsystems with version 6.22 of the storage-management software. You might manage these storage subsystems in coexistence with new storage subsystems that you are managing with Storage Manager 7.02. To determine if you have coexisting storage subsystems, see “Managing new and existing storage subsystems attached to the same host” on page 11.

Use Table 11 to determine your installation process.

Table 11. Determining your installation process in a standard (noncluster) configuration

Current environment	Planned environment	Action
No existing storage subsystems	New storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	Go to “New installation process” on page 30.
Existing storage subsystems with controllers that have firmware version 3.x (machine type 3526) and storage-management software version 6.22	Upgrade storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	Go to Chapter 6, “Migration process,” on page 61.

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Table 11. Determining your installation process in a standard (noncluster) configuration

Current environment	Planned environment	Action
Existing storage subsystems with controllers that have firmware versions 4.00.00 through 4.00.01 and storage-management software version 7.00 or 7.01 (machine types 3526 and 3552)	Upgrade storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	1. Uninstall storage-management software version 7.0 or 7.01 using the procedures in the Installation Guide for the previous version of the storage-management software. 2. Go to “New installation process”. 3. Update the NVSRAM and firmware to version 4.00.02 using the storage-management software online help.
	Continue to use your existing versions 4.00.00 through 4.00.01 controller firmware. Be sure to uninstall previous versions of the storage-management software before installing version 7.02. You can manage these existing storage subsystems through Storage Manager 7.02, which includes components that are compatible with these older firmware versions. The functional differences between your existing controller firmware and controller firmware 4.00.02 is provided on the installation CD. Refer to the README file located in the \NT\ directory on the installation CD for more information.	1. Uninstall storage-management software version 7.0 or 7.01 using the procedures in the Installation Guide for the previous version of the storage-management software. 2. Go to “New installation process”.

New installation process

Begin the installation of the storage-management software with “Installing the SM7client package” on page 32. Continue the process until you have completed “Installing the SM7agent package” on page 37. You do not need to install or use the migrate utility.

Figure 16 shows a flowchart of the installation process.

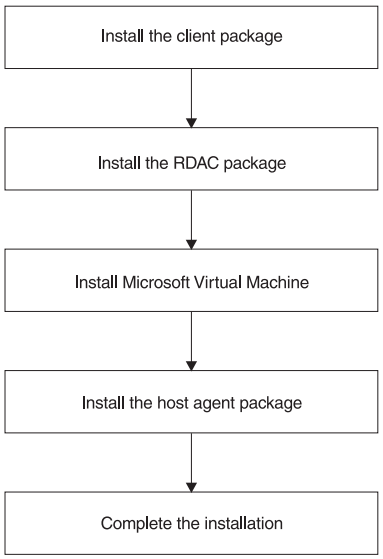

Figure 16. Installation process

Installation with existing storage subsystems

Begin this installation with “Installing the SM7client package” on page 32. Continue the process until you have completed “Installing the SM7agent package” on page 37. Then, if you are upgrading the controller firmware on the existing storage subsystems to version 4.x, go to “Installing SM7migrate” on page 66.

Figure 17 shows a flowchart of the process for an installation with existing storage subsystems.

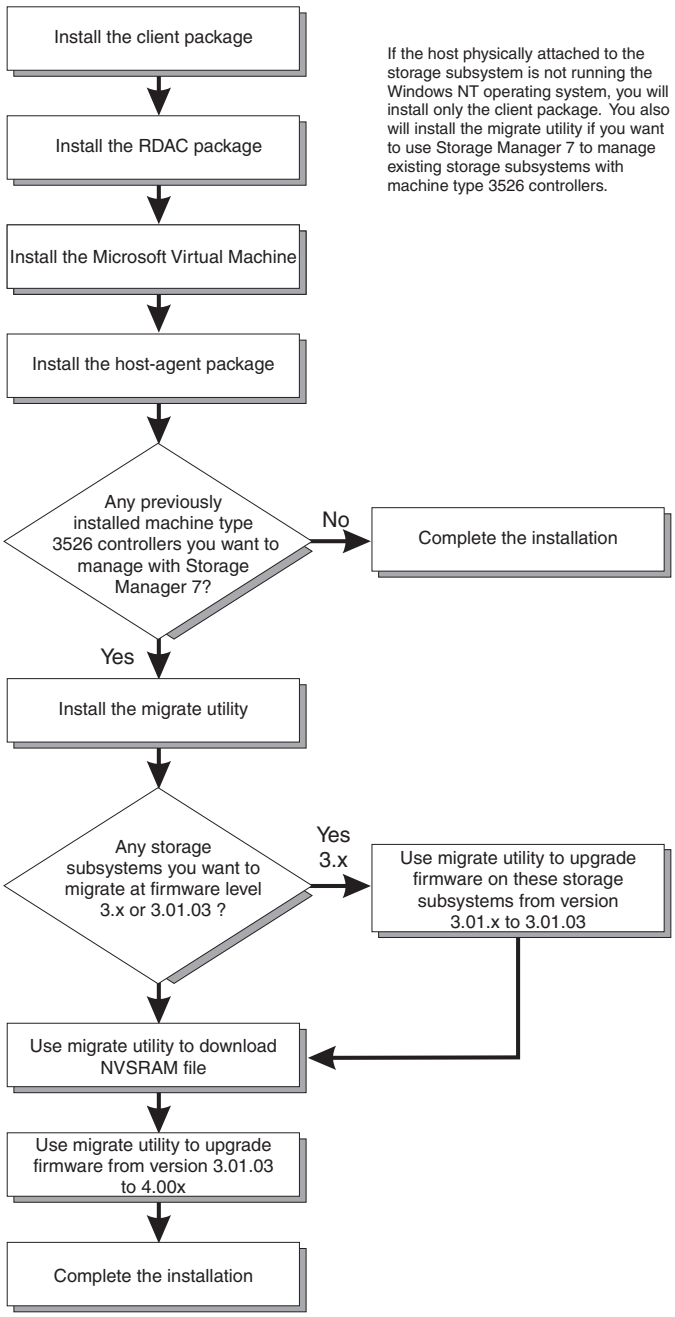

Figure 17. Installation process for existing storage subsystems

Installing the SM7client package

Use the following procedure to install the SM7client on a management station that is configured with one of the following:

- Windows NT Server 4.0 with Service Pack 5 or greater
- Windows NT Workstation 4.0 with Service Pack 5 or greater

Important notes:

- If you are configuring only a networked management station, you need to install only the SM7client.
- If you want to install SM7client on a stand-alone host and manage storage subsystems through the Fibre Channel I/O path rather than over the network, you must install the TCP/IP software on the host and assign a static IP address to the host. The host operating system must be Windows NT Server 4.0 or Windows NT Workstation 4.0.

Installation instructions

Before you install the software, make sure that:

- The management station has at least 20 MB of available disk space.
- The display properties are set to a minimum screen resolution of 800 x 600 pixels and a palette of 256 colors or more.
- You close all other programs.

To install the SM7client package:

1. Insert the IBM Netfinity FAStT Storage Manager CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install**, and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\SM7client directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.

   The Choose Destination Location window opens.
10. Click **Browse** if you want to change the destination location.
11. Click **Next**.
12. When the installation is complete, click **Finish**.

Verifying the SM7client installation

Use the following procedure to verify that the installation was successful:

1. Click **Start** → **Programs**.
2. Verify that the “Netfinity Fibre Channel Storage Manager client” appears in the list of programs.
3. If you are installing SM7client on only a management station, go to Chapter 5, “Completing the installation,” on page 55; otherwise, go to “Installing the RDAC package” on page 34.

Installing the RDAC package

Use the following procedure to install the RDAC package on a host computer that is connected to one or more storage subsystems.

The RDAC package contains the following components:

- The multipath device driver that is necessary for controller failover support
- The Hot Add utility for dynamically adding logical drives to the operating system (see “Using the Hot Add utility” on page 75)

Important: You must install RDAC before installing the SM7agent package.

Assigning drive letters

Note: If you are installing the RDAC software on an existing configuration, go to “Installation instructions” on page 35.

The installation procedure installs the RDAC device driver before the native Windows NT class device driver. This is necessary to enable the RDAC. However, this means that the system recognizes the storage subsystem logical drives before it recognizes any local drives, and assigns drive letters accordingly.

Note: *Before* you install this software, you *must* have static drive letters assigned to the existing local drives.

Use the following procedure to determine if you need to assign static drive letters and to assign them, if necessary:

1. Power off the storage subsystem to prevent Disk Administrator (WINDISK) from locking up while you are assigning drive letters and installing the RDAC device driver.
2. Click **Start** → **Programs** → **Administrative Tools** → **Disk Administrator** to view the disk configuration and check the number of partitions.
   - If you have only one partition, go to step 4.
   - If you have two partitions, go to step 3.
3. If you have at least two partitions (the boot partition and one other partition) and both of the following conditions apply, go to “Installation instructions” on page 35.
   - The last partition that you created was created with Disk Administrator.
   - The partition has a drive letter assigned and has a status of Unknown or has a file system on it (that is, it has a status other than Unformatted).
4. Use the following procedure to create a new partition.
   a. Select a drive containing free disk space.
   b. Click **Partition** → **Create**. The partition is created (a drive letter is assigned, and the partition status is Unformatted).
   c. Click **Partition** → **Commit Changes Now**. The partition status changes to Unknown, and static drive letters are assigned to all existing partitions.
5. Continue with “Installation instructions” on page 35.

Installation instructions

Before you install the software, make sure that:

- You have Administrator privileges on the host computer.
- The host computer is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host computer has at least 1 MB of available disk space.
- The display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 colors or more.
- You close all other programs.

Install the RDAC software:

1. Insert the IBM Netfinity FAStT Storage Manager CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Remove Programs Properties window opens.
3. Click **Install**, and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\RDAC directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.

   When RDAC is installed, the Setup Complete window opens.
10. Click **No, I will restart my computer later**; then, click **Finish**.
11. Click **Start** → **Shutdown**.

    The Shut Down Windows window opens.
12. Click **Shutdown** to shut down the server.
13. Power on the storage subsystem.
14. After the storage subsystem is powered on completely, power on the host to ensure that the changes take effect.

Verifying the RDAC installation

Use the following procedure to verify that the installation was successful.

1. Click **Start** → **Settings** → **Control Panel** → **Devices**.

   The Devices window opens.
2. Scroll through the list of devices, and then select **symarray**.
3. Make sure that the status of the symarray device is Started.
4. Continue with “Installing Microsoft Virtual Machine (MSVM)” on page 36.

Installing Microsoft Virtual Machine (MSVM)

Use the following procedure to install Microsoft Virtual Machine (MSVM) on a host computer that is connected to one or more storage subsystems.

Important: You must install the Microsoft Virtual Machine (MSVM) before installing SM7agent. The Netfinity FAStT Storage Manager 7.02 installation CD contains a version of Microsoft VM that was tested with the storage-management software. Before you install this version, go to the Web site at http://www.ibm.com/pc/support to see if a newer version of the software is available. Also, check the Web site for the latest support information.

Installation instructions

Before you install the software, make sure that:

- You have Administrator privileges on the host computer.
- The host computer is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host computer has at least 1 MB of available disk space.
- The display properties is set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 colors or more.
- You close all other programs.

Install Microsoft Virtual Machine (MSVM) on a host computer:

1. Insert the IBM Netfinity FAStT Storage Manager CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install**, and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens
5. Select the CD-ROM drive.
6. Select the \NT\SM7agent directory.
7. Select the msjavx86.exe file, and then click **Open**.
8. Click **Finish**, and follow the instructions on the screen.

   If the program detects newer files, you will be prompted to overwrite the older files, click **Yes**. When the software is installed, the Setup Complete window opens.

   If Service Pack 6a is installed, you will be prompted to reboot. Click **Yes** to restart the host.

   Note: You must restart the host to ensure that all changes take effect.
9. After installing SM7agent and restarting the host, reinstall Service Pack 6a. Failure to do so will result in the agent service not starting properly.
10. Click **Yes** to restart the host.
11. Continue with “Installing the SM7agent package” on page 37.

Installing the SM7agent package

Use the following procedure to install SM7agent on a host computer connected to one or more storage subsystems. The SM7agent consists of the following components:

- The host-agent software that is necessary for host-agent management of the storage subsystems.
- The SM7devices utility that is used to display the relationship of logical drives to operating system device names. For more information, see “Using the SM7devices utility” on page 76.

Important: You cannot install SM7agent unless RDAC is installed. The Microsoft Virtual Machine is also a required component for installing and using SM7agent.

You must install SM7agent even if you do not intend to manage storage subsystems through the host-agent software.

Installation instructions

Before you install the software, make sure that:

- You have Administrator privileges on the host computer.
- The host computer is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host computer has at least 1 MB of available disk space.
- The display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 or more.
- You installed RDAC and the Microsoft Virtual Machine (MSVM).
- You close all other programs

Install the SM7agent:

1. Insert the IBM Netfinity FAStT Storage Manager CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install**, and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\SM7agent directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.

   When SM7agent is installed, the Setup Complete window opens.

   Note: You must restart the host to ensure that all changes take effect.
10. Click **Finish** to restart the host.

Verifying the SM7agent installation

Use the following procedure to verify that the installation was successful:

1. Click **Start** → **Settings** → **Control Panel** → **Services**. The Services window opens.
2. Scroll through the list of services until you find the “Netfinity Fibre Channel Storage Manager 7 agent”.
3. Make sure that the status of the agent service is Started.

   Note: If you are not using the host-agent software to manage storage subsystems, you can stop the host-agent service. Click **Start** → **Settings** → **Control Panel** → **Services**. Select the host-agent from the list of displayed services, and click **Startup**. Under Startup Type, click **Manual**, and then click **OK**.
4. Go to Chapter 5, “Completing the installation,” on page 55.

Chapter 4. Installing software in a cluster server environment

This chapter describes how to install the hardware components and storage-management software in the multi-host configuration, using cluster server software.

Important: Always check for a README file on any installation media. This README file might contain important information that was not available when this *Installation and Support Guide* was prepared.

Pre-installation process

There are two configurations in which you can install the storage-management software:

- You do not have existing storage subsystems.
- You do have existing storage subsystems.

Before you begin the installation of Storage Manager 7.02, read “Installing the hardware” on page 40 to make sure that all hardware components are installed correctly for the cluster server configuration. Then, use Table 12 to determine your installation process.

Table 12. Determining your installation process in a cluster server environment

Current environment	Planned environment	Action
No existing storage subsystems	New storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	Go to “New installation” on page 40.
Existing storage subsystems with controllers that have firmware version 3.x (machine type 3526) and storage-management software version 6.22	Upgrade storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	Go to “Migration process for a Windows NT cluster configuration” on page 52.
Existing storage subsystems with controllers that have firmware versions 4.00.00 through 4.00.01 and storage-management software versions 7.00 or 7.01 (machine types 3526 and 3552)	Upgrade storage subsystems with controllers that will use version 4.00.02 firmware and will be managed with Storage Manager 7.02.	Go to “Upgrading from a previous version of the storage-management software in a cluster server configuration” on page 50.
	Continue to use your existing versions 4.00.00 through 4.00.01 controller firmware. Be sure to uninstall previous versions of the storage-management software before installing version 7.02. You can manage these existing storage subsystems through Storage Manager 7.02, which includes components that are compatible with these older firmware versions. The functional differences between your existing controller firmware and the controller firmware 4.00.02 is provided on the installation CD. Refer to the README file located in the \NT\ directory on the installation CD for more information.	Go to “Upgrading from a previous version of the storage-management software in a cluster server configuration” on page 50. **Note:** When using this procedure, if you want to continue to use controller firmware versions 4.00.00 through 4.00.01, do not update the NVSRAM and controller firmware to version 4.00.02.

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New installation

Before you begin the new installation, read “Installing the hardware” to make sure that all hardware components are installed correctly for the cluster server environment. Then, begin the software installation process with “Installing the SM7client package” on page 43. Continue the process until you have completed “Installing the cluster server software” on page 49. You do not need to install or use the migrate utility.

Important: After connecting the storage subsystems to both nodes, do not start Windows NT on both nodes at the same time until you install the cluster software on at least one node. To suspend Windows NT startup on node B, press the spacebar at the operating system (OS) startup. Do not install the cluster software until instructed to do so.

Figure 18 shows a flowchart of the process for installing the storage-management software for a new installation.

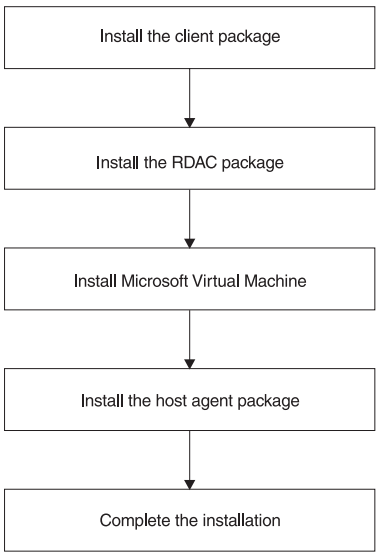

Figure 18. Process for a new installation

Installing the hardware

The hardware installation involves installing host adapters and storage subsystems.

Host adapters

Refer to the appropriate host-adapter documentation for specific installation requirements and procedures. The following considerations apply:

- You can install two host adapters in each node to run two cables from each node to both controllers in a storage subsystem. For example, if you are using single-channel host adapters and want the dual-path configuration, you must install two host adapters in each node. Figure 19 on page 42 shows Fibre Channel single- and dual-path connection examples.
- In a multinode system, be sure to set each host adapter with a unique hard loop ID for diagnostic purposes. Refer to the host adapter documentation for setting the hard loop ID.

- Install the correct device driver for the host adapter. Refer to the README file in the \NT\Host_Adapter directory on the IBM Netfinity FAStT Storage Manager CD for information on supported host adapters and device drivers.

Storage subsystems

Refer to the appropriate hardware documentation to install the storage subsystems. The following considerations apply:

- If you are managing storage subsystems directly, you must install Ethernet cables to both controllers in each storage subsystem.
- Unless you are using dual-channel host adapters, you need two host adapters per node to use the dual-path configuration.

Note: Use the dual-path configuration for the maximum RDAC protection, in the event that there is a problem with the connection.

The following figure shows Fibre Channel connections using single-path and dual-path configurations for fully redundant, partially-redundant, and non-redundancy. For more information, refer to the hardware documentation that comes with your controller unit or storage server.

Note: The interlink is used as the clustering heartbeat path.

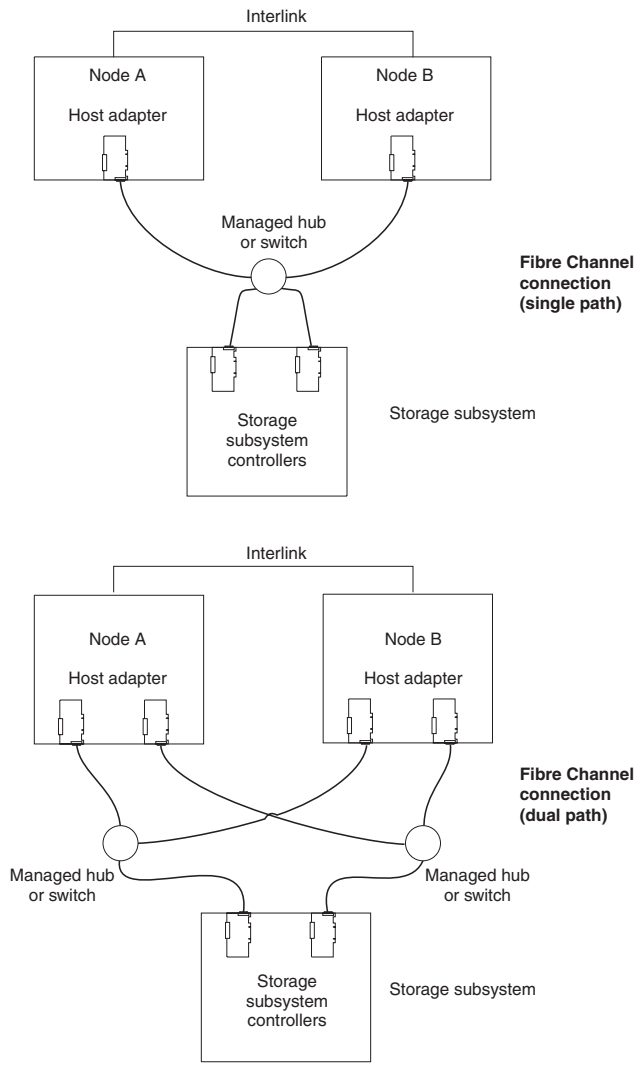

Figure 19. Installing the storage subsystem on a Fibre Channel network

Note: Other managed hub configurations are possible.

Continue with “Installing the SM7client package” on page 43.

Installing the SM7client package

Install the SM7client package on each management station. You can install the package on host node A or node B configured with one of the following operating systems:

- Windows NT Server 4.0
- Windows NT Workstation 4.0
- Windows 98
- Windows 98 Second Edition

Important notes:

- If you are configuring only a networked management station, you need to install only the SM7client.
- After connecting the storage subsystems to both nodes, do not start Windows NT on both nodes at the same time until you install the cluster software on at least one node. To suspend the Windows NT startup on node B, press the spacebar at the operating system (OS) startup. Do not install the cluster software until instructed to do so.
- If you want to install SM7client on a stand-alone host and manage storage subsystems through the Fibre Channel I/O path rather than over the network, you must install the TCP/IP software on the host and assign a static IP address to the host. The host operating system must be Windows NT Server 4.0 or Windows NT Workstation 4.0.

Installation Instructions

Before you install the software, make sure that:

- The management station has at least 20 MB of available disk space.
- The display properties are set to a minimum screen resolution of 800 x 600 pixels and a palette of 256 colors or more.
- You close all other programs.

Install the SM7client:

1. Insert the IBM Netfinity FAStT Storage Manager installation CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add//Remove Programs Properties window opens.
3. Click **Install**, and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\SM7client directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.

   The Choose Destination Location window opens.
10. Click **Browse** if you want to change the destination location.

11. Click **Next**.
12. When the installation is complete, click **Finish**.

Verifying the SM7client installation

Use the following procedure to verify that the installation was successful:

1. Click **Start** → **Programs**.
2. Verify that Netfinity FAStT Storage Manager 7 client appears in the list of programs.
3. If you are installing SM7client on only a management station, go to “Continuing the installation” on page 48; otherwise, go to “Installing the RDAC package”.

Installing the RDAC package

Use the following procedure to install the RDAC package on a host computer that is connected to one or more storage subsystems.

The RDAC package consists of the following components:

- The multipath device driver that is necessary for controller failover support.
- The Hot Add utility for dynamically adding logical drives to the operating system (see “Using the Hot Add utility” on page 75).

Important: You must install the RDAC package before installing the SM7agent package.

Assigning drive letters

The installation procedure loads the RDAC device driver before the native Windows NT class device driver. This is necessary to enable the RDAC. However, this means that the system recognizes the storage subsystem logical drives before it recognizes any local drives, and assigns drive letters accordingly.

Note: *Before* you install this software, you *must* have static drive letters assigned to the existing local drives.

Use the following procedure to determine if you need to assign static drive letters and to assign them, if necessary.

1. Power off the storage subsystem to prevent Disk Administrator (WINDISK) from locking up while you are assigning drive letters or installing the RDAC device driver.
2. Click **Start** → **Programs** → **Administrative Tools** → **Disk Administrator** to view the disk configuration and to check the number of partitions.
   - If you have two or more partitions, go to Step 3.
   - If you have only one partition, go to Step 4.
3. If you have at *least two* partitions (the boot partition and one other partition) and both of the following conditions apply, go to “Installation instructions” on page 45. Otherwise, go to Step 4 on page 45.
   - The last partition you created was created with Disk Administrator.
   - The partition has a drive letter assigned and has a status of Unknown or has a file system on it (that is, it has a status other than Unformatted).

4. Use the following procedure to create a new partition.
   a. Select a drive containing free disk space.
   b. Click **Partition** → **Create**. The partition is created (a drive letter is assigned and the partition status is Unformatted).
   c. Click **Partition** → **Commit Changes Now**. The partition status changes to Unknown, and static drive letters are assigned to all existing partitions.
5. Continue with “Installation instructions”.

Installation instructions

Before you install the RDAC package, make sure that:

- You have Administrator privileges on the host computer.
- The host computer is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host computer has at least 1 MB of available disk space.
- The display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 colors or more.
- You close all other programs.

Installing RDAC:

1. Insert the IBM Netfinity FAStT Storage Manager installation CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install** and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\RDAC directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.

   When RDAC is installed, the Setup Complete window opens.
10. Click **No, I will restart my computer later**; then, click **Finish**.
11. Click **Start** → **Shutdown**.

    The Shut Down Windows window opens.
12. Click **Shutdown** to shut down the server.
13. Power on the storage subsystem.
14. After the storage subsystem is powered on completely, power on the host to ensure that the changes take effect.

Verifying the RDAC installation

Use the following procedure to verify that the installation was successful.

1. Click **Start** → **Settings** → **Control Panel** → **Devices**.

   The Devices window opens.
2. Select **symarray** from the list of devices.
3. Make sure that the status of the **symarray** device is Started.
4. Continue with “Installing Microsoft Virtual Machine (MSVM)”.

Installing Microsoft Virtual Machine (MSVM)

Use the following procedure to install Microsoft Virtual Machine (VM) on a host machine connected to one or more storage subsystems.

Important: You must install the Microsoft Virtual Machine (VM) before installing SM7agent. The Netfinity FAStT Storage Manager 7.02 installation CD contains a version of Microsoft VM that was tested with the storage-management software. Before you install this version, go to the Web site at http://www.ibm.com/pc/support to see if a newer version of the software is available. Also, check the Web site for the latest support information.

Installation instructions

Before you install the software, make sure that:

- You have Administrator privileges on the host machine.
- The host machine is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host machine has at least 1 MB of available disk space.
- The display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 colors or more.
- You close all other programs.

Install Microsoft Virtual Machine:

1. Insert the IBM Netfinity FAStT Storage Manager installation CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install** and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the NT\SM7agent directory.
7. Select the msjavx86.exe file. and click **Open**.
8. Click **Finish,** and follow the instructions on the screen.

   When the software is installed, the Setup Complete window opens.

   Note: You must restart the host to ensure that all changes take effect.
9. Click **Yes** to restart the host.
10. Continue with “Installing the SM7agent package” on page 47.

Installing the SM7agent package

Use the following procedure to install the SM7agent package on a host machine connected to one or more storage subsystems.

The SM7agent package consists of the following components:

- The host-agent software necessary for host-agent management of the storage subsystems.
- The SM7devices utility necessary for relating logical drives to operating system device names. For more information, see “Using the SM7devices utility” on page 76.

Important notes:

- You cannot install the SM7agent package unless the RDAC package is installed. The Microsoft Virtual Machine is also a required component for installing and using the SM7agent package.
- You must install SM7agent even if you do not intend to manage storage subsystems through the host-agent software.

Installation instructions

Before you install the software, make sure that:

- You have Administrator privileges on the host machine.
- The host machine is configured with Windows NT 4.0 and Service Pack 5 or greater.
- The host machine has at least 1 MB of available disk space.
- The display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 or more.
- You installed RDAC and the Microsoft Virtual Machine (VM).
- You close all other programs.

Install the SM7agent package:

1. Insert the IBM Netfinity FAStT Storage Manager installation CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install** and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the \NT\SM7agent directory.
7. Select the setup.exe file, and then click **Open**.
8. Click **Finish**.

   The setup program Welcome window opens.
9. Click **Next** to begin the installation.
10. After SM7agent is installed, the Setup Complete window opens.
11. You must restart the host to ensure that all changes take effect. Click **Finish** to restart the host.

Verifying the SM7agent installation

Use the following procedure to verify that the installation was successful.

1. Click **Start** → **Settings** → **Control Panel** → **Services**.

   The services window opens.

2. Scroll through the list of services until you find the Netfinity Fibre Channel Storage Manager 7 agent.

3. Make sure that the status of the host-agent service is started.

   Note: If you are not using the host-agent software to manage storage subsystems, you can stop the host-agent service. Click **Start** → **Settings** → **Control Panel** → **Services**. Select the host-agent from the list of displayed services and click **Startup**. Under Startup Type, click **Manual**, and then click **OK**.

Continuing the installation

If you installed the storage-management software on Node A, go to "Setting up the storage subsystems". If you installed the storage-management software on Node B, go to "Verifying drive letters" on page 49.

Setting up the storage subsystems

Use the procedures in Chapter 5, "Completing the installation," on page 55 to perform the following tasks:

1. Start Enterprise Management and perform an Initial Automatic Discovery of storage subsystems on the local subnetwork. (See "Starting Enterprise Management" on page 55.)
2. Add other devices to the management domain as necessary. (See "Adding devices" on page 57.)
3. Create all of your planned arrays and logical drives on each storage subsystem connected to your cluster. (See "Creating arrays and logical drives" on page 57.)
4. Modify configuration settings in NVSRAM by running the appropriate scripts required for your configuration. (See "Modifying configuration settings in NVSRAM" on page 60.)
5. Open a Subsystem Management window for each storage subsystem and configure the storage subsystem as much as possible. You do not have to completely configure the storage subsystems. However, any changes you make later must be made known to Node B. (See "Starting Subsystem Management" on page 58.)
6. After you complete the procedures in Chapter 5, "Completing the installation," on page 55, continue with step 7.
7. If you installed the storage-management software on Node A, go to "Shutting down node A" on page 49, If you installed the storage-management software on Node B, go to "Verifying drive letters" on page 49.

Shutting down node A

After installing the storage-management software on node A:

1. Shut down Windows NT, but leave Node A running (do *not* turn off the node).
2. Return to “Installing the SM7client package” on page 43 and repeat the installation procedures to install the necessary software components on Node B.

Verifying drive letters

After installing the storage-management software on node B:

1. Use the Windows NT Disk Administrator to verify that the drive letters that are assigned to the configured logical drives are the same as those that are assigned to Node A.
2. Continue with “Shutting down node B”.

Shutting down node B

1. Shut down Windows NT, but leave Node B running (do *not* turn off the node).
2. Continue with the next section, “Installing the cluster server software”.

Installing the cluster server software

Use the following procedure to install the cluster server software on Nodes A and B.

Important: Before you install the cluster server software, make sure that you have installed the storage-management software on both nodes of the cluster server.

1. Install the cluster server software on Node A, as follows:
   a. Refer to the appropriate Microsoft Cluster Server (MSCS) documentation for the correct procedure to install the cluster server software.

      Note: During installation, specify that you want to Form A New Cluster.

   b. After the system restarts, leave Node A up and running.
2. Install the Cluster Server software on Node B, as follows:
   a. Refer to the appropriate MSCS documentation for the correct procedure to install the Cluster Server software.

      Note: During installation, specify that you want to Join The Existing Cluster.

   b. After the system restarts, leave Node B up and running.

   Important: When the installation of the MSCS is complete, be sure to reinstall the latest supported Service Pack.

3. Verify the software installation, as follows:
   a. On either node (A or B), click **Start** → **Programs** → **Administrative Tools (Common)**.
   b. Click Cluster Administrator.
   c. In the Cluster or Server Name field, type either the name of the cluster or the name or IP address of one of the nodes.
   d. If the installation is successful, the computer names of both nodes appear on the left side of the Cluster Administrator window.
4. If both node names appear, go to "Completing final tasks" on page 60. Otherwise, reinstall the cluster server software.

Upgrading from a previous version of the storage-management software in a cluster server configuration

Be sure that you are familiar with the steps required in "New installation" on page 40, before you continue with the following upgrade procedures.

You can choose from one of the following procedures to upgrade your existing storage subsystem to Storage Manager 7.02 and to controller firmware version 4.00.02:

- **Performing a scheduled upgrade.** A scheduled upgrade means scheduling down time on your cluster server to upgrade the controller firmware and the storage-management software. The scheduled upgrade is the preferred procedure for upgrading a cluster server configuration.
- **Performing a rolling upgrade.** A rolling upgrade means upgrading the controller firmware and storage-management software so that the services and resources offered by the cluster are available, while the node that is being upgraded is not available.

Important: After the storage subsystem controller firmware has been upgraded to 4.00.02, you will not be able to communicate with the controller until you have upgraded to Storage Manager 7.02 software on your management station and host. Previously installed versions of the storage-management client and host-agent software will not recognize controllers running version 4.00.02 firmware.

Performing a scheduled upgrade from storage-management software version 7.0 or 7.01 to Storage Manager 7.02

Complete the following steps to upgrade from storage-management software version 7.0 or 7.01 to Storage Manager 7.02.

1. Before installing the storage-management software, do the following:
   a. Click **Start** → **Settings** → **Control Panel** → **Services**.

      The Services window opens.
   b. Select **Cluster Server** from the list of displayed services and then, click **Startup**. The Service window opens.
   c. In the Startup Type group box, click **Manual**; then, click **OK**.
   d. Stop Cluster Server on all nodes in the cluster configuration.
2. Shutdown all but node A in the cluster configuration.
3. From node A, to uninstall the components from the previous version of the storage-management software, use the uninstall procedure that came with the version of the storage-management software that you are running.

4. Verify that the IBM Host Bus Adapter driver versions are current. If they are not at the current versions, refer to the README file in \NT\Host_Adapter directory on the installation CD to upgrade the driver versions before continuing.
5. Install the Storage Manager 7.02 SM7client package using the procedure in “Installing the SM7client package” on page 43.
6. Install the Storage Manager 7.02 RDAC package using the procedure in “Installing the RDAC package” on page 44.
7. Install the Storage Manager 7.02 SM7agent package using the procedure in “Installing the SM7agent package” on page 47.
8. Upgrade the controller NVSRAM and controller firmware to version 4.00.02. Then, modify the appropriate configuration settings in NVSRAM using the procedure in “Modifying configuration settings in NVSRAM” on page 60.

   Note: You can continue to use your existing controller firmware versions 4.00.00 through 4.00.01. You can manage these existing storage subsystems through Storage Manager 7.02.
9. Shutdown this node.
10. On node B, repeat step 3 on page 50 through step 7; then, repeat step 9.
11. All nodes should be shut down. Start up one node at a time, using the following procedure:
    a. Click **Start** → **Settings** → **Control Panel** → **Services**.

       The Services window opens.
    b. Select **Cluster Server** from the list of displayed services; then, click **Startup**. The Service window opens.
    c. In the Startup Type group box, click **Automatic**; then, click **OK**.
    d. Start the cluster server on node B.

Performing a rolling upgrade from storage-management software version 7.0 or 7.01 to Storage Manager 7.02

Note: To avoid losing access to a cluster, you need to perform a rolling upgrade. A rolling upgrade means upgrading so that the services and resources offered by the cluster are always available, even though the node being upgraded is not available.

If you have applications installed in the cluster server environment that do not support a rolling upgrade, then you will have to do either of the following:

- Put those resources offline before the upgrade; then, put them back online after the upgrade, or
- Use a different upgrade method

Complete the following steps to perform a rolling upgrade from storage-management software version 7.0 or 7.01 to Storage Manager 7.02:

1. On node A, open Cluster Administrator.
2. Select node A, then pause the node (**File** → **Pause Node**)
3. Double-click on the Active Groups folder in the right window of Cluster Administrator.
4. Select each group listed, and move your selection to node B.
5. On node A, to uninstall the components from the previous version of the storage-management software, use the uninstall procedure that came with the version of the storage-management software you are running.

6. Verify that the IBM Host Bus Adapter driver versions are current. If they are not at the current versions, refer to the README file in \NT\Host_Adapter directory on the installation CD to upgrade the driver versions before continuing.
7. Install the Storage Manager 7.02 SM7client package using the procedure in “Installing the SM7client package” on page 43.
8. Install the Storage Manager 7.02 RDAC package using the procedure in “Installing the RDAC package” on page 44.
9. Install the Storage Manager 7.02 SM7agent package using the procedure in “Installing the SM7agent package” on page 47.
10. Upgrade the controller NVSRAM and controller firmware to version 4.00.02. Then, modify the appropriate configuration settings in NVSRAM using the procedure in “Modifying configuration settings in NVSRAM” on page 60.

    Note: You can continue to use your existing controller firmware versions 4.00.00 through 4.00.01. You can manage these existing storage subsystems through Storage Manager 7.02.
11. Run Cluster Administrator, and resume the node (**File** → **Resume Node**)
12. On node B, repeat step 1 on page 51 through step 9; then, repeat step 11.

Migration process for a Windows NT cluster configuration

Complete the following steps to migrate controller firmware from version 3.x to 4.x and to upgrade the storage-management software to Storage Manager 7.02.

1. Before installing the storage-management software, do the following:
   a. Click **Start** → **Settings** → **Control Panel** → **Services**.

      The Services window opens.
   b. Select **Cluster Server** from the list of displayed services and then, click **Startup**. The Service window opens.
   c. In the Startup Type group box, click **Manual**; then, click **OK**.
   d. Stop cluster server on all nodes in the cluster configuration.
2. Shutdown all but node A in the cluster configuration.
3. To complete the migration process on node A, go to Chapter 6, “Migration process,” on page 61.

   Note: The migration process will upgrade the controller firmware from version 3.x to 4.x and upgrade the storage-management software from version 6.22 to 7.01.
4. From the one remaining node, to uninstall the components from the previous version of the storage-management software, use the uninstall procedure that came with the version of the storage-management software that you are using.
5. Verify that the IBM Host Bus Adapter driver versions are correct. If they are not the correct versions, use the README file in \NT\Host_Adapter directory on the installation CD to upgrade the driver versions before continuing.
6. Install the Storage Manager 7.02 SM7client package using the procedure in “Installing the SM7client package” on page 43.
7. Install the Storage Manager 7.02 RDAC package using the procedure in “Installing the RDAC package” on page 44.
8. Install the Storage Manager 7.02 SM7agent package using the procedure in “Installing the SM7agent package” on page 47.

9. Upgrade the controller NVSRAM and controller firmware to version 4.00.02. Then, modify the appropriate configuration settings in NVSRAM using the procedure in “Modifying configuration settings in NVSRAM” on page 60.
10. Shutdown this one node.
11. On node B, repeat step 4 on page 52 through step 8 on page 52; then, repeat step 10.
12. All nodes should be shut down. Start up one node at a time, using the following procedure:
    a. Click **Start** → **Settings** → **Control Panel** → **Services**.

       The Services window opens.
    b. Select **Cluster Server** from the list of displayed services and then, click **Startup**. The Service window opens.
    c. In the Startup Type group box, click **Automatic**; then, click **OK**.
    d. Start cluster server on the node.

Chapter 5. Completing the installation

This chapter contains procedures for starting Enterprise Management and Subsystem Management and for completing the installation tasks.

Starting Enterprise Management

The Enterprise Management window is the first window to open when you start the software. Use the Enterprise Management window to:

- Add and discover the storage subsystems that you want to manage.
- Provide a comprehensive view of all storage subsystems in your management domain.
- Perform batch storage subsystem management tasks using the Script Editor.

Use the following procedure to start the Enterprise Management window:

1. Click **Start** → **Programs**.
2. Click **Netfinity Fibre Channel Storage Manager 7 client**.

   The client software starts, and the Enterprise Management window and the Confirm Initial Automatic Discovery window open, as shown in Figure 20.

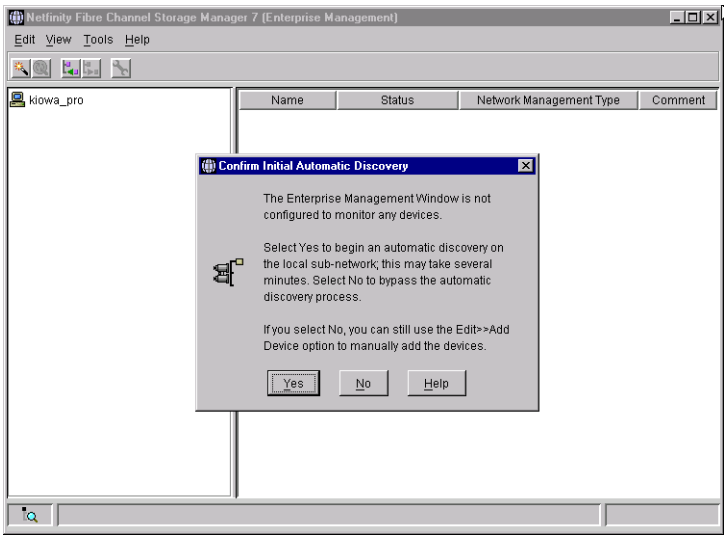

Figure 20. Confirm Initial Automatic Discovery window

Note: The Enterprise Management window can take several minutes to open. No wait cursor (such as an hourglass) is displayed.

If you do not want to perform the initial automatic discovery, click **No**. You can use the **Edit** → **Add Device** menu option to add hosts and storage subsystems. For more information, see “Adding devices” on page 57.

3. Click **Yes** to begin an initial automatic discovery of hosts and storage subsystems that are attached to the local subnetwork on which the management station is installed.

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The software sends a broadcast message across the local subnetwork where the management station is installed. It discovers host-agent managed storage subsystems if the hosts that provide network management connections to the storage subsystems respond to the broadcast. The software discovers directly managed storage subsystems if the controllers in those storage subsystems respond to the broadcast message.

Note: It can take up to a minute for the Enterprise Management window to refresh after an initial automatic discovery.

If you need to stop the automatic discovery operation, close the Enterprise Management window.

When the initial automatic discovery is complete, you can see all hosts and storage subsystems that are attached to the local subnetwork, as shown in Figure 21.

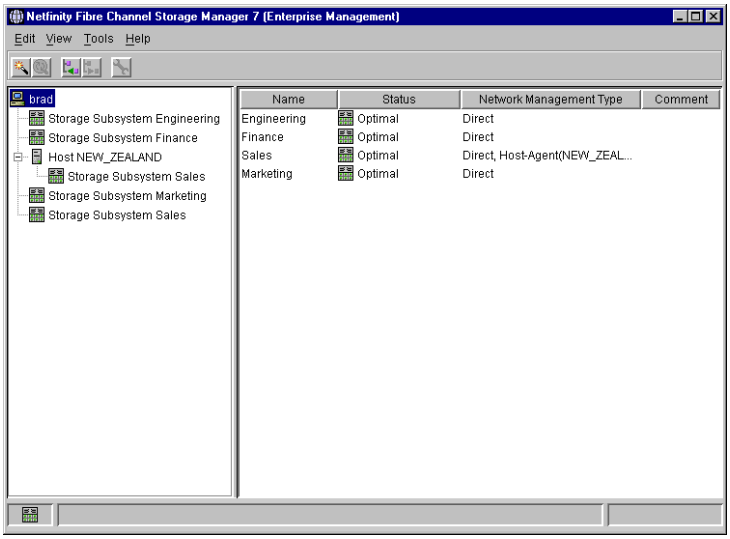

Figure 21. Enterprise Management window

If you do not see all hosts and storage subsystems, do the following:

- Check the hardware and connections for possible problems (refer to the hardware documentation for specific procedures).
- Refer to the Enterprise Management Help topic about discovering storage subsystems.
- Make sure that the device is on the local subnetwork. If it is not, you must use the Add Device option.

Note: If any device shows a status of Unresponsive, use the software to remove the device from the management domain and then add it again. Refer to the Enterprise Management online Help for instructions on removing and adding devices.

A storage subsystem might be duplicated in the device tree after an automatic discovery, if the storage subsystem is directly managed but is attached to a host with the host-agent software installed and running. In this case, you can remove the duplicate storage management icon from the device tree using the remove device option in the Enterprise Management window.

Continue with “Adding devices” on page 57.

Adding devices

You can add more hosts or storage subsystems outside the local subnetwork. For more information about this option, refer to the Enterprise Management window online Help.

Important: If you are managing storage subsystems through the host-agent software and you physically add new storage subsystems, you must stop and restart the host-agent service so that it can recognize the new storage subsystems (see “Stopping the host-agent service” on page 60). Then, go to the Enterprise Management window and click **Tools** → **Rescan** to add the new storage subsystems to the management domain.

Continue with “Creating arrays and logical drives”.

Creating arrays and logical drives

Use the following procedure to create an array or logical drive:

1. Highlight a storage subsystem in the Enterprise Management window and select **Tools** → **Manage Device** to start a Subsystem Management window for that storage subsystem.
2. Create all of your planned arrays and logical drives on this storage subsystem using the **Configure** → **Create Array/Logical Drive option**.
3. Repeat the arrays/logical drive configuration for each storage subsystem connected to your cluster.

   Note: If you make any other logical drive additions or deletions, you must make them known to node B.
4. Go to “Setting up alert notifications”.

Setting up alert notifications

After you add devices to the management domain, set up alert notification options to report critical events on the storage subsystems. The following options are available for alert notification:

- Notification to a designated network management station (NMS) using Simple Network Management Protocol (SNMP) traps (see “Setting up the NMS for SNMP notification” for more information)
- Notification to designated e-mail addresses
- Notification to designated alphanumeric pagers (when a third-party software package is used to convert e-mail messages)

Note: The Enterprise Management Window must remain open if you want to monitor the condition of storage subsystems included in your management domain. You may want to minimize the window. If you close this window, you will not receive alert notifications. Refer to the Enterprise Management online Help for more information on alert notification options.

Setting up the NMS for SNMP notification

If you choose to set up alert notification using SNMP traps, you must first copy a management information base (MIB) file to the designated network management station. Use this procedure to set up the MIB file on the network management station.

Important: You need to set up your designated NMS only one time.

1. From the \NT\SM7mib directory on the Netfinity FAStT Storage Manager Installation CD, copy the Arrayman.mib file to the network management station.
2. Follow the steps that are required by your specific network management station to compile the MIB file.

   Note: For details on the required steps, consult your network administrator or the documentation that is specific to the NMS product that you are using.

Configuring alert destinations

Configure SNMP trap destinations and e-mail destinations for alert notifications using Enterprise Management. Refer to the Enterprise Management online Help for specific procedures.

Starting Subsystem Management

The Subsystem Management window enables you to manage selected subsystems.

Use the following procedure to open a Subsystem Management window for a selected storage subsystem:

1. In the Enterprise Management window, select a storage subsystem.
2. Click **Tools** → **Manage Device**.

   The software displays the Subsystem Management window for the selected storage subsystem, as shown in Figure 22.

   Note: Using the open Subsystem Management window, you can manage only the selected storage subsystem. However, you can open multiple Subsystem Management windows to manage other storage subsystems.

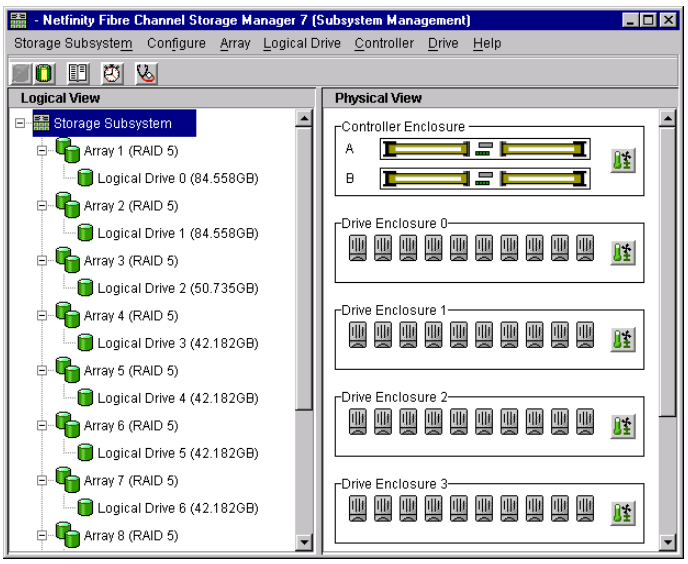

Figure 22. Subsystem Management window (models 3526 and 3552)

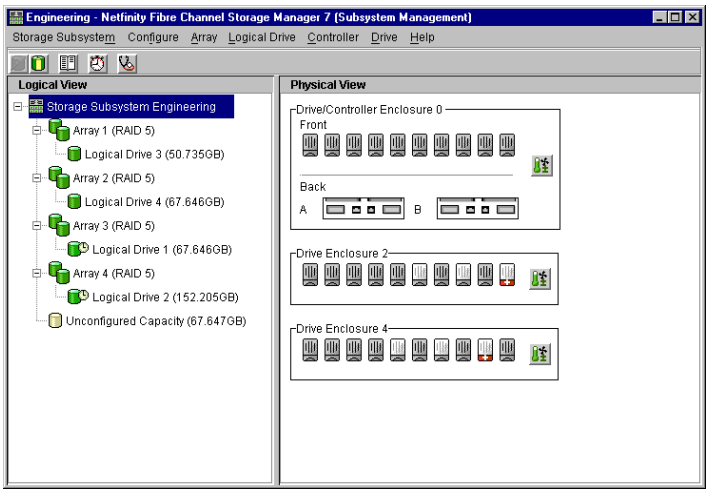

Figure 23. Subsystem Management window (model 3542)

Renaming storage subsystems

When starting Storage Manager 7.02 for the first time, the storage subsystems are unnamed. You must use the Subsystem Management window to rename each storage subsystem from <unnamed> to the name that you want. Refer to the names that you entered in the information record that you created using Table 14 on page 79. Then, refer to the topic about renaming storage subsystems in the Subsystem Management online Help. The Help topic provides detailed instructions for renaming storage subsystems.

Performing other storage-subsystem management tasks

You can perform the following storage-subsystem management tasks:

- Downloading controller firmware
- Downloading controller NVSRAM
- Locating a storage subsystem
- Viewing a storage subsystem profile
- Typing or changing a storage subsystem password
- Creating and managing logical drives and arrays
- Using the Performance Monitor
- Creating storage partitions (if applicable)

Note: To create storage partitions, you must obtain the worldwide name or port name of each host adapter in each host connected to the storage subsystem.

For more information about these and other storage-subsystem management tasks, refer to the appropriate topics in the Subsystem Management online Help.

Go to “Modifying configuration settings in NVSRAM” on page 60.

Modifying configuration settings in NVSRAM

Depending on the operating system, management method (host-agent or direct) and configuration (cluster or noncluster) that you selected, you might need to run scripts to modify configuration settings stored in NVSRAM on each storage subsystem you are managing with Storage Manager 7.02.

Use the following procedure to modify the configuration settings.

1. Insert the Netfinity FAStT Storage Management Installation CD into the CD-ROM drive on the management station.
2. Go to the NT\Scripts directory and read the README file in that directory.
3. In the Enterprise Management window, select a storage subsystem; then, click **Tools** → **Execute Script**.
4. Run the scripts for your configuration using steps 6 through 8.

   Note: In a cluster configuration, if you are managing storage subsystems with only the host-agent, run the script to disable networking.
5. To run a script file, click **File** → **Load Script**.

   The Load Script window opens.
6. Select the appropriate script from the NT\Scripts directory on the installation CD.
7. Click **Open** to load the script.
8. Click **Tools** → **Execute Only**. Wait until the `Script Execution Complete` message displays.
9. Repeat the procedures in steps 3 through 8 for each storage subsystem that you are managing with the storage-management software.

Completing final tasks

If you want to manage storage subsystems using only the direct method, go to "Stopping the host-agent service". Otherwise, go to Chapter 7, "Operating-system support," on page 73.

Note: You can manage the storage subsystems using both the direct and host-agent management methods.

Stopping the host-agent service

Use the following procedure to stop the host-agent service:

1. Click **Start** → **Settings** → **Control Panel** → **Services**.
2. Click **Netfinity Fibre Channel Storage Manager 7 Agent**.
3. Click **Stop**.
4. Click **Startup**.

   The Service window opens.
5. Under Startup Type, click **Manual**.
6. Click **OK**.
7. Click **Close** to close the Services window, and then close the Control Panel.
8. Go to Chapter 7, "Operating-system support," on page 73.

Chapter 6. Migration process

If you have a previous installation of storage subsystems containing controller model 3526 that you are managing with version 6.22 of the storage-management software, and you want to manage those storage subsystems with Storage Manager 7.01, continue with “Installation prerequisites”. Otherwise, Go to Chapter 5, “Completing the installation,” on page 55.

Use the migration procedure to perform the following tasks:

- Upgrading from storage-management software version 6.22 to Storage Manager Version 7.01 on the management station
- Upgrading RDAC on the host computer
- Installing MSVM and SM7agent on the host computer
- Migrating from firmware 3.x to 4.x on the RAID controllers in an IBM Netfinity Fibre Channel RAID Controller Unit model 3526-1RU.

  Notes:

  1. Perform the installation of SM7client on each management station.
  2. Perform the installation of SM7rdac, MSVM, and SM7agent on each host.
  3. Perform the migration process from one host for each storage subsystem.

Installation prerequisites

Before starting the migration process, make sure that:

1. The host computer and management station are running Windows NT Service Pack 5 or greater.

   Note: You cannot migrate the controller firmware if the host agent and management station are running Windows 2000. Windows 2000 can communicate with controllers at firmware level 4.x.
2. Fibre Channel RAID controllers to be migrated must be at bootware 03.01.00.02 and appware 03.01.02.22.
3. Make sure that 32 LUN support is enabled.

   (The ’LargeLuns’ setting in the registry for the Fibre Channel Host Bus Adapters (HBA) must be set to ’1’ and the ’Luns per target’ setting in the ALT-Q FC HBA utility must be set to’0’.)
4. Storage-management software version 6.22 must be uninstalled before beginning the migration process.
5. Download the software files from the IBM web site, http://www.ibm.com/pc/netfinity
   a. Click **Downloads→Netfinity and PC Server Drivers.**
   b. Select your product and click **Servers** → **Fibre Channel Solutions** → **3526** → **All** → **Fibre**; then, link and download the following software:
      - 06p4929A IBM Netfinity FAStT Storage Manager 7 for Windows NT version 7.01.
      - IBM Netfinity FAStT Storage Manager 7.01 migration from Storage Manager version 6.22 (for Windows NT only).

Before you install the software, make sure that:

- You have Administrator privileges on the host computer.

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- The host computer is configured with Window NT 4.0 and Service Pack 5 or greater.
- The host computer has at least 10 MB of available disk space and the display properties are set to a minimum screen resolution of 640 x 480 pixels and a palette of 256 colors.
- The management station has at least 20 MB of available disk space and the display properties are set to a minimum screen resolution of 800 x 600 pixels and a palette of 256 colors.
- You close all other programs. You cannot update the controller if there is an active lock on the logical disk(s). This includes IBM Netfinity Manager, Netfinity Director, Diskeeper, or Microsoft Cluster Server.

Installation preparation

Use the following procedure to prepare for the migration process:

1. Run 06P4929A.exe. Choose a directory to extract the files to and click **Unzip**. This will create the following directory structure under the target extraction directory:

Directory of

<target directory>\temp\AGENT701	SM7agent-NT-07012501.exe
<target directory>\temp\CLIENT701	SM7client-NT-07012503.exe
<target directory>\temp\FW04000100	FW_04000100_04000100.dlp
<target directory>\temp\MIB	arrayman.mib
<target directory>\temp\MSVM	MSJavx86-5_00_3186.exe
<target directory>\temp\NVSRAM	NV4766WNT856004.dlp
	NV4774WNT856003.dlp
<target directory>\temp\RDAC	SM7rdac-07002507.exe
<target directory>\temp\SCRIPTS	SM7Scripts.exe
<target directory>\temp	READM701.txt

2. Run migrate701.exe. Choose the same directory as the one selected in the previous step to extract the files to and click **Unzip**. This will create the following directory structure under the target extraction directory:

Directory of

<target directory>\temp\FW03010300	firmware_03010300.dlp
<target directory>\temp\MIB	arrayman.mib
<target directory>\temp\migrate701	sm7migrate-nt-07012500.exe
	· Migrate.txt
	· Migrate.cmd
	· NVutil.exe
	· SetNVSRAM.cmd

Installing SM7client

Use the following procedure to install the SM7client package on a management station or file server that is configured with one of the following operating systems.

- Windows NT Server 4.0
- Windows NT Workstation 4.0
- Windows 98
- Windows 98 Second Edition

Note: If you want to install SM7client on a host and manage storage subsystems through the Fibre Channel I/O path rather than over the network, you must install the TCP/IP software on the host and assign a static IP address to the host. The host operating system must be Windows based.

Installation Instructions

1. Go to the *<target directory>*\temp\client701 directory.
2. Run the SM7client-NT-07012503.exe file.

   This self-extracting executable file will expand out its files to the c:\storage directory. If prompted to overwrite files, click **Yes to All**.

   Note: Your directory path might be identified differently.
3. From the c:\storage directory, select the setup.exe file, and then click **Open**.
4. Click **Next**.

   The setup program Welcome window opens.
5. Click **OK** to begin the installation.

   The Choose Destination Location window opens.
6. Click **Browse** if you want to change the destination location.
7. Click **Next** to begin the installation.
8. When the installation is complete, click **Finish**.

Verifying the SM7client installation

Use the following procedure to verify that the installation was successful:

1. Click **Start** → **Programs**.
2. Verify that Netfinity Fibre Channel Storage Manager 7 client appears in the list of programs.
3. Go to “Installing SM7rdac”.

Installing SM7rdac

Use the following procedure to install the RDAC package on a host computer that is connected to one or more storage subsystems.

The RDAC package consists of the following components:

- The multipath device driver that is necessary for controller failover support.
- The Hot Add utility for dynamically adding logical drives to the operating system (see “Using the Hot Add utility” on page 75).

Important: You must install the RDAC package before installing the SM7agent package.

Installation instructions

1. Select the *<target directory>*\temp\RDAC\ directory.
2. Run the SM7rdac-07002507.exe file.

   Set the overwrite files setting to 'Always'. This self-extracting executable file will expand out its files to the c:\storage directory.
3. From the c:\storage directory, run the setup.exe file.
4. Click **Next**.

   The setup program Welcome window opens.
5. Click **OK** to begin the installation.

   After RDAC is installed, the Setup Complete window opens.
6. You must restart the host to ensure that all changes take effect. Click **Finish** to restart the host computer.

Verifying the SM7rdac installation

Use the following procedure to verify that the installation was successful.

1. Click **Start** → **Settings** → **Control Panel** → **Devices**.

   The Devices window opens.
2. Select **symarray** from the list of devices.
3. Make sure that the status of the symarray device is Started.
4. Continue with "Installing Microsoft Virtual Machine (MSVM)".

Installing Microsoft Virtual Machine (MSVM)

Use the following procedure to install Microsoft Virtual Machine (MSVM) on a host computer connected to one or more storage subsystems.

Important: You must install the Microsoft Virtual Machine (MSVM) before installing SM7agent. The Netfinity FAStT Storage Manager 7.01 installation CD contains a version of Microsoft VM that was tested with the storage-management software. Before you install this version, go to the IBM Web site, http://www.ibm.com/pc/support to see if a newer version of the software is available. Also, check the Web site for the latest support information.

Installation instructions

1. Go to the *<target directory>*\temp\MSVM directory.
2. Run the MSJavx86-5_00_3186.exe file.

   If prompted, choose not to overwrite newer files. This self-extracting executable file will expand out its files to the c:\storage directory.
3. Click **Next** and follow the instructions.

   After the software is installed, the Setup Complete window opens.

   Note: You must restart the host to ensure that all changes take effect.
4. Select **Yes** to restart the host computer.

Installing the SM7agent package

Use the following procedure to install the SM7agent package on a host machine connected to one or more storage subsystems.

The SM7agent package consists of the following components:

- The host-agent software necessary for host-agent management of the storage subsystems.
- The SM7devices utility necessary for relating logical drives to operating system device names. For more information, see “Using the SM7devices utility” on page 76.

Important: You cannot install the SM7agent package unless the RDAC package is installed. The Microsoft Virtual Machine is also a required component for installing and using the SM7agent package.

You must install SM7agent even if you do not intend to manage storage subsystems through the host-agent software.

Installation instructions

1. Select the *<target directory>*\temp\AGENT701 directory.
2. Run the SM7agent-NT-07012501.exe file.

   If prompted to overwrite files, select **Yes to All**. This self-extracting executable file will expand out its files to the c:\storage directory.
3. From the c:\storage directory, run the setup.exe file.
4. Click **Next**.

   The setup Welcome window opens.
5. Click **OK** to begin the installation.

   When the SM7agent package is installed, the Setup Complete window opens.
6. You must restart the host to ensure that all changes take effect. Click **Finish** to restart the host.

Verifying the SM7agent installation

Use the following procedure to verify that the installation was successful.

1. Click **Start** → **Settings** → **Control Panel** → **Services**.

   The services window opens.
2. To ensure that the service is installed, scroll through the list of services until you locate the Netfinity Fibre Channel Storage Manager 7 agent.

   Notes:

   a. If the host-agent does not find controllers connected that have firmware version 4.x installed, the following Service Control Manager message appears:

      ```
      At least one service or driver failed during system startup. Use
      Event Viewer to examine the event log for details.
      ```

   b. An entry similar to the following will be present in the NT system event log regarding the fact that the storage management agent did not start:

Date:	6/14/00	Event ID:	7024
Time:	7:00:38 PM	Source:	Service Control Manager
User:	N/A	Type:	Error
Computer:	FC-PD	Category:	None
Description:			
The Netfinity Fibre Channel Storage Manager 7 Agent service terminated with service-specific error 100.			

At this point this error is expected and can safely be ignored. When the host is connected to a storage subsystem with firmware version 4.x installed, the host-agent will start automatically after the system is restarted.

Note: If you are not using the host-agent software to manage storage systems, you can stop the host-agent service. Select the agent from the list of displayed services, an then select **Stop**.

Installing SM7migrate

Use the following procedure to install SM7migrate on a host computer connected to one or more storage subsystems. SM7migrate is necessary for downloading NVSRAM files and for upgrading controller firmware.

Installation instructions

1. Insert the IBM Netfinity FAStT Storage Manager installation CD into the CD-ROM drive.
2. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.
3. Click **Install** and follow the instructions on the screen.
4. Click **Browse**.

   The Browse window opens.
5. Select the CD-ROM drive.
6. Select the *<target directory>*\temp\MIGRATE701 directory.
7. Run the SM7migrate-NT-07012500.exe file.

   If prompted to overwrite files, select **Yes to All**. This self-extracting executable file will expand out its files to the c:\storage directory.
8. From the c:\storage directory, run **setup.exe**.
9. Select **Next**.

   The setup program's Welcome window opens.
10. Select **OK**.

    The Choose Destination Location window opens.
11. Click **Browse** if you want to change the destination location.
12. Click **Next** to begin the installation.
13. You must restart the host to ensure that all changes take effect. Click **Finish** to restart the host.

Downloading firmware, NVSRAM, and batch files

If you are upgrading previously installed storage subsystems for management with Netfinity FAStT Storage Manager 7.x, you must use SM7migrate to download a default NVSRAM file. The default settings enable the network bit and the bit for creation of an access volume.

1. Copy the NV4766WNT856004.dlp file from the *<target directory>*\Temp\NVSRAM directory to the \Program Files\SM7migrate\native directory.
2. Copy the firmware_03010300.dlp file from the *<target directory>*\temp\FW03010300 to the \Program Files\SM7migrate\native directory.
3. Copy the FW_04000100_04000100.dlp file from the *<target directory>*\temp\FW04000100 directory to the \Program Files\SM7migrate\native directory.
4. Copy the migrate.cmd batch file to the \Program Files\SM7migrate\native directory.
5. Copy the NVutil.exe file to the \Program Files\SM7migrate\native directory.
6. Copy the SetNVSRAM.cmd batch file to the \Program Files\SM7migrate\native directory.

Running the SetNVSRAM.cmd batch file

Before you can upgrade the NVSRAM, the storage subsystems need to be set to report all LUNs (the older version of the NVSRAM limited the storage subsystems to only reporting eight LUNs each). Run the SetNVSRAM batch file to prepare the storage subsystems. This will need to be performed for each storage subsystem on which the NVSRAM will be updated.

Important: You must run the setNVSRAM.cmd batch file. If this step is not performed before you upgrade the NVSRAM, the NVSRAM update could fail.

Note: The batch file performs step 1 and 2.

1. nvutil -o 34=30

   This will set offset 34 in the NVSRAM to 30 so that the storage subsystem reports all LUNs.

2. nvutil -o 34

   This will read back the setting of offset 34 in the NVSRAM of the storage subsystem. This should show ’30’.

3. Power down the host system.
4. Power cycle the storage Raid controllers.
5. Power up the host computer.
6. Confirm that you are ready to proceed with upgrading the NVSRAM.
7. Select **Start** → **Settings** → **Control Panel** → **SCSI Adapters applet**.

   Count the number of devices listed for the FC HBAs that are attached to the RAID controllers in the storage subsystems. There should be 32 devices listed for each RAID controller that each FC HBA can communicate with.

Running the Migrate.cmd batch file

To facilitate the installation of the NVRAMs and firmware files, a batch file has been developed. When this file is run, the procedure steps in “Installing NVSRAM files” on

page 68 and “Upgrading firmware from version 3.x to version 4.x” on page 68 are performed automatically. The batch file steps that correlate to the manual actions are shown next to the commands in “Installing NVSRAM files” on page 68 and “Upgrading firmware from version 3.x to version 4.x” on page 68.

Note: Be sure to use the Migrate.cmd batch file.

Installing NVSRAM files

1. From a DOS command prompt, change to the \Program Files\SM7migrate\native directory.
2. Type:

   `SM7migrate NV4766WNT856004.dlp` (batch file steps 1 and 2)

   The software displays information on each storage subsystem (see product table on page 1) connected to the host computer on which you are running SM7migrate. For example, you might see:

   - `JASON_001:Drive0 Drive8`
   - `MAGGIE_01:Drive16 Drive32`
   - `FRED_001:Drive1 Drive9`

   Note: The first part of the displayed information refers to the storage subsystem name (for example, `JASON_001`). The second part of the displayed information refers to the controllers in the storage subsystem (for example, Drive0 Drive8).

   The software displays the following options:

   `Make Selection: (A)ll Modules, E(x)it, or Module Index Number`
3. Type a number corresponding to one of the Module Index Numbers.

   Important: Do not type `A` to update all modules, this might result in the NVSRAM not being updated properly on all storage subsystem.

   The message `Download to controller drive <n> was successful` is displayed.
4. Run the ClearLocks.bat file located in the \Program Files\SM7migrate\native directory to clean up unnecessary files generated by the firmware migration.
5. Repeat steps 2 to 4 above, making sure that the same Module Index Number is entered as before, to update the NVSRAM on the storage subsystem twice.

   Note: This is batch file step 2.

   Important: This second update of the NVSRAM must be performed due to a timing window that exists that might prevent the NVSRAM from being updated properly the first time. The second update ensures that the NVSRAM is updated correctly.

   If the message `Download to controller Drive <n> was successful` is not displayed, stop the migration process and contact IBM service.
6. Repeat steps 2 through 5 above for each storage subsystem that you wish to manage with Storage Manager 7.01.

Upgrading firmware from version 3.x to version 4.x

Storage Manager 7.01 only manages storage subsystems with controllers using firmware version 4.x. If you want to manage controllers with Storage Manager 7.01, use SM7migrate to upgrade the firmware on those controllers from version 3.x to version 4.x. Depending on the version of the firmware currently installed on the controllers, this might be a two-part process:

- Upgrading from version 3.*x* to 3.1.3 (the “stepping stone” for upgrading to version 4.x)
- Upgrading from version 3.1.3 to version 4.x

Use the following procedure to use the SM7migrate utility to upgrade controller firmware from version 3.x to version 3.1.3. (This is the “stepping stone” for upgrading to version 4.x.)

Attention: Do not use SM7migrate to upgrade firmware directly from version 3.01.x to version 4.x because you might lose communication with the controllers in the storage subsystem.

1. From the DOS command prompt, change to the \Program Files\SM7migrate\native directory.
2. Type:

   `SM7migrate firmware_03010300.dlp` (batch file step 3)

   The software displays information on each storage subsystem connected to the host computer on which you are running SM7migrate. For example, you might see:

   - `JASON_001:Drive0 Drive8`
   - `MAGGIE_01:Drive16 Drive32`
   - `FRED_001:Drive1 Drive9`

   Note: The first part of the displayed information refers to the storage subsystem name (for example, `JASON_001`). The second part of the displayed information refers to the controllers in the storage subsystem (for example, Drive0 Drive8).

   The software displays the following options:

   `Make Selection: (A)ll Modules, E(x)it, or Module Index Number.`
3. Type a number corresponding to one of the Module index numbers.

   Notes:

   a. Do not type `A` to update all modules, this might result in the NVSRAM not

      being updated properly on all storage subsystems.

      `Download to controller Drive <n> was successful` is displayed.

   b. If you receive an error message that the filename you typed is not a downloadable file, check to make sure that the .dlp file is in the \Program Files\SM7migrate\native directory. If you placed the file in another directory, move it to the \Program Files\SM7migrate\native directory and try the migration procedure again.

   c. If the message `Download successful` is not displayed, stop the migration process and contact IBM service.
4. Run the ClearLocks script located in the \SM7migrate\native directory to clean up unnecessary files generated by the firmware migration.
5. Repeat steps b through d above for each storage subsystem that you wish to manage with Storage Manager 7.01.

6. Restart the system.
7. Complete the following procedure to use the SM7migrate utility to upgrade controller firmware from version 3.1.3 to version 4.x:
   a. From a DOS command prompt, change to the \Program Files\SM7migrate\native directory.
   b. Type:

      `SM7migrate FW_04000100_04000100.dlp` (batch file step 4)

      The software displays information on each storage subsystem connected to the host machine on which you are running SM7migrate. For example, you might see:

      - `JASON_001:Drive0 Drive8`
      - `MAGGIE_01:Drive16 Drive32`
      - `FRED_001:Drive1 Drive9`

      Note: The first part of the displayed information refers to the storage subsystem name (for example, `JASON_001`). The second part of the displayed information refers to the controllers in the storage subsystem (for example, `Drive0 Drive8`).

      The software displays the following options:

      `Make Selection: (A)ll Modules, E(x)it, or Module Index Number`

   c. Type a number corresponding to one of the Module index numbers.

      Important notes:

      - Do not type A to update all modules, this may result in the NVSRAM not being updated properly on all storage subsystems.

        The message `Download to controller Drive <n> was successful` is displayed.
      - If you receive an error message that the filename you typed is not a downloadable file, check to make sure that the .dlp file is in the \Program Files\SM7migrate\native directory. If you placed the file in another directory, move it to the \Program Files\SM7migrate\native directory and try the migration procedure again.
      - If the message `Download successful` is not displayed, stop the migration process and contact IBM service.

   d. Run the ClearLocks script located in the \SM7migrate\native directory to clean up unnecessary files generated by the firmware migration.
   e. Repeat steps b through d above for each storage subsystem that you wish to manage with Storage Manager 7.01.
   f. Restart the system.

Applying NVSRAM configuration scripts

After the system has restarted, three NVSRAM configuration scripts must be run to configure the storage subsystem for use with Windows NT 4.0 hosts in a non-clustered environment. Use the following procedure to apply these scripts:

1. Run *<target directory>*\Temp\SCRIPTS\SM7Scripts.exe. This self-extracting file will extract the NVSRAM configuration script files. Select a target directory and click **Unzip**.

- This will create the following directory structure under the target extraction directory:

```
                    Directory of <target directory>
04/25/00  05:25p                       321 clusteringoff.scr
04/25/00  05:22p                       423 clusteringon.scr
Comment: Executed to enable the proper operation of MS Clustering
04/21/00  03:48p                       246 lun0off.scr
04/21/00  03:48p                       245 lun0on.scr
Comment: Executed to manage the default creation of LUN 0
04/21/00  03:53p                       248 networkoff.scr
04/21/00  03:54p                       248 networkon.scr
Comment: Executed to enable\disable the Network capabilities of the
controllers
04/21/00  03:56p                       248 propresetoff.scr
04/25/00  05:21p                       248 propreseton.scr
Comment: Executed to enable\disable the "Propagated Reset" between controllers
04/21/00  03:52p                       252 softresetoff.scr
04/21/00  03:51p                       253 softreseton.scr
Comment: Executed to set the interpretation of a Target Reset to either soft of
hard resets either soft of hard resets.
04/25/00  05:39p                       398 UnixWare.scr
03/31/00  12:01p                       317 Novell.scr
04/25/00  05:42p                       654 FactoryDefaults.scr
05/02/00  11:47a                       405 Windows2000.scr
05/02/00  11:47a                       402 WinNT4.scr
Comment: Executed to set the controllers to the Factory defaults and to set the
Inquiry data to conform to the OS requirements.
```

2. Select **Start** → **Programs** → **Netfinity Fibre Channel Storage Manager 7**.
3. After the Netfinity Fibre Channel Storage Manager 7 program starts, you will be prompted with the following message:

```
          Confirm Initial Automatic Discovery

The Enterprise Management Window is not configured to
monitor any devices.

Select Yes to be in an automatic discover on the local
sub-network; this may take several minutes. Select No to
bypass the automatic discover process.


<Yes>              <No>              <Help>
```

   Select **Yes**.

   If you select **No**, you can still use the **Edit** → **Add Device** option to manually add the devices.

   The storage subsystems that are at firmware level 4.x will be automatically discovered.

4. In the right hand pane of the Netfinity Fibre Channel Storage Manager 7 (Enterprise Management) window, right-click on a storage subsystem, and select **Execute Script** in the resulting pop-up menu.

   The Script Editor window opens.

5. From the Script Editor window menu select **File** → **Load Script**.

   If prompted to save changes to newscript.scr, select **No**.
6. In Load Script window, select the *<target directory>*\FactoryDefaults.scr file and select **Open**.
7. From the Script Editor window menu, select **Tools** → **Verify and Execute**.

   `Script execution complete` will be displayed in the lower pane of the Script Editor window.
8. From the Script Editor window, select **File** → **Load Script**.

   If prompted to save changes to newscript.scr, select **No**.
9. In the Load Script window, select the *<target directory>*\WinNT4.scr file and then, select **Open**.
10. From the Script Editor window, select **Tools** → **Verify and Execute**.

    `Script execution complete` will be displayed in the lower pane of the Script Editor window.
11. From the Script Editor window, select **File** → **Load Script**.

    If prompted to save changes to newscript.scr, select **No**.
12. In Load Script window, select the *<target directory>*\softreseton.scr file and then, select **Open**.
13. From the Script Editor window, select **Tools** → **Verify and Execute**.

    `Script execution complete` will be displayed in the lower pane of the Script Editor window.

Cleaning up

1. Uninstall SM7migrate.
2. The migration is complete. You can begin using Storage Manager 7.01 to manage the storage subsystems that are at firmware level 4.x.

Chapter 7. Operating-system support

This chapter contains information that is related to operating the storage-management software with Windows NT.

Windows NT restrictions

Important: Always check for a README file on any installation media. This README file might contain important information that was not available when this *Installation and Support Guide* was prepared.

Table 13 explains the restrictions that apply when you use the Netfinity FAStT Storage Manager Version 7.02 with Windows NT.

Table 13. Windows NT restrictions and notes

Restriction	Workaround
Clicking a vertical scroll arrow (either up or down) causes the scroll box to move all the way to the opposite end of the scroll bar.	This is a known defect in the Java Runtime Environment. Click the scroll box and slide it until you reach the desired position in the Help window.
Logical drive migration (removing a set of drives configured with logical drives from one storage subsystem to insert in another storage subsystem) is not supported because it could cause loss of configuration.	Call for service.
If you manage storage subsystems through the host-agent software and use the storage management software to download controller firmware, the download process can take up to 10 minutes to complete.	None.
If you configure a new storage subsystem with a single controller, you must place the controller in (slot A). The controller firmware cannot recognize or communicate with a single controller until slot A is populated. This restriction does not apply to storage subsystems that were originally configured with two controllers.	None.
A public loop configuration (managed hubs attached to switches) is not supported.	None.
If you remove a fan or power supply (CRU) from a storage subsystem while the system is running, the storage-management software does not report an error message, and the component is not reported as missing. **Note:** Fan and power supply CRU failures are reported.	Replace the missing fan or power supply CRUs immediately to ensure redundancy. Make sure that the fan or power supply CRU is properly seated in the controller unit.

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Number of supported logical drives

The supported logical drive limits are as follows:

- Windows NT with Service Pack 5 or greater will support up to 8 logical drives per storage subsystem (LUNs 0–7).
- Windows NT with Service Pack 5 supports up to 32 logical drives per storage subsystem (LUNs 0–31) if the host adapter also supports large LUNs and is configured correctly.
- Host adapters support a maximum number of logical drives. Refer to the host-adapter documentation for specific information.
- The host-agent management method uses a special logical drive, called an access volume, to communicate with the controllers on the storage subsystem. The access volume uses one of the allowable logical drives. Therefore, managing storage subsystems with the host-agent software limits you to one fewer LUN than the maximum number that is supported by Windows NT and the host adapter.

Creating logical drives

A *logical drive* is a logical object that is the basic structure that you create to store data on the storage subsystem. A logical drive is configured across an array with a specific RAID level to meet application needs for data availability and Fibre Channel I/O performance. A logical drive is recognized by the operating system as one drive.

You can add or delete logical drives in a standard (noncluster) configuration and in a cluster server environment.

Standard configuration

When you create new logical drives with the storage-management software, you must add the new logical drives to Windows NT. Refer to the Windows NT documentation for details about adding a drive. Remember that each logical drive (not array) is recognized by Windows NT as one drive. After creating logical drives, run the Hot Add and SM7devices utilities that are provided with the storage-management software. The Hot Add utility adds newly created logical drives to the operating system, and the SM7devices utility identifies logical drives by their associated operating system device names. For information about using these utilities, see “Using the Hot Add utility” on page 75 and “Using the SM7devices utility” on page 76.

Before either deleting logical drives with the storage-management software or using **Configure** → **Reset Configuration**, stop all input and output activity to the affected storage subsystem. Then use Disk Administrator to delete any partitions and to unassign drive letters that are associated with the logical drives.

Attention: If you do *not* use Disk Administrator first, registry information will be damaged.

Cluster server environment

When you create logical drives on one node in a cluster server environment, you must assign the same drive letter on the other node as well. After creating logical drives, run the Hot Add and SM7devices utilities that are provided with the storage-management software. The Hot Add utility adds newly created logical drives to the operating system, and the SM7devices utility identifies logical drives by their associated operating system device names. For information about using these

utilities, see “Using the Hot Add utility” on page 75 and “Using the SM7devices utility” on page 76.

Use the following procedure to add logical drives in a cluster server environment:

1. Use the storage-management software to create a new logical drive. For specific instructions, refer to the Subsystem Management online Help.
2. Use the Hot Add utility to add the logical drive on Node A.
3. Use Disk Administrator on Node A to format the new logical drive.
4. Use the Hot Add utility to add the logical drive on Node B.
5. Use Disk Administrator on Node B to assign the same drive letter to the new logical drive as the one it has on Node A.
6. Start the Cluster Administrator on Node B, and use it to stop the cluster service.
7. Click **Node B** → **File Stop** → **Cluster Service**.
8. In Cluster Administrator, click **Node B**, and then click **File** → **Evict Cluster Node**.
9. Restart Node A.
10. On Node A, use Cluster Administrator either to create a new array or select an existing array to which you can add the new logical drive.
11. Select the array, and click **File** → **New** → **Resource**.
12. Name the new resource and click Physical Disk as the resource type.
13. Click **Next**.
14. Click **Node A** as the disk resource owner, and then click **Next**.
15. Specify any dependencies (other resources that Cluster Administrator must bring online) before this new disk resource is brought online.
16. Select the new disk from the drive parameter list, and then click **Finish**.
17. Uninstall the Cluster Server software from Node B.
18. Reinstall the Cluster Server software on Node B, and join the existing cluster that includes Node A.

Important: Edit the properties of the new disk to enable Node B to be a possible owner of the resource. You can redistribute the cluster resources between Nodes A and B and edit the properties of all cluster resources to include Node B. Move any cluster resources that belong to Node B from Node A back to Node B.

Using the Hot Add utility

The RDAC software includes a utility called Hot Add that you can use to add new logical drives dynamically without restarting the system. The utility registers the new logical drives with the operating system so that you can use Disk Administrator to create partitions, add device names, and so on. The Hot Add utility is installed as part of the RDAC package.

After you finish creating the logical drives on a particular storage subsystem, go to the host that is attached to that storage subsystem, and perform the following steps to use the hot add utility:

1. From a DOS command prompt, type:

   ```
   hot_add
   ```

2. Press Enter.

   The new logical drives are available through the Disk Administrator.

Using the SM7devices utility

The SM7agent software includes a utility called SM7devices that you can use to view the storage subsystem logical drive that is associated with a particular operating system device name. This capability is helpful when you want to create drive letters or partitions for the logical drive using Disk Administrator.

After you finish creating the logical drives on a particular storage subsystem, go to the host that is attached to that storage subsystem, and perform the following steps to use SM7devices:

1. From a DOS command prompt, change to the \Program Files\SM7agent directory.
2. Type:

   ```
   SM7devices
   ```

3. Press Enter.

   The software displays device identification information. For example, you might see:

   ```
   \\.\PHYSICALDRIVE0 [Storage Subsystem Finance, Logical Drive DEBIT, LUN
   0, WWN <600a0b80000602860000000382060eb>]
   \\.\PHYSICALDRIVE1 [Storage Subsystem Finance, Logical Drive CREDIT, LUN
   1, WWN <600a0b70006028600000000392060eb>]
   ```

   Where PHYSICALDRIVE*x* = Disk*x* in Disk Administrator
   Storage Subsystem*x* = the storage subsystem name
   Logical Drive*x*= the logical drive name
   LUN*x* = the logical unit number associated with the logical drive
   WWN*x* = the worldwide name for the logical drive

Uninstalling storage-management software components

Use the following procedure if you need to uninstall one or more of the components of Storage Manager 7.02.

Attention: Do not uninstall the RDAC component unless instructed to do so by IBM service personnel. The host-agent package requires RDAC to function properly. If you uninstall RDAC in a coexistence environment, you will loose Fibre Channel I/O path failover support for both Storage Manager 7.02 and storage-management software version 6.22.

1. Click **Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.

   The Add/Remove Programs Properties window opens.

2. From the list of programs, select the component that you want to uninstall.

   For example, select Fibre Channel Storage Manager 7 Client.

3. Click **Add/Remove.**

   The Confirm File Deletion window opens.

4. Click **Yes** to start the uninstallation process.
5. When the uninstallation is completed, click **OK.**

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Appendix B. Storage subsystem/controller information record

Table 14 provides a data sheet on which you can record storage subsystem names, management types, hardware Ethernet addresses, and IP addresses. Make a copy of this table and complete the information for your storage subsystems and controllers. Use the information that is recorded in Table 14 to set up the BOOTP table for the network server and the host or Domain Name System (DNS) table. The information in Table 14 helps you add storage subsystems after initial installation. The column headings show a page reference for detailed instructions about obtaining the information. For a sample information record, see Table 9 on page 18.

Table 14. Storage subsystem and controller information record

Storage subsystem name (see page 18)	**Management type (see page 15)**	**Controllers—Ethernet and IP addresses, and host name (see pages 19 and 20)**		**Host—IP address and host name (see page 20)**
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				
Storage subsystem name:				

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