Dell™ PowerVault™ 720N, 740N, and 760N

USER'S GUIDE

www.dell.com

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Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your computer or storage system from potential damage.

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks of text are notes, cautions, and warnings, and they are used as follows:

NOTE: A NOTE contains important information that helps you install or operate the system efficiently.

CAUTION: A CAUTION contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING: A WARNING contains instructions that you must follow to avoid personal injury.

Safety Warnings

Observe the following warnings while servicing this system:

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

WARNING: The power supplies in your computer or storage system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

WARNING: This system may have more than one power supply cable. To reduce the risk of electrical shock, a trained service technician must disconnect all power supply cables before servicing the system.

DŮLEŽITÉ UPOZORNĚNÍ: Tento systém může mít více napájecích kabelů. Ke snížení rizika úrazu elektrickým proudem je nutné, aby školený servisní technik před prováděním servisu systému odpojil všechny napájecí kabely.

ADVARSEL: Dette system kan have mere end et strømforsyningskabel. For at reducere risikoen for elektrisk stød, bør en professionel servicetekniker frakoble alle strømforsyningskabler, før systemet serviceres.

VAROITUS: Tässä järjestelmässä voi olla useampi kuin yksi virtajohto. Sähköiskuvaaran pienentämiseksi ammattitaitoisen huoltohenkilön on irrotettava kaikki virtajohdot ennen järjestelmän huoltamista.

ПРЕДУПРЕЖДЕНИЕ: Данная система может иметь несколько кабелей электропитания. Во избежание электрического удара квалифицированный техник должен отключить все кабели электропитания прежде, чем приступить к обслуживанию системы.

OSTRZEŻENIE: System ten może mieć więcej niż jeden kabel zasilania. Aby zmniejszyć ryzyko porażenia prądem, przed naprawą lub konserwacją systemu wszystkie kable zasilania powinny być odłączone przez przeszkolonego technika obsługi.

ADVARSEL! Det er mulig at dette systemet har mer enn én strømledning. Unngå fare for støt: En erfaren servicetekniker må koble fra alle strømledninger før det utføres service på systemet.

VARNING: Detta system kan ha flera nätkablar. En behörig servicetekniker måste koppla loss alla nätkablar innan service utförs för att minska risken för elektriska stötar.

Additional Safety Precautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

General Precautions

Observe the following general precautions for using and working with your system:

- Observe and follow service markings. Do not service any Dell product except as explained in your Dell system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a Dell authorized service technician.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your Dell authorized service provider:
  - — The power cable, extension cord, or plug is damaged.
  - — An object has fallen into the product.
  - — The product has been exposed to water.

- The product has been dropped or damaged.
- The product does not operate correctly when you follow the operating instructions.

- Keep your system components away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the computer gets wet, see the appropriate chapter in your troubleshooting guide or contact a Dell-authorized service provider.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with Dell products or other Dell-approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your Dell service provider or local power company.
- To help avoid damaging your system components, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:
  - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
  - 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure that your monitor and attached peripherals are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your computer or storage system or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system components and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cord, use a three-wire cord with properly grounded plugs.
- Observe extension cord and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cord or power strip does not exceed 80 percent of the extension cord or power strip ampere ratings limit.

- Do not use appliance/voltage converters or kits sold for appliances with your Dell product.
- To help protect your system components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position cables and power cords carefully; route cables and the power cord and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your system components' cables or power cord.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.
- Turn down the volume before using headphones or other audio devices.

Precautions for Server and Storage Systems

Observe the following additional safety guidelines for your system:

- Unless your installation and/or troubleshooting documentation specifically allows it, do not remove enclosure covers, attempt to override the safety interlocks, or access any components inside the system. Depending on your system, installation and repairs may be done only by individuals who are qualified to service your computer or storage system equipment and trained to deal with products capable of producing hazardous energy levels.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your Dell product, observe the following guidelines:
  - — Install the power supply before connecting the power cable to the power supply.
  - — Unplug the power cable before removing the power supply.
  - — If the system has multiple sources of power, disconnect power from the system by unplugging *all* power cables from the power supplies.
- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the computer or storage system. Avoid sudden stops and uneven surfaces.

Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.

WARNING: After installing system components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.

NOTE: Dell's server and storage systems are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.
- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.
- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Extend only one component at a time from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
- Ensure that proper airflow is provided to components in the rack.
- Do not step on or stand on any system/component when servicing other systems/components in a rack.

Precautions for Products With Modems, Telecommunications, or Local Area Network Options

Observe the following guidelines when working with options:

- Do not connect or use a modem or telephone during a lightning storm. There may be a risk of electrical shock from lightning.
- Never connect or use a modem or telephone in a wet environment.
- Do not plug a modem or telephone cable into the network interface controller (NIC) receptacle.
- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.
- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

Precautions for Products With Laser Devices

Observe the following precautions for laser devices:

- Do not open any panels, operate controls, make adjustments, or perform procedures on a laser device other than those specified in the product's documentation.
- Only authorized service technicians should repair laser devices.

When Working Inside Your Computer

Before you remove the computer covers, perform the following steps in the sequence indicated.

WARNING: Some Dell systems can be serviced only by trained service technicians because of high voltages and energy hazards. Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.

CAUTION: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

1. Turn off your computer and any peripherals.
2. Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

3. Disconnect your computer and peripherals from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following notice may appear throughout this document to remind you of these precautions:

WARNING: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

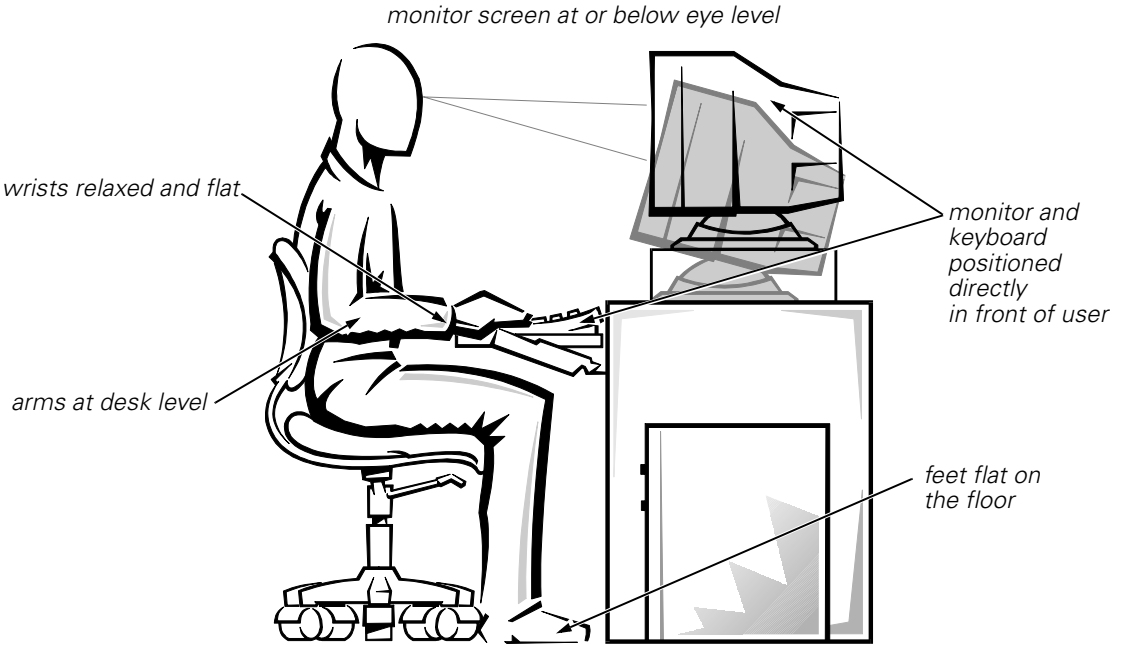
Ergonomic Computing Habits

WARNING: Improper or prolonged keyboard use may result in injury.

WARNING: Viewing the monitor screen for extended periods of time may result in eye strain.

For comfort and efficiency, observe the following ergonomic guidelines when you set up and use your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure that the monitor screen is at eye level or slightly lower when you sit in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while you use the keyboard or mouse.
- Always leave space to rest your hands while you use the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.



Preface

About This Guide

This guide is intended for anyone who configures and operates a new Dell PowerVault 720N, 740N, or 760N filer that runs Data ONTAP 5.3 software.

It can be used by system administrators who are familiar with operating systems that run on the filer's clients, such as UNIX, Windows 9*x*, and Windows NT and with how the Network File System (NFS), Common Internet File System (CIFS), and Hypertext Transfer Protocol (HTTP) protocols are used for file sharing or transfers. This guide doesn't cover basic system or network administration topics, such as Internet Protocol (IP) addressing, routing, and network topology.

The guide provides information about configuring the filer using both the Setup Wizard and the `setup` command. It is organized in the following sections:

- Chapter 1 introduces the standard features of the filer and provides a description of the software media for the filer.
- Chapters 2 and 3 describe how to configure the software using the Setup Wizard.
- Chapter 4 describes how to configure the software using the `setup` command.
- Chapters 5 through 9 provide additional information for configuration for both Setup Wizard and `setup` command users.
- Chapter 10 provides information about installing SecureShare if you used the `setup` command; if you used the Setup Wizard, SecureShare was automatically installed.
- Appendix A, "Technical Specifications," summarizes the technical specifications of the PowerVault 720N, 740N, and 760N storage systems.
- Appendix B, "Installing PowerVault Filer Software," provides instructions for installing the Data ONTAP 5.3 software.
- Appendix C, "Preparing for CIFS Configuration," provides information about deciding on a domain or workgroup configuration, choosing between PC-style or UNIX-style permissions, and adding the filer to a Windows NT domain.
- Appendix D, "Time Zones," provides the time zones needed for the setup prompt.

- Appendix E, "Regulatory Notices," is for users who are interested in which regulatory agencies have tested and approved the Dell PowerVault 720N, 740N, and 760N filers.
- Appendix F, "Warranty, Return Policy, and Year 2000 Statement of Compliance," describes the warranty for your Dell system and the "Total Satisfaction" Return Policy.
- The glossary provides definitions of terms, acronyms, and abbreviations used in this guide.

Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your system, see Appendix F, "Warranty, Return Policy, and Year 2000 Statement of Compliance."

Other Documents You May Need

Besides this *User's Guide*, the following documentation is included with your system:

- The *Getting Started* document provides step-by-step instructions for setting up your computer system.
- The *Quick Reference* card provides the filer commands and command options.
- The *Installation and Troubleshooting Guide* provides instructions for installing system hardware and includes troubleshooting and diagnostic procedures for testing your computer system.
- The *System Administrator and Command Reference Guide* provides information about how to configure, operate, and manage Dell PowerVault 720N, 740N, and 760N filers that run Data ONTAP 5.3 software. It also contains the user commands.

You may also have one or more of the following documents.

NOTE: Documentation updates are sometimes included with your system to describe changes to your system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain the latest information.*

- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options. Installation instructions for the options are included in the *Installation and Troubleshooting Guide*.
- Technical information files—sometimes called "readme" files—may be installed on your root volume to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

Terminology Conventions

This guide uses the following terms:

- *Filer* refers to a PowerVault 720N, 740N, or 760N storage system.
- *System* refers, at a minimum, to a filer and a connected PowerVault 700N Disk Array Enclosure (DAE) storage system. A tape backup device can also be a component of the system, but is not required.

Notational Conventions

You can enter filer commands on either the console or from any client computer that can access the filer through `telnet`.

In examples that illustrate commands executed on a UNIX workstation, this guide uses the command syntax of SunOS 4.1.*x*. The command syntax and output might differ, depending on your version of UNIX.

This guide uses the term "type" to mean pressing one or more keys on the keyboard. It uses the term "enter" to mean pressing one or more keys and then pressing the Enter key.

Key Combinations

When describing key combinations, this guide uses the hyphen (-) to separate individual keys. For example, "Ctrl-D" means pressing the "Control" and "D" keys simultaneously. Also, this guide uses the term "Enter" to refer to the key that generates a carriage return, although the key is named "Return" on some keyboards.

Typographical Conventions

Typographical conventions used in this guide are shown in the following table:

Convention	Type of Information
Italic type	Words or characters that require special attention.
	File names.
	Placeholders for information you must supply. For example, if the guide says to enter the `arp -d` *`hostname`* command, you enter the characters "arp -d" followed by the actual name of the host.
	Man page names.
	Book titles in cross-references.

Convention	Type of Information
`Monospaced` font	Command and daemon names. Information displayed on the system console or other computer monitors. The contents of files.
`Bold monospaced` font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters.

Special Messages

This guide contains special messages that are described as follows:

NOTE: A NOTE contains important information that helps you install or operate the system efficiently.

CAUTION: A CAUTION contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING: A WARNING contains instructions that you must follow to avoid personal injury.

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CHAPTER 1
Filer Features and Software

Standard Features of the Filer

Figure 1-1 shows the standard features that you can see from the front panel of the Dell™ PowerVault™ 720N, 740N, or 760N filer.

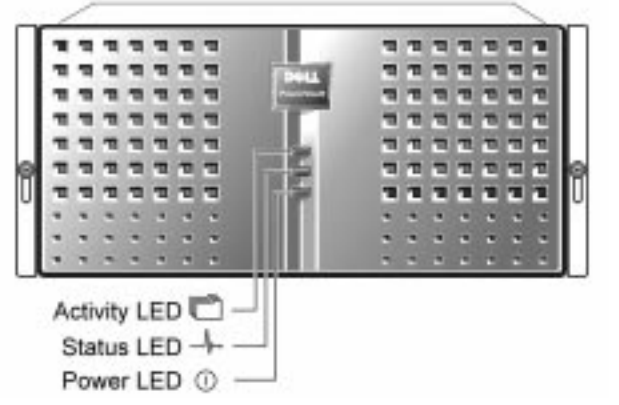


Figure 1-1. Filer Features

Filer Software Description

About the Software

The filer was shipped with a CD and system boot diskettes. Because system software has been installed at the factory, you don't need the CD or system boot diskettes to install or configure a new filer.

Store the filer software in a safe place so that you can use it to recover in case of a software problem in the future.

CD and Diskette Contents

Table 1-1 describes the CD and system boot diskettes:

Table 1-1. Filer CD and Diskettes

Package Item	Contents
Data ONTAP 5.3 CD	This CD contains the system software and documentation. If you need to reinstall the system software for any reason, you need this CD; call Dell technical support for instructions before reinstalling system software on the filer. The Data ONTAP 5.3 CD contains the system files and system boot software in two formats so that it can be read by both UNIX® and PC workstations. For full information about the contents of the CD, read the file named *contents.txt* on the CD.
System boot diskettes	If the filer fails to boot from hard disk, or if you forget your password, you must boot the filer from the system boot diskettes.
Custom MIB	Use this Management Information Base (MIB) with SNMP to get detailed information about filer operation. For further information, see your *System Administrator and Command Reference Guide*.

Software Updates

Dell regularly makes software updates available to customers who purchase software support agreements.

You can find information about the latest software updates at Dell's World Wide Web site at **http://www.dell.com**.

CHAPTER 2
Setup Wizard — Introduction

Overview

The Setup Wizard provides an easy to use Web-based method of configuring the basic settings for a new filer.

The configuration method using the `setup` command is different from the Setup Wizard configuration method in these ways:

- Uses command-line installation and configuration commands to install and configure the new filer
- Provides limited on-line help

The Setup Wizard uses the network and a Web browser to perform the initial basic setup for filers, eliminating the need for the command-line setup. The Setup Wizard contains context-sensitive help for each field on each page.

After you finish the basic configuration, you can use the Web-based FilerView™ tool to complete other types of configurations you might need on this filer. FilerView also uses the network and a Web browser to perform general management tasks.

Prerequisites to Using the Setup Wizard

The Setup Wizard needs an IP address to begin the configuration process, which you can obtain using either of the following methods:

- An existing Dynamic Host Configuration Protocol (DHCP) server on your network during initial boot of the new filer.
- If the filer can't find or obtain an IP address from the DHCP server, the normal `setup` script, using a console connected to the filer, prompts you for several pieces of information, including an IP address, and then asks whether you want to use the Setup Wizard. This method works with any filer; however, you must have a console connected to the filer for the initial few pieces of setup information.

Restriction on Using Setup Wizard

If you don't want to switch from the console to the Web-based wizard to do the configuration (when you are not using a DHCP server), you should use the `setup` command configuration that is discussed in Chapter 4, "setup Command — Introduction."

About Basic Configuration Using Setup Wizard

The Setup Wizard uses multiple Web pages with a limited number of questions per page to set up the filer. On-line context-sensitive help is available for each field that you need to respond to. The Setup Wizard covers protocol licensing, based on what you purchased; administration setup; DNS, NIS, and Windows NT setup; and routing and email gateway setup.

CHAPTER 3
Setup Wizard — Basic Configuration of the Filer

Beginning the Configuration

Steps to Configuration

There are several steps to performing the basic configuration of a new filer:

- Providing the filer with an IP address
- Using the Setup Wizard to do the configuration
- Verifying the configuration of the filer

How to Provide an IP Address

There are two methods to providing the filer with an IP address:

Using DHCP to Obtain the IP Address for the New Filer

To use the DHCP server to obtain an IP address for the filer, you need to ensure that the following DHCP configuration exists:

- You need the MAC address from the filer's *e0* interface before you turn on and configure your filer. You need to manually allocate a static IP address on the DHCP server.

  The *e0* MAC address is printed on a label on the back of the filer's PCB carrier, in the upper left-hand corner.

- Use the *e0* MAC address to manually allocate a static IP address on the DHCP server for your filer; or provide your DHCP administrator with the information to perform this task. The DHCP server uses the *e0* MAC address to identify the filer when it boots.

  To avoid IP address conflicts, use a static IP address on your DHCP server. If you use a dynamic IP address, the filer does not release that address when its lease expires. The lease is a predetermined expiration time set on the DHCP server.

  If you are using DHCP to obtain the IP address for the filer, see "Using Setup Wizard on a Filer With a DHCP Server."

Entering a Static IP Address for the New Filer

If you are not using DHCP to obtain the IP address for the filer, see "Using Setup Wizard on a New Filer Without a DHCP Server."

How to Use the Setup Wizard

After you have the IP address for the new filer, you can point your browser to the URL address on the filer to start the Setup Wizard. You follow the pages of prompts to complete the configuration. Each prompt field has its own context-sensitive help screen if you need more information than the prompt gives.

The last page of the wizard displays all the configuration settings you provided and enables you to make any changes you might want to make. You can click the field you want to change; the wizard takes you to that specific page.

After you finish making any changes necessary, you click Finish and the Setup Wizard configures the filer. After the Setup Wizard finishes, the filer is ready for use.

How to Verify the Configuration

You can verify that the configuration is successful by using `ping` to see that all network interfaces are up and working.

Using Setup Wizard on a Filer With a DHCP Server

Description

This procedure configures a PowerVault 720N, 740N, or a 760N filer using the Setup Wizard. After you complete this procedure, the filer is running the protocols for which you purchased licenses, and is configured and ready for use.

Prerequisites

You need the following requirements completed before you begin the procedure:

- A static IP address on your DHCP server set up before you begin the filer configuration
- The new filer attached to the network
- A client browser on the same network as the filer's *e0* network

Restrictions

If your new filer will be using virtual interfaces, use the procedure documented in "Using Setup Wizard on a New Filer Without a DHCP Server."

Steps

To begin the configuration, perform the following steps:

1. Turn on the filer's power switch to begin the configuration process.

   The first time the filer boots, it contacts the DHCP server and requests an IP address. The DHCP server supplies the static IP address you configured it with.

2. From a client on the same network, point a web browser to

   http://filer-name/api

   or

   http://filer-ip-address/api

   Replace *filer-name* or filer-*ip-address* with either the name of the filer or the filer's IP address that you set up in the DHCP server.

   The Setup Wizard loads.

3. Enter the information as requested.

Results

After you finish configuring the filer, it is on-line. The following directories exist on the filer:

/vol/vol0
/vol/vol0/home

NOTE: /vol is not a directory—it is a special virtual root path under which the filer mounts its volumes. You cannot mount /vol to view all the volumes on the filer; you must mount each filer volume separately.

If you purchased a license for the NFS protocol, */vol/vol0* is exported to the administration host for root access; */vol0/home* is exported to the administration host for root access and to all clients for general access. Paths such as */etc/passwd* are referenced as */vol/vol0/etc/passwd*.

If you purchased a license for the CIFS protocol, */vol/vol0* is shared as C$; only the system administrator with the root password has read and write access to the C$ share. The */vol/vol0/home* directory is shared as HOME without access granted to anyone.

Where to Go From Here

Verify the network connections of your new filer using the procedure in "Verifying Network Connections."

Using Setup Wizard on a New Filer Without a DHCP Server

Description

This procedure enables you to use the Setup Wizard on a new filer without using a DHCP server to obtain the new filer's IP address. This procedure also enables you to set up virtual interfaces in your new filer.

After you complete this procedure, the filer is running the protocols for which you purchased licenses, and is configured and ready for use.

Prerequisites

You need the following requirements completed before you begin the procedure:

- Installed filer hardware and the serial console attached to the filer according to the instructions in your hardware guide
- The new filer attached to the network
- A client browser on the same network as the filer's *e0* network

Steps

To give the filer an IP address and to use the Setup Wizard to configure the filer, perform the following steps:

1. Turn on the filer's power switch to begin the configuration process.

   The first time the filer boots up, it runs setup.

   If setup does not run automatically, enter **`setup`** and press Enter.

2. Enter the information as requested.

   The following prompt is displayed:

   ```
   Would you like to continue setup through the web
   interface? [n]
   ```

3. Enter **`yes`** to continue the setup using the Setup Wizard.

   The wizard displays the following message:

   ```
   Point a web browser to
        http://filer-name/api
   or
        http://filer-ip-address/api
   to complete setup.
   ```

4. From a client attached to the network, point your browser to the filer address given; the Setup Wizard loads.

5. Enter the information as requested.

Where to Go From Here

Verify the network connections of your new filer using the procedure in "Verifying Network Connections."

Verifying Network Connections

Description

After you configure the filer, you use the `ping` command from a client attached to the network to verify that the filer is set up correctly and can communicate with other computers on the network.

Steps

To verify filer communication, perform the following steps:

1. At a client attached to the network, enter the following command:

   `ping <filer ipaddress>`

2. Replace *`<filer ipaddress>`* with the Internet protocol (IP) address that you assigned the filer.

3. Repeat the test for each interface that is installed in the filer.

Examples

The following examples test the network connections for a filer that has the host name *filer* with two interfaces named *e0* and *f0* installed:

```
ping filer-e0

ping filer-f0
```

Troubleshooting

If an interface does not respond to a `ping` command, make sure that:

- The interface is securely attached to the network.
- The media type is set up correctly if the interface is on an Ethernet card containing different media connectors.
- The routers function properly with correct routing information if the `ping` command is issued from a network not directly attached to the interface.

Where to Go From Here

You have completed the configuration using the Setup Wizard. Go to Chapter 5, "Using FilerView."

CHAPTER 4
setup Command — Introduction

Overview

Configuration Process

To configure a new filer for the first time, perform the following steps. Some of the procedures are optional, depending on the filer options that you purchased.

1. Set up DHCP.

   If you want to use the Dynamic Host Configuration Protocol (DHCP) to configure the filer's onboard interface (*e0*), follow the instructions in "Using DHCP With the Filer."

   Using DHCP to assign an IP address to a filer enables you to use a Telnet client to complete the first-time configuration, rather than having to attach a serial console to the filer to complete the configuration.

2. Add the filer to a Windows NT domain.

   If you purchased a license for the CIFS protocol for your filer and you plan to add the filer to a Windows NT domain, see "Adding the Filer to a Windows NT Domain" in Appendix C.

3. Configure the filer.

   Configure your filer according to the instructions in "Configuring the Filer."

4. Verify the filer's network connections.

   Verify that the filer is communicating on the network by following the instructions in "Verifying Network Connections."

5. Configure HTTP service.

   If you purchased a license for the HTTP protocol for your filer, configure the HTTP options as described in Chapter 6, "Configuring HTTP on the Filer."

6. Set up `passwd` and `group` files.

If you purchased a license for the CIFS protocol for your filer and you are not using a Windows NT domain controller to authenticate users, configure `passwd` and `group` files according to the instructions in Chapter 7, "Setting Up passwd and group Files."

7. Configure CIFS shares.

   If you purchased a license for the CIFS protocol for your filer, configure CIFS shares so that users can access directories on the filer.

8. Configure clients to access the filer.

   You must configure clients according to the instructions in Chapter 9, "Configuring Clients to Access the Filer," so that they can access information on the filer.

9. Install the SecureShare program on CIFS clients.

   If you purchased a license for the CIFS protocol for your filer, you can install the SecureShare program on Windows clients according to the instructions in Chapter 10, "setup Command — Installing SecureShare," This enables users to view and modify the UNIX permissions and attributes on files stored on the filer.

10. Learn about the Data ONTAP 5.3 software.

    Read Chapter 1, "Filer Features and Software."

11. Learn about FilerView.

    Read Chapter 5, "Configuring the Filer Using FilerView," to learn how to administer your filer using the FilerView Web-based administration tool.

Using DHCP With the Filer

Description

Follow this procedure to use DHCP to assign a static IP address to the onboard interface (*e0*) on a filer during first-time configuration. This procedure enables you to use a Telnet client to access the filer and complete the first-time configuration, rather than having to attach a hard-wired console to the filer. When you use DHCP to assign an IP address to the onboard interface, the filer:

- Obtains the address from the DHCP server when the filer is turned on
- Configures the onboard interface with the IP address
- Becomes accessible to a Telnet client or the Setup Wizard

Prerequisites

To use this procedure, you must have a DHCP server and the filer on the same network segment.

Steps

To use DHCP to assign an IP address to the onboard interface, perform the following steps:

1. Locate the MAC address for the onboard interface by looking for a label on the back of the left side of the filer's PCB carrier, if necessary.
2. Configure the DHCP server to return a static IP address for the interface based on the MAC address for the onboard interface.

CAUTION: The DHCP server must return a static IP address for the interface. If the server returns a dynamic IP address, the filer displays an error message and continues to use the IP address permanently—which can result in an IP address conflict if the DHCP server assigns the IP address dynamically to other clients from time to time.

Configuring the Filer

Description

This procedure describes how to configure your filer whether or not you use DHCP. Complete this procedure after you install your new filer. After you configure your filer, it is visible on your network and available for access by users from their client computers.

Prerequisites

Before you start this procedure, you must:

- Install the filer hardware and the serial console according to the instructions in your hardware guide if you are not using DHCP.
- Complete steps 1 through 3 of "Configuration Process."

Steps

To configure a filer, perform the following steps:

1. Turn on the filer's power switch to begin the configuration process.

   The first time the filer boots:

   - If you followed the steps in "Using DHCP With the Filer," the filer obtains an IP address for the e0 interface.
   - The filer runs the `setup` command.
2. Enter the configuration information as prompted by the `setup` program.

Results

After you finish configuring the filer, it is on-line. The following directories exist on the filer:

/vol/vol0
/vol/vol0/home

NOTE: /vol is not a directory—it is a special virtual root path under which the filer mounts its volumes. You cannot mount /vol to view all the volumes on the filer; you must mount each filer volume separately.

If you purchased a license for the NFS protocol, */vol/vol0* is exported to the administration host for root access; */vol0/home* is exported to the administration host for root access and to all clients for general access.

If you purchased a license for the CIFS protocol, */vol/vol0* is shared as C$; only the system administrator with the root password has read and write access to the C$ share. The */vol/vol0/home* directory is shared as HOME without access granted to anyone.

Verifying Network Connections

Using the ping Command

After you configure the filer, you use the `ping` command from a client attached to the network to verify that the filer can communicate with other computers on the network.

Procedure

To verify filer communication, perform the following steps:

1. At a client attached to the network, enter the following command:

   ping *hostname-interface*

   Replace the variable *hostname* with the host name that you assigned to the filer when you ran `setup`; replace the variable *interface* with one of the interface names that the filer assigned when you ran `setup`.

2. Repeat the test once for each interface that is installed in the filer.

Examples

The following examples test the network connections for a filer that has the host name *filer* with two interfaces named *e0* and *f0* installed:

ping filer-e0

ping filer-f0

How to Troubleshoot Problems

If an interface does not respond to a `ping` command, make sure that:

- The interface is securely attached to the network.
- The media type is set up correctly if the interface is using a multi-port Ethernet card with different port speeds.
- The routers function properly with correct routing information if the `ping` command is issued from a network not directly attached to the interface.

CHAPTER 5
Using FilerView

Administering Your Filer From FilerView

Using FilerView

This chapter introduces FilerView, the Web-based administration tool for Data ONTAP™ 5.3.

FilerView enables you to perform most administration tasks from any client on your network that has a compatible Web browser. FilerView is a GUI-based administration tool, using Java applets, that performs tasks that would otherwise require you to enter commands at the filer console or edit configuration files.

You can use FilerView even if you did not purchase a license for the HTTP protocol.

If you prefer to manage the filer by using a command-line interface and editing configuration files, see your *System Administrator and Command Reference Guide*.

Prerequisites

You need Netscape Navigator 4 or later or Microsoft Internet Explorer 4 or later to access FilerView. FilerView has not been tested with other Web browsers.

Accessing FilerView

If you used the Setup Wizard, you can access FilerView by clicking the *system management tools* link on the Setup Wizard's Finished page.

If you used the `setup` command, you can access FilerView by pointing your browser to the filer home page (*http://hostname/na_admin*), substituting the filer's name for *hostname*.

Example

If your host's name is filer, enter the following URL:

`http://filer/na_admin`

When your browser connects to the filer, the filer home page is loaded. The initial page contains the choices shown in Table 5-1.

Table 5-1. FilerView Home Page Choices

Choice	Description
Manual Pages	Links to UNIX-style man pages for the Data ONTAP 5.3 console commands.
FilerView	Links to the FilerView opening screen with management options.
Filer-At-A-Glance	Displays a tool that monitors the performance of the filer.

Using the FilerView Interface

The FilerView interface consists of two frames: a left frame and a right frame.

Left Frame

The left frame contains an expandable list of categories:

- The Real-time Displays category contains choices that launch separate tools that monitor filer performance.
- The other categories represent management functions.

To view the Real-time Displays or the functions in a category, double-click the Real-time Displays or a category name. To select a Real-time Display or a function, double-click the display or function name.

NOTE: The first time you select a function, FilerView prompts you to enter the filer's administration password. After you enter the correct password, FilerView does not prompt you for the password again.

Right Frame

The right frame contains a logo initially.

As you select functions from the left frame, the right frame changes to display forms that provide information about the filer configuration and enable you to change the filer's configuration.

To alter the filer configuration, you change information that is displayed in forms and then save the information.

Help Button

The top of the window contains a Help button that you can click to view Help for the form that is currently displayed in the right frame.

CHAPTER 6
Configuring HTTP on the Filer

HTTP Configuration Information

About This Chapter

This chapter contains instructions for configuring the filer to provide HTTP service. If you purchased a license for the HTTP protocol, follow the instructions in this chapter to configure the HTTP service; otherwise, continue with Chapter 7, "Setting Up passwd and group Files."

Prerequisites

Before configuring the filer to provide HTTP service, you must decide which directory path that the filer uses as the home directory for files to be accessed by HTTP clients.

The path name for the directory uses the following format:

/vol/volume_name/directory_name

For example, to use the */home/html_files* directory path on the *vol0* volume, you use the following path:

/vol/vol0/home/html_files

Procedure

NOTE: All lines within filer configuration files must end with a carriage return.

To configure HTTP service, perform the following steps:

1. At the filer console, enter the following command to enable the HTTP daemon:

   options httpd.enable on

2. Use the following command syntax to specify the root of the path that HTTP requests can use:

   options httpd.rootdir *pathname*

For example, if you want HTTP clients to gain access to files or subdirectories under */vol0/home/html_files*, enter

options httpd.rootdir /vol/vol0/home/html_files

When Web browsers request files using HTTP, the filer delivers the files using the root directory. For example, if a browser requests the URL *http://filer/demo/index.htm*, the filer sends the file */vol0/home/html_files/demo/index.htm*.

3. If you want the HTTP service started whenever the filer is booted, use an editor from an NFS or Microsoft® Windows® operating system client to enter the following lines to the filer's */etc/rc* file:

```
options httpd.enable on
options httpd.rootdir pathname
```

Results

The filer is configured to respond to requests from Web browsers.

CHAPTER 7
Setting Up passwd and group Files

passwd and group Information

About This Chapter

This chapter describes how to set up the *passwd* and *group* files on the filer so that the filer can authenticate users.

Who Should Use This Chapter

You should use the information in this chapter if your filer is licensed for the CIFS protocol and does not use a Windows NT domain controller to authenticate users.

If your filer does use a Windows NT domain controller, skip this chapter and continue with Chapter 8, "Configuring Access to CIFS Shares."

Location of the passwd and group Files

The `setup` program created default *passwd* and *group* files in the */etc* directory of the filer default volume.

How the Filer Uses the passwd and group Files

The filer uses *passwd* and *group* files for the following reasons:

- To authenticate users for CIFS access and to translate user and group names in the */etc/quotas* file to UIDs and GIDs

  If the filer uses a Windows NT domain controller to authenticate CIFS users, the domain controller verifies the user's login name and password, and the filer verifies that the user has an entry in the *passwd* file.

  If the filer uses the *passwd* file to authenticate NFS or CIFS users, the filer uses the encrypted password in the *passwd* file to verify the user's login name and password.

- To determine CIFS guest access

  For additional information about guest access, see your *System Administrator and Command Reference Guide*.

- To determine users' rights to access files

  For information about how the filer uses the files to determine access rights in an environment with both NFS and CIFS users, see your *System Administrator and Command Reference Guide*.

Default passwd File

Figure 7-1 shows the default entry in the *passwd* file.

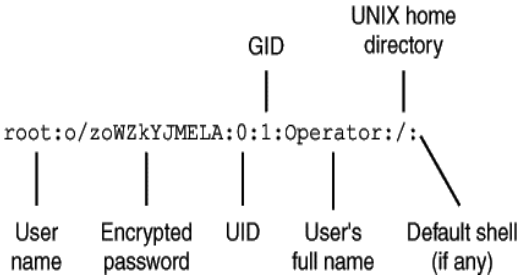


Figure 7-1. passwrd File Default Entry

Table 7-1 describes the fields in an entry.

Table 7-1. passwrd File Field Entries

Field	Description
User name	Contains a user name for the user.
Encrypted password	Contains a password for the user. The filer disregards this field if NIS or a Microsoft Windows NT® operating system domain controller is used to authenticate user names and passwords.
UID	Contains a unique integer that is the UID (user ID).
GID	Contains a unique integer that is the user's primary GID (group ID).
User's full name	Contains the user's full name. The filer ignores this field.
UNIX home directory	Contains the path of the user's home directory. The filer ignores this field.
Default shell	Contains the path of the user's default shell. The filer ignores this field.

Default group File

Figure 7-2 shows the default entry in the *group* file.

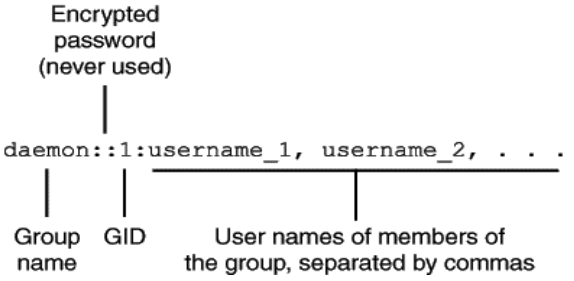


Figure 7-2. group File Default Entry

Table 7-2 describes the fields in an entry.

Table 7-2. group File Field Entries

Field	Description
Group name	Contains a unique group name.
Encrypted password	Contains a password. This field is never used and is blank.
GID	Contains a unique integer that is the GID.
User names	Contains a comma-separated list of user names that belong to the group.

Accessing passwd and group Files From Windows NT and Windows 9x Workstations

Description

This procedure enables you to access the *passwd* and *group* files from a Windows NT or Windows 9*x* workstation.

Steps

To access the files from a Windows NT or Windows 9*x* workstation, perform the following steps:

1. Map a drive to the root of the default filer volume using the following Universal Naming Convention (UNC) path; replace *filername* with the name of your filer:

   `\\filername\C$`

   When prompted, enter a password based on one of the following scenarios:

   - If Windows displays a dialog box asking for a user name and a password, use Administrator as the user name.
   - If you set up the filer to use a Windows NT domain controller to authenticate users, use the domain's administrator password.
   - If you set up the filer to use the *passwd* file to authenticate users, use the administrator password that you entered during setup.

2. Change to the */etc* directory.

Accessing passwd and group Files From UNIX/NFS Clients

Description

This procedure enables you to access the *passwd* and *group* files from a UNIX/NFS client.

Steps

To access the files from a UNIX/NFS client, perform the following steps:

1. Mount the root of the default filer volume to the client's file system using the following path; replace *filername* with the name of your filer:

   filername:/vol/vol0

2. Change to the */etc* directory.

Adding Entries to the passwd File

The procedure you use to add entries to the */etc/passwd* file depends on whether you are using the */etc/passwd* file or either a Windows NT domain controller or NIS to authenticate users.

If you are using the */etc/passwd* file to authenticate users, see "Adding Entries to the passwd File From a UNIX Client."

If you are using either a Windows NT domain controller or NIS to authenticate users, see "Adding Entries to the passwd File From a Windows/NFS Client."

Adding Entries to the passwd File From a UNIX Client

Description

In this procedure, you add entries to a *passwd* file on a UNIX client using a text editor, then transfer the file to the filer. You add entries to the *passwd* file on a UNIX client because each entry in the file requires an encrypted password and the filer does not have a command for creating passwords. The format for entries in the *passwd* file is as follows:

```
username:password:uid:gid:full name:/:default shell
```

Steps

To add entries to a *passwd* file, perform the following steps:

1. Log in to a UNIX client as the root user.
2. Change to the */etc* directory.
3. Make a copy of the existing *passwd* file under a new name, such as *passwd.old*.
4. Open the existing *passwd* file in a text editor.
5. Add an entry for each user who needs access to files.

   Leave the password and default shell fields empty. You set passwords in step 8. The filer does not use the default shell field.
6. If you did not purchase a license for the NFS protocol, delete any entries from the *passwd* file that are for non-CIFS users.
7. Save the file and exit the editor.
8. Set a password for each user by entering the following command:

   passwd *username*

   The `passwd` program prompts you to enter the new password twice.
9. Copy the *passwd* file from the UNIX client to the */etc* directory on the filer.
10. Delete the *passwd* file from the UNIX client and rename the saved file to *passwd*.
11. Continue with "Adding Entries to the group File."

Adding Entries to the passwd File From a Windows/NFS Client

Description

In this procedure, you edit the *passwd* file from a Windows NT or Windows 9*x* workstation or a UNIX/NFS client using a text editor. The format for entries in the *passwd* file is as follows:

```
username:password:gid:uid:full name:default shell
```

Steps

To add entries to the *passwd* file, perform the following steps:

1. In a text editor, open the *passwd* file from the */etc* directory of the default filer volume.
2. Add an entry for each user who needs to access files.

   Leave the password and default shell fields empty. The filer does not use them when users are authenticated by a Windows NT domain controller or NIS.
3. Save the file and exit the text editor.
4. Continue with "Adding Entries to the group File."

Adding Entries to the group File

Description

In this procedure, you edit the *group* file from either a Windows NT or Windows 9*x* workstation or a UNIX/NFS client using a text editor. This enables you to add users to a specific group that has rights to access the filer.

The format for entries in the group file is as follows:

```
groupname::gid:username,...,username
```

Prerequisites

This procedure assumes that you already connected to the root filer volume using the instructions in one of the following sections:

- "Accessing passwd and group Files From Windows NT and Windows 9*x* Workstations"
- "Accessing passwd and group Files From UNIX/NFS Clients"

Steps

To add entries to the *group* file, perform the following steps:

1. Use a text editor to open the */etc/group* file.
2. Add entries to the file for each group.
3. Save the file and exit the text editor.

Results

The *passwd* and *group* files on the filer now contain entries for users and groups. The filer can verify users' rights to access the filer.

CHAPTER 8
Configuring Access to CIFS Shares

Assigning Access Rights

About This Chapter

This chapter describes how to assign users and groups access rights to CIFS shares (directories) using FilerView; see your *System Administrator and Command Reference Guide* for instructions about using Windows NT Server Manager to assign access rights.

If you did not purchase a license for the CIFS protocol, continue on to Chapter 9, "Configuring Clients to Access the Filer."

Scope of Shares Access

The rights you assign to a share apply to the entire share; for example, if you assign a user rights to a share named HOME, the user gains rights to the directory specified by the HOME share and to all subdirectories under the directory. When you assign rights, they are recorded in the share ACL.

cifs Command Parameters

FilerView enables you to grant users and groups access to CIFS shares, using the following form of the `cifs` command:

```
cifs access share [-g] {user|group} rights
```

The `cifs` command parameters are described in Table 8-1.

Table 8-1. cifs Command Parameters

Parameter	Description
`access`	Specifies that an access entry is to be created.
`share`	Specifies the name of the share.
`user | group`	Specifies the name of the user or group for which access to the share is granted. When prefixed with the `-g` option, this field specifies a UNIX group.

Table 8-1. cifs Command Parameters *(continued)*

Parameter	Description
`rights`	Specifies which rights the user or group have to the share. In UNIX-style permissions, rights are specified by three characters, *rwx*, which stand for read, write, and execute. A dash (-) in any position denies the user the right specified by the character it replaces. Examples: *rwx* grants read, write, and execute rights. *r--* grants only the right to read files. *rw-* grants only the rights to read and write files. *r-x* grants only the rights to read and execute files. In Windows NT-style permissions, rights are specified as: No Access, Read, Change, and Full Control.

Establishing Access to Shares

Description

The following procedure creates the access rights to the current CIFS shares.

Steps

To establish access to shares, perform the following steps:

1. From FilerView, select the CIFS option.
2. From the CIFS option, select Share/Access Editor.
3. Select the specific share you want to provide access to and click New Access.
4. Choose either Access by Group or Access by User.
5. Enter the name of the user or group for whom you want to specify access rights to the share.
6. In the Rights field, select the type of permissions you want to set for this share.
7. Click OK to create the new access.

CHAPTER 9
Configuring Clients to Access the Filer

CIFS and NFS Client Configuration

This chapter describes how to configure CIFS and NFS clients to access directories and files on the filer.

Configuring CIFS Clients

About This Section

Follow the instructions in this section to configure CIFS clients to access information on the filer.

Filer Is Visible to CIFS Clients After Setup

After setup finishes, the filer becomes visible to CIFS clients by automatically registering with the master browser on its local network.

If cross-subnet browsing is configured correctly, the filer is now visible to all CIFS clients. For more information about cross-subnet browsing, refer to the Microsoft networking documentation.

CIFS Client Connection Methods

Table 9-1 describes the various methods by which CIFS clients can connect to the filer. For more information about the following commands and windows, refer to the *System Administrator and Command Reference Guide*.

Table 9-1. CIFS Client Connection Methods

Method	Client operating system	Command or window	Description
1	Windows 9*x*, Windows NT 4.0	Map Network Drive window (from Windows Explorer)	Connect to the filer as a network drive.
2	Windows 9*x*, Windows NT 4.0	Network Neighborhood	Click the filer icon in the Network Neighborhood window.
3	Windows NT 3.51, Windows for Workgroups	Connect Network Drive window (from the File Manager)	Connect to the filer as a network drive.
4	Any operating system that supports the MS-DOS® command-line interface and supports the `net use` command	`net use command`	Map a share to a drive letter on the command line. For example: `net use f:\\filer\home`

Steps

To inform users about how to access the filer, perform the following steps:

1. Determine the connection methods that are correct for your CIFS clients.
2. If your CIFS clients can use methods 1, 3, and 4 to connect to the filer, inform your users of the filer's UNC path.

   The UNC path consists of a computer name and a share name in the following format:

   `\\`*`computer_name`*`\`*`share_name`*

   If the filer is named filer and the directory that contains users' directories is shared with the name "home," the UNC path is *\\filer\home*.
3. If your CIFS clients can use method 2 to connect to the filer, inform your users of the filer name so that they can locate the filer in Network Neighborhood.

Results

After you provide users with information about how to access the filer, they can connect to the filer, view directories, and read and write files.

Configuring NFS Clients

About This Section

If you purchased a license for the NFS protocol, follow the instructions in this section to prepare NFS clients to mount file systems from the filer.

Host and Interface Names

When you ran the Setup Wizard or the `setup` command, the filer generated a host name for each interface by appending the number of the interface to the filer host name.

For example, the interface name for the first interface on a filer named filer might be *filer-e0*; the second interface might be *filer-e1*.

Configuring NFS Clients Using Two Types of Name Resolution

To configure NFS clients, choose one of the following methods for name resolution:

- DNS or NIS
- /etc/hosts file

Configuring NFS Clients Using DNS or NIS for Name Resolution

If you use DNS or NIS for name resolution, add an entry in your DNS or NIS databases for each of the filer interfaces.

The following example shows how the entries might look for a filer with these interfaces:

```
255.255.255.145    filer-e0 filer
255.255.255.155    filer-e1
```

In the first line of the preceding example, the filer host name itself is used as an alias for the first network interface.

Configuring NFS Clients Using /etc/hosts File for Name Resolution

If you use */etc/hosts* file for name resolution, add an entry in each host's */etc/hosts* file for each of the filer interfaces.

The following example shows how the entries might look for a filer with these interfaces:

```
255.255.255.145    filer-e0 filer
255.255.255.155    filer-e1
```

In the first line of the preceding example, the filer host name itself is used as an alias for the first network interface.

Exporting Filer Directories for NFS Clients

You must export the filer's file systems before clients can mount them.

Use an editor from an NFS or CIFS client to edit the */etc/exports* file to export filer directories.

Mounting File Systems on NFS Clients

Description

For clients to mount file systems from the filer, you must create entries for the directories exported from the filer in each client's */etc/fstab* or */etc/vfstab* file.

After you edit the clients' */etc/fstab* or */etc/vfstab* file, the clients mount the file systems automatically when they boot.

Steps

To prepare clients to mount the filer's file systems, perform the following steps:

NOTE: The /vol/vol0/home directory is used as a sample filer directory in this procedure. You should use a path that exists on the filer.

1. Create a directory on the client to act as a mount point. For example, */n/filer/home*.

2. To mount the filer's */vol/vol0/home* directory to */n/filer/home*, add the following line to the client's */etc/fstab* or */etc/vfstab* file:

   ***filername*:/vol/vol0/home /n/filer/home nfs rw 0 0**

   Replace *filername* with the name of your file.

   The file system is mounted when the client reboots.

3. To mount the */vol/vol0/home* directory without a client reboot, enter the following command at the client:

   mount *filername:*/vol/vol0/home /n/filer/home

Result

After the */vol/vol0/home* directory on the filer is mounted, the user on the client system can create, modify, or remove files in */n/filer/home*.

Where to Go From Here

If you configured the filer using the `setup` command, continue on to Chapter 10, "setup Command — Installing SecureShare."

If you configured the filer using the Setup Wizard, your configuration is complete. SecureShare was automatically installed by the Setup Wizard.

CHAPTER 10
setup Command — Installing SecureShare

About SecureShare

Features in SecureShare

For multiprotocol environments, Data ONTAP 5.3 provides two SecureShare features:

- SecureShare Access, which makes it easy for Windows users to change UNIX file permissions on the filer.

  SecureShare Access appears as a tab in the Properties dialog box of a set of files you select if at least one of the files is a UNIX file. To use SecureShare Access, see your *System Administrator and Command Reference Guide*.

- SecureShare Account Migrator, which makes it easy to convert users and groups from a Windows NT domain into the format necessary to populate the */etc/passwd* and */etc/group* files on your filer. It enables you to perform the following tasks:

  — Create the commands necessary to build CIFS shares for each user and apply appropriate rights to these shares.

  — Synchronize a Windows NT domain with */etc* files, so you can keep your */etc* files current by running the program daily.

  You can run SecureShare Account Migrator only from Windows NT, and only if you have administrative access to the filer.

Installing SecureShare Access

Description

This procedure installs SecureShare Access from the CD onto the filer.

Steps

To install SecureShare Access from the CD, perform the following steps:

1. Make sure that the Data ONTAP 5.3 CD is in the CD-ROM drive.
2. Click the CD-ROM drive icon.
3. Click UTILS.
4. Click SSACCESS.
5. Click SSACCESS.EXE.
6. Follow the prompts in the SecureShare Access installer program.

Installing SecureShare Account Migrator

Description

The following procedure installs the SecureShare Account Migrator from the CD onto the filer.

Steps

To install SecureShare Account Migrator from the CD, perform the following steps:

1. Make sure that the Data ONTAP 5.3 CD is in the CD-ROM drive.
2. Click the CD-ROM drive icon.
3. Click UTILS.
4. Click SSAM.
5. Open the README file.
6. Click SSACMIGR.EXE.
7. Follow the prompts in the SecureShare Account Migrator installer program.

APPENDIX A
Technical Specifications

Table A-1. Technical Specifications

Microprocessor	
Microprocessor type	21164A Alpha 400MHz on the PowerVault 720N and 740N filers; Alpha 600MHz on the PowerVault 760N filer
Internal cache	No cache on the PowerVault 720N filer; 1-MB onboard cache on the PowerVault 740N filer; 2-MB onboard cache on the PowerVault 760N filer
Math coprocessor	internal to microprocessor
Expansion Bus	
Bus types	PCI
Bus speed: PCI	33 MHz
PCI expansion-card connectors	Four in PowerVault 720N filer; two 32-bit and two 64-bit Seven in PowerVault 740N filer; two 32-bit and five 64-bit Nine in the PowerVault 760N filer; three 32-bit and six 64-bit
PCI expansion-card connector data width (maximum)	64 bits

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Memory	
Architecture	3.3-V DIMM, unbuffered SDRAM (ECC)
DIMM sockets	four; gold contacts
DIMM capacities	256 MB on the PowerVault 720N; 512 MB on the PowerVault 740N; and 1 GB on the PowerVault 760N, unbuffered SDRAM
Maximum RAM	256 MB on the PowerVault 720N; 512 MB on the PowerVault 740N; and 1 GB on the PowerVault 760N
Drives	
Externally accessible bays	one 3.5-inch bay for a diskette drive
Ports and Connectors	
Externally accessible: Serial	one 9-pin console connector; one 9-pin diagnostics connector
Controls and Indicators	
Reset control	push button
Power control	power switch on the back
Status indicator	green LED
Hard-disk drive activity indicator	green LED
Power indicator	green LED
Activity indicator (on NIC connector)	yellow LED
Power	
DC power supply:	
Wattage	240 W
Heat dissipation	1025 BTUs
Voltage	90 to 250 V AC single phase
Current	4 A at 90 V AC (rated)
Frequency	47 to 63 Hz

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

Table A-1. Technical Specifications *(continued)*

Physical	
Height	22.23 cm (8.75 inches)
Width	43.18 cm (17.0 inches)
Depth	64.14 cm (25.25 inches)
Weight	28.8 kg (64.0 lb)
Environmental	
Temperature:	
Operating	10° to 40°C (50° to 95°F)
Storage	-20° to 65°C (–4° to 149°F)
Relative humidity:	
Operating	10% to 90% (noncondensing)
Storage	10% to 90% (noncondensing) in original shipping container; 50% otherwise
Altitude:	
Operating	–16 to 3077 m (–50 to 10,000 ft) at 37° C
Storage	–16 to 7625 m (–50 to 25,000 ft)

NOTE: For the full name of an abbreviation or acronym used in this table, see the Glossary.

APPENDIX B
Installing PowerVault Filer Software

PowerVault Filer Software Installation

What This Appendix Contains

This appendix contains information for:

- Booting from bootable system diskettes
- Installing Data ONTAP™ 5.3 software
- Changing to CIFS-compatible security styles
- Creating bootable system diskettes
- Creating a Diagnostics diskette

Installing the Operating System

To perform the installation, you must have access to either of the following clients, which must have write permission to the filer's root directory:

- a system running a Microsoft Windows 9*x* or Windows NT 4.0, and a CD-ROM drive
- a UNIX workstation running NFS Client version 2 or 3, and a CD-ROM drive

You must be able to log into the filer as Administrator and have access to the filer's system console.

Booting From Bootable System Diskettes

Booting From Diskette

To boot the filer, complete the following steps:

1. Insert the diskette labeled *System Boot Diskette 1* into the filer's diskette drive.

2. Ensure the filer is running.

3. At the system console, enter:

   `reboot`

   The filer displays the following boot menu:

   ```
   1) Normal Boot

   2) Boot without /etc/rc

   3) Change Password

   4) Initialize all disks

   5) Maintenance mode boot

   Selection (1-5)?
   ```

4. Choose one of the boot types shown below by entering the corresponding number:

   - Normal Boot (1) — Use Normal Boot to run the filer normally, but from a diskette.
   - Boot without */etc/rc* (2) — Use Boot without */etc/rc* to troubleshoot and repair configuration problems.

     NOTE: Booting without /etc/rc causes the filer to use only default options settings, disregarding all the options settings you put in /etc/rc, and disabling some services, such as `syslog`.

   - Change Password (3) — Use Change Password to reset your filer's administrative password.
   - Initialize all disks (4) — Use Initialize all disks to zero all disks attached to the filer.

     NOTE: This action will result in a loss of all data on the disks.

   - Maintenance mode boot (5) — Use Maintenance mode boot to go into Maintenance mode and perform some volume and disk operations and get detailed volume and disk information. Maintenance mode is special for the following reasons:
     - — Most normal functions, including file/system operations, are disabled.
     - — A limited set of commands is available for diagnosing and repairing disk and volume problems.
     - — You exit Maintenance mode with the `halt` command.

5. Remove the system boot diskette and store it.

Installation From a Windows Client

From a Windows NT or Windows 9x client, you must install the files from the CD to the filer by performing the following steps.

NOTE: CIFS must be licensed and configured on the filer. To register the CIFS license, enter the following commands from the filer console:

`filer>license cifs=<license number>`

where *<license number>* is the provided CIFS license.

`filer>cifs setup`

To access the system files from the CD and install them on the filer, perform the following steps:

1. As the Domain Administrator from a Windows client, right-click My Computer and click Map Network Drive.
2. In the Map Drive dialog box that appears, select an unused drive letter.
3. In the Path field of the dialog box, enter a path similar to the following example:

   //filer/c$

   where *filer* is the name of the filer, and *c$* is the name assigned to the hidden share of its root directory.

   Do not change the Connect As field.
4. Insert the CD in the CD-ROM drive, and from the root directory of the CD, run the *setup.bat* file to begin the installation process.
5. After viewing the Welcome screen and the software license agreement screen, specify a destination folder (this folder is the mapped, root-level directory of the filer).

   You must accept the license agreement to continue with this procedure.

   The Browse option allows this mapping to be specified.
6. Select the appropriate setup installation method.

   Typical — installs Data ONTAP 5.3 operating system and local help files.
   Compact — installs Data ONTAP 5.3.
   Custom — allows you to select from the available components and install.
7. Once the files have been copied to the filer, enter **`download`** at the filer's console to complete the installation.

   The filer can now be rebooted; no boot diskettes are needed.

Installation From a UNIX Client

From a UNIX client running NFS Client version 2 or 3, you must install the files from the CD to the filer by performing the following steps.

NOTE: An NFS license must be purchased and registered on the filer to proceed. To register the NFS license, enter the following command from the filer console:

`filer>license nfs=<`*`license number`*`>`

where *<license number>* is the provided NFS license.

To access the system files from the CD and install them on the filer, perform the following steps:

1. Mount the filer's root file system to a directory on the client. For example, enter:

   `mount filer:/ /mnt`

   where */mnt* is the directory on the client where you want to mount the filer's root file system.

2. Change the directory to a local temporary directory on the client system. For example, enter:

   `cd /tmp`

   where */tmp* is a local temporary directory on the client.

3. Insert the CD into the CD-ROM drive and extract the files, specifying the input file, output file, and block size. For example, enter:

   `tar xvf /CD-ROM_MNT_PT/ontap/5_3/alpha/sysfiles.tar`

   where *CD-ROM_MNT_PT* is the name of your CD mount point.

   Result: The `tar` command reports the names of the files that are copied (*tar_image.Z* and *dell_filer_install*).

4. Run the *dell_filer_install* script with an argument that tells the script where to install the files; this is the mount point for the filer's root directory. You can keep or delete the *`tar`* files.

   - To delete the *`tar`* files, enter:

     `./dell_filer_install /mnt`

   - To keep the *`tar`* files, enter:

     `./dell_filer_install -k /mnt`

   where */mnt* is the directory on the client where you mounted the filer's root file system.

   Result: The install script decompresses and extracts files.

5. From the client system, unmount the filer's root file system (/) by entering the following commands:

```
cd /
umount /mnt
```

where */mnt* is the directory on the client where you mounted the filer's root file system.

6. At the filer console, enter **download** to complete the installation.

Changing to CIFS-Compatible Security Styles

Every volume and qtree has a default security style of UNIX, which permits only UNIX-style permissions.

Security Styles

To enable NTFS-style file security on one or more volumes, you can change the security style of the volumes you want to one of the following styles:

- Mixed — allows both UNIX-style and Windows NT-style permissions.
- NTFS — allows only Windows NT-style permissions.

NOTE: If you have only one volume, that volume is also the root volume.

Changing the Root Volume Security Style

To change the security style of the root volume to mixed, use the following command:

```
qtree security /vol/vol0/ mixed
```

The default name of the root volume is */vol/vol0*, and you must put a slash after the name of the root volume.

For additional information about security styles, volumes, and qtrees, refer to your *System Administrator and Command Reference Guide*.

Creating Bootable System Diskettes

Overview of Creating Bootable System Diskettes

You can create the bootable system diskettes from the CD. Refer to the appropriate procedure that follows depending on whether you are working from a Windows client or a UNIX client to administer your filer.

Creating Bootable System Diskettes on a Windows Client

To create the boot diskette from a Windows client system, perform the following steps:

1. Use the RaWrite utility to extract the system boot diskette software and copy it to the diskette.

   If you do not already have this utility on your system, it is on the CD in the *<drive>:\utils\Rawrite* directory where *drive* is the CD-ROM drive.

2. Insert a blank, write-enabled diskette into the diskette drive. Label the diskette "System Boot Diskette 1, Data ONTAP 5.3."

3. Open the RaWrite folder and double-click the *Rawrite.exe* file.

   The RaWrite utility starts and prompts you for an image source file.

4. Enter the name used for the image file (for example, boot1 for boot diskette 1 or boot2 for boot diskette 2).

   The utility prompts you for a target diskette drive.

5. Enter the drive letter for the formatted diskette that will be the system boot diskette.

   The status of the operation is displayed in messages. When the operation is done, continue to the next step.

6. Remove the diskette from the drive and write-protect the diskette.

7. Repeat this procedure for the second system boot diskette and label it "System Boot Diskette 2, Data ONTAP 5.3."

Creating Bootable System Diskettes on a UNIX Client

To create the boot diskette from a UNIX client, perform the following steps:

Replace the variable filename with the name of the image to be */mnt/ontap/5_3/alpha/boot1* and */mnt/ontap/5_3/alpha/boot2* in the CD, where */mnt* is the directory on the client where you mounted the CD-ROM drive.

If the diskette drive in your administration client is not named */dev/fd0*, replace */dev/fd0* with the name of your diskette drive by performing the following steps:

1. Insert a blank, write-enabled diskette into the diskette drive on the administration client system. Label the diskette "System Boot Diskette 1, Data ONTAP 5.3."

2. Copy the boot diskette 1 image to the diskette using the `dd` command. For example,

   `dd if=`*`filename`*` of=/dev/fd0 bs=512`

3. Remove the diskette from the drive and write-protect the diskette.

4. Repeat this procedure for the second system boot diskette and label it "System Boot Diskette 2, Data ONTAP 5.3."

Creating a Diagnostics Diskette

Creating Diskettes From Diskette Image Files

This section describes how to make a Diagnostics boot diskette from a diskette image file supplied on the CD for a Windows client system or a DOS shell window or a UNIX client.

Creating a Diagnostics Diskette on a Windows Client System

To create the diagnostics diskette from a Windows client system or a DOS shell window, perform the following steps:

1. Use the RaWrite utility to extract the diagnostics boot diskette software and copy it to the diskette.

   If you do not already have this utility on your system, it is on the CD in the *<drive>:\utils\Rawrite* directory where *drive* is the CD-ROM drive.
2. Insert the CD in the Windows client system CD-ROM drive.
3. Insert a blank, write-enabled diskette into the Windows client diskette drive. Label the diskette "System Diagnostics Diskette".
4. Open the RaWrite folder and double-click the *Rawrite.exe* file.

   The RaWrite utility starts and prompts you for an image source file.
5. Enter the name used for the image file (for example, boot1 for boot diskette 1 or boot2 for boot diskette 2).

   The utility prompts you for a target diskette drive.
6. Enter the drive letter for the formatted diskette that will be the system diagnostics diskette.

   The status of the operation is displayed. When the operation is done, continue to the next step.
7. Remove the diskette from the drive and write-protect the diskette.

Creating a Diagnostics Diskette on a UNIX Client

To create the diagnostics diskette from a UNIX client, perform the following steps:

1. Insert the CD in the UNIX client CD-ROM drive.
2. Mount the CD (some UNIX clients do this automatically when the CD is inserted into the drive; others require that you use the `mount` command).
3. Insert a blank, write-enabled diskette into the UNIX client diskette drive (in this procedure, it is assumed that the CD is mounted at */cdrom*). Label the diskette "System Diagnostics Diskette" and include the filer name and model on this label.
4. Copy the boot diskette 1 image to the diskette using the `dd` command. For example,

dd if=*cdrom*/ontap/5_3/alpha/diag_1_6 of=/dev/fd0 bs=512

Replace */dev/fd0* with the device name of your diskette drive if it is not */dev/fd0*.

5. Remove the diskette from the drive and write-protect the diskette.

APPENDIX C
Preparing for CIFS Configuration

CIFS Information Needed

About This Appendix

This appendix contains information to help you understand the following CIFS configuration issues:

- Deciding on a domain or workgroup configuration
- Choosing between PC-style or UNIX-style permissions
- Adding the filer to a Windows NT domain

Deciding on a Domain or Workgroup Configuration

About This Section

You can install the filer into a Windows NT domain or Windows workgroup. Use the information in this section to help you decide which to choose.

CAUTION: It is difficult to change this decision after you run `setup`.

Definition of a Domain

A domain:

- Is a collection of Windows NT computers that share a common directory database defined by a Windows NT server administrator
- Has a unique domain name
- Provides access to centralized user and group accounts
- Enables centralized administration of user and group accounts

Definition of a Workgroup

A workgroup:

- Is a collection of Windows NT computers
- Has a unique workgroup name
- Is grouped for viewing purposes
- Does not provide access to centralized user and group accounts
- Does not enable centralized administration of user and group accounts

When to Install Into a Windows NT Domain

Install the filer into a Windows NT domain:

- If you want centralized administration using a Windows NT domain
- If you want to integrate the filer into the Windows NT domain topology
- If you want user authentication to be handled by Windows NT domain controllers

CAUTION: Your network must have at least one Windows NT domain controller to install the filer into a Windows NT domain.

When to Install Into a Windows Workgroup

Install the filer into a Windows workgroup:

- If you do not want centralized administration through a Windows NT domain
- If you want UNIX-style authentication using an */etc/passwd* file or NIS

CAUTION: If you install the filer into a Windows workgroup, it is not compatible with clients that have Windows NT 4.0 Service Pack 3 or higher or Windows 9*x* clients with Microsoft Distributed File System (DFS) 4.1 installed. Clients can be made compatible by adding a registry entry to reenable plain-text passwords.

To reenable plain-text passwords on a Windows NT client, consult the Microsoft Knowledge Base on the Web at *http://www.microsoft.com/kb/default.asp;* refer to article Q166730, "With Unencrypted Password SP3 Fails to Connect to SMB Server."

To reenable plain-text passwords on a Windows 9*x* client, consult the following file in the Microsoft Knowledge Base on the Web: *http://www.microsoft.com/ntserver/dfs/readme.asp*.

Summary of Domain and Workgroup Features

Table C-1 shows which authentication features are available to domains and which are available to workgroups.

Table C-1. Domain and Workgroup Features

Feature	Domain	Workgroup
Compatible with Windows NT 4.0 Service Pack 3 or higher (encryption).	Y	N
Compatible with Windows NT 4.0 Service Pack 3 or higher (message signing).	N	N
Support for Windows NT-only users.	Y	N
Encrypted password sent to filer.	Y	N
/etc/passwd and */etc/group* files on the filer determine User Identification numbers (UIDs) and Group Identification numbers (GIDs) for multiprotocol.	Y	Y
/etc/passwd file on the filer contains users' passwords.	N	Y
Single login.	Y	N
Change password remotely.	Y	Y (only with NIS)
Multiple net segments.	Y	N

Choosing Between PC-Style or UNIX-Style Permissions

About This Section

When you configure the CIFS protocol, you must choose whether the filer uses PC-style or UNIX-style permissions.

NOTE: If you are setting up a filer in a Windows NT-only environment, you can skip this section.

This section provides a brief overview of PC-style and UNIX-style permissions and provides guidelines for choosing which style to use. PC-style permissions are similar to FAT (File Allocation Table); they maintain security with share level ACLs (Access Control Lists).

In addition, PC-style permissions also allow you to further restrict file security using file permissions. UNIX-style permissions do not use share level ACLs. Therefore, using PC-style permissions only affects PC access to files with UNIX security.

How PC-Style Permissions Work

PC-style permissions are determined by the rights assigned in a share's ACL and are limited by the UNIX permissions assigned to a file. To write to a file when PC-style permissions are in effect, a user must meet the following criteria:

- The user must have write permission for the file in the ACL.
- The user must have write permission for the file according to the UNIX-style permissions associated with the file.

  If the user is the owner of the file, the filer uses the UNIX-style permissions set for the owner of the file. If the user is not the owner of the file, the filer uses the UNIX-style permissions set for the UNIX group associated with the file. Note that the UNIX "other" permissions are not used.

When to Choose PC-Style Permissions

Choose PC-style permissions if you need file access to be controlled by ACLs.

How UNIX-Style Permissions Work

UNIX-style permissions are determined by the rights associated with the UNIX UID and GID and are limited by the ACL permissions assigned to a file. To write to a file when UNIX-style permissions are in effect, a user must meet the following criteria:

- If the user is the owner of the file, the write permission for the user's UID must be set.
- If the user is not the owner of the file, he or she must be a member of the group (GID) associated with the file and the write permission for the group's GID must be set.
- The user must have write permission for the file in the ACL.

When to Choose UNIX-Style Permissions

Choose UNIX-style permissions if you want to implement simple security and need access to be controlled using exact UNIX rules.

NOTE: If you choose UNIX-style permissions, set the share ACL permission to `rwx` *for* `everyone`. *With this setting, the UNIX rights work just as they do on a UNIX system.*

Adding the Filer to a Windows NT Domain

About This Section

Use the information in this section to add the filer to a Windows NT domain before you configure the filer.

NOTE: This section presents one method of adding the filer to a Windows NT domain. For alternative ways of adding the filer to a Windows NT domain, consult the Microsoft Knowledge Base on the Web at ***http://www.microsoft.com/kb/default.asp*** *and refer to article Q140387, "Batch File Adds/Removes Machine Accounts in Server Manager."*

Prerequisites

CAUTION: It is difficult to change the decision to add the filer to a Windows NT domain after you have run `setup`**.**

To add the filer to a Windows NT domain, you must meet the following prerequisites:

- You must have a permanent Windows NT domain.
- You must have the "add workstation to domain" privilege.
- You must be able to connect to the Primary Domain Controller (PDC).

Procedure

To add the filer to a Windows NT domain, perform the following steps:

1. Log in as Administrator at a Windows NT server that is a member of the Windows NT domain into which you are adding the filer.
2. Run Server Manager.
3. From the Computer menu, select Add to Domain.

   The Add Computer To Domain window appears.
4. Click the Windows NT Workstation or Server option button.
5. Enter the name of the filer.

   The filer name can have up to 15 of the following characters:

   letters (A–Z), numerals (0–9), !, #, $, @, %, ', (,), -, ^, _, {, }, and ~
6. Click Add.

Results

The filer was added to the Windows NT domain.

CAUTION: Do not use this account until you finish configuring the filer.

APPENDIX D
Time Zones

Time Zone Selection

About This Section

You must enter one of the following time zones when `setup` prompts for a time zone.

Africa

Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
Africa/Algiers
Africa/Asmera
Africa/Bamako
Africa/Bangui
Africa/Banjul
Africa/Bissau
Africa/Blantyre
Africa/Brazzaville
Africa/Bujumbura
Africa/Cairo
Africa/Casablanca
Africa/Conakry
Africa/Dakar
Africa/Dar_es_Salaam
Africa/Djibouti
Africa/Douala
Africa/Freetown
Africa/Gaborone
Africa/Harare
Africa/Johannesburg
Africa/Kampala
Africa/Khartoum
Africa/Kigali
Africa/Kinshasa
Africa/Lagos
Africa/Libreville
Africa/Lome
Africa/Luanda
Africa/Lumumbashi
Africa/Lusaka
Africa/Malabo
Africa/Maputo
Africa/Maseru
Africa/Mbabane
Africa/Mogadishu
Africa/Monrovia
Africa/Nairobi
Africa/Ndjamena
Africa/Niamey
Africa/Nouakchott
Africa/Ouagadougou
Africa/Porto-Novo
Africa/Sao_Tome
Africa/Timbuktu
Africa/Tripoli
Africa/Tunis
Africa/Windhoek

America

America/Adak
America/Anchorage
America/Anguilla
America/Antigua
America/Aruba
America/Asuncion
America/Atka
America/Barbados
America/Belize
America/Bogota
America/Boise
America/Buenos_Aires
America/Caracas
America/Catamarca
America/Cayenne
America/Cayman
America/Chicago
America/Cordoba
America/Costa_Rica
America/Cuiaba
America/Curacao

America/Dawson
America/Dawson_Creek
America/Denver
America/Detroit
America/Dominica
America/Edmonton
America/El_Salvador
America/Ensenada
America/Fort_Wayne
America/Fortaleza
America/Glace_Bay
America/Godthab
America/Goose_Bay
America/Grand_Turk
America/Grenada
America/Guadeloupe
America/Guatemala
America/Guayaquil
America/Guyana
America/Halifax
America/Havana
America/Indiana
America/Indianapolis
America/Inuvik
America/Iqaluit
America/Jamaica
America/Jujuy
America/Juneau
America/Knox_IN
America/La_Paz
America/Lima
America/Los_Angeles
America/Louisville
America/Maceio
America/Managua
America/Manaus
America/Martinique
America/Mazatlan
America/Mendoza
America/Menominee
America/Mexico_City
America/Miquelon
America/Montevideo
America/Montreal
America/Montserrat
America/Nassau
America/New_York
America/Nipigon
America/Nome
America/Noronha
America/Panama
America/Pangnirtung
America/Paramaribo
America/Phoenix
America/Port_of_Spain
America/Port-au-Prince
America/Porto_Acre
America/Puerto_Rico
America/Rainy_River
America/Rankin_Inlet
America/Regina
America/Rosario
America/Santiago
America/Santo_Domingo
America/Sao_Paulo
America/Scoresbysund
America/Shiprock
America/St_Johns
America/St_Kitts
America/St_Lucia
America/St_Thomas
America/St_Vincent
America/Swift_Current
America/Tegucigalpa
America/Thule
America/Thunder_Bay
America/Tijuana
America/Tortola
America/Vancouver
America/Virgin
America/Whitehorse
America/Winnipeg
America/Yakutat
America/Yellowknife

Antarctica

Antarctica/Casey
Antarctica/DumontDUrville
Antarctica/Mawson
Antarctica/McMurdo
Antarctica/Palmer
Antarctica/South_Pole

Asia

Asia/Aden
Asia/Alma-Ata
Asia/Amman
Asia/Anadyr
Asia/Aqtau
Asia/Aqtobe
Asia/Ashkhabad
Asia/Baghdad
Asia/Bahrain
Asia/Baku
Asia/Bangkok
Asia/Beirut
Asia/Bishkek
Asia/Brunei
Asia/Calcutta
Asia/Chungking
Asia/Colombo
Asia/Dacca
Asia/Damascus
Asia/Dubai
Asia/Dushanbe
Asia/Gaza
Asia/Harbin
Asia/Hong_Kong
Asia/Irkutsk
Asia/Ishigaki
Asia/Istanbul
Asia/Jakarta
Asia/Jayapura
Asia/Jerusalem
Asia/Kabul
Asia/Kamchatka
Asia/Karachi
Asia/Kashgar
Asia/Katmandu
Asia/Krasnoyarsk
Asia/Kuala_Lumpur
Asia/Kuching
Asia/Kuwait
Asia/Macao
Asia/Magadan
Asia/Manila

Asia/Muscat
Asia/Nicosia
Asia/Novosibirsk
Asia/Omsk
Asia/Phnom_Penh
Asia/Pyongyang
Asia/Qatar
Asia/Rangoon
Asia/Riyadh
Asia/Saigon
Asia/Seoul
Asia/Shanghai
Asia/Singapore
Asia/Taipei
Asia/Tashkent
Asia/Tbilisi
Asia/Tehran
Asia/Tel_Aviv
Asia/Thimbu
Asia/Tokyo
Asia/Ujung_Pandang
Asia/Ulan_Bator
Asia/Urumqi
Asia/Vientiane
Asia/Vladivostok
Asia/Yakutsk
Asia/Yekaterinburg
Asia/Yerevan

Atlantic

Atlantic/Azores
Atlantic/Bermuda
Atlantic/Canary
Atlantic/Cape_Verde
Atlantic/Faeroe
Atlantic/Jan_Mayen
Atlantic/Madeira
Atlantic/Reykjavik
Atlantic/South_Georgia
Atlantic/St_Helena
Atlantic/Stanley

Australia

Australia/ACT
Australia/Adelaide
Australia/Brisbane
Australia/Broken_Hill
Australia/Canberra
Australia/Darwin
Australia/Hobart
Australia/LHI
Australia/Lindeman
Australia/Lord Howe
Australia/Melbourne
Australia/NSW
Australia/North
Australia/Perth
Australia/Queensland
Australia/South
Australia/Sydney
Australia/Tasmania
Australia/Victoria
Australia/West
Australia/Yancowinna

Brazil

Brazil/Acre
Brazil/DeNoronha
Brazil/East
Brazil/West

Canada

Canada/Atlantic
Canada/Central
Canada/East-Saskatchewan
Canada/Eastern
Canada/Mountain
Canada/Newfoundland
Canada/Pacific
Canada/Saskatchewan
Canada/Yukon

Chile

Chile/Continental
Chile/EasterIsland

Etc

Etc/GMT
Etc/GMT+0
Etc/GMT+1
Etc/GMT+2
Etc/GMT+3
Etc/GMT+4
Etc/GMT+5
Etc/GMT+6
Etc/GMT+7
Etc/GMT+8
Etc/GMT+9
Etc/GMT+10
Etc/GMT+11
Etc/GMT+12
Etc/GMT0
Etc/GMT-0
Etc/GMT-1
Etc/GMT-2
Etc/GMT-3
Etc/GMT-4
Etc/GMT-5
Etc/GMT-6
Etc/GMT-7
Etc/GMT-8
Etc/GMT-9
Etc/GMT-10
Etc/GMT-11
Etc/GMT-12
Etc/GMT-13
Etc/GMT-14
Etc/Greenwich
Etc/UCT
Etc/Universal
Etc/UTC
Etc/Zulu

Europe

Europe/Amsterdam
Europe/Andorra
Europe/Athens
Europe/Belfast
Europe/Belgrade
Europe/Berlin
Europe/Bratislava
Europe/Brussels
Europe/Bucharest
Europe/Budapest
Europe/Chisinau
Europe/Copenhagen
Europe/Dublin
Europe/Gibraltar
Europe/Helsinki
Europe/Istanbul
Europe/Kiev
Europe/Kuybyshev
Europe/Lisbon
Europe/Ljubljana
Europe/London
Europe/Luxembourg
Europe/Madrid
Europe/Malta
Europe/Minsk
Europe/Monaco
Europe/Moscow
Europe/Oslo
Europe/Paris
Europe/Prague
Europe/Riga
Europe/Rome
Europe/San_Marino
Europe/Sarajevo
Europe/Simferopol
Europe/Skopje
Europe/Sofia
Europe/Stockholm
Europe/Tallinn
Europe/Tirane
Europe/Vaduz
Europe/Vatican
Europe/Vienna
Europe/Vilnius
Europe/Warsaw
Europe/Zagreb
Europe/Zurich

GMT

GMT
GMT+1
GMT+2
GMT+3
GMT+4
GMT+5
GMT+6
GMT+7
GMT+8
GMT+9
GMT+10
GMT+11
GMT+12
GMT+13
GMT-1
GMT-2
GMT-3
GMT-4
GMT-5
GMT-6
GMT-7
GMT-8
GMT-9
GMT-10
GMT-11
GMT-12

Indian (Indian Ocean)

Indian/Antananarivo
Indian/Chagos
Indian/Christmas
Indian/Cocos
Indian/Comoro
Indian/Kerguelen
Indian/Mahe
Indian/Maldives
Indian/Mauritius
Indian/Mayotte
Indian/Reunion

Mexico

Mexico/BajaNorte
Mexico/BajaSur
Mexico/General

Miscellaneous

Arctic/Longyearbyen
CET
CST6CDT
Cuba
EET
Egypt
Eire
EST
EST5EDT
Factory
GB
GB-Eire
Greenwich
Hongkong
HST
Iceland
Iran
Israel
Jamaica
Japan
Kwajalein
Libya
MET
MST
MST7MDT
Navajo
NZ
NZ-CHAT
Poland
Portugal
PRC
PST8PDT
ROC
ROK
Singapore
Turkey
UCT
Universal
UTC
WET
W-SU
Zulu

Pacific

Pacific/Apia
Pacific/Auckland
Pacific/Chatham
Pacific/Easter
Pacific/Efate
Pacific/Enderbury
Pacific/Fakaofo
Pacific/Fiji
Pacific/Funafuti
Pacific/Galapagos
Pacific/Gambier
Pacific/Guadalcanal
Pacific/Guam
Pacific/Honolulu
Pacific/Johnston
Pacific/Kiritimati
Pacific/Kosrae
Pacific/Kwajalein
Pacific/Majuro
Pacific/Marquesas
Pacific/Midway
Pacific/Nauru
Pacific/Niue
Pacific/Norfolk
Pacific/Noumea
Pacific/Pago_Pago
Pacific/Palau
Pacific/Pitcairn
Pacific/Ponape
Pacific/Port_Moresby
Pacific/Rarotonga
Pacific/Saipan
Pacific/Samoa
Pacific/Tahiti
Pacific/Tarawa
Pacific/Tongatapu
Pacific/Truk
Pacific/Wake
Pacific/Wallis
Pacific/Yap

System V

SystemV/AST4
SystemV/AST4ADT
SystemV/CST6
SystemV/CST6CDT
SystemV/EST5
SystemV/EST5EDT
SystemV/HST10
SystemV/MST7
SystemV/MST7MDT
SystemV/PST8
SystemV/PST8PDT
SystemV/YST9
SystemV/YST9YDT

US (United States)

US/Alaska
US/Aleutian
US/Arizona
US/Central
US/East-Indiana
US/Eastern
US/Hawaii
US/Indiana-Starke
US/Michigan
US/Mountain
US/Pacific
US/Pacific-New
US/Samoa

Aliases

GMT=Greenwich, UCT, UTC, Universal, Zulu

CET=MET (Middle European Time)

US/Eastern=Jamaica

US/Mountain=Navajo

APPENDIX E
Regulatory Notices

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Technical Support representative of Dell Computer Corporation or an experienced radio/television technician for additional suggestions. You may find the *FCC Interference Handbook, 1986*, to be helpful. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7 or on the World Wide Web at **http://www.fcc.gov/Bureaus/Compliance/WWW/tvibook.html**.

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is typically for business or industrial environments.
- Class B is typically for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

A Notice About Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell Computer Corporation. If you prefer, you can order a cable from Dell Computer Corporation on the World Wide Web at http://www.dell.com/products/dellware/index.htm.

A Notice About Networked Computer Systems: Some Dell computer systems that are classified for Class B environments may include an on-board network interface controller (NIC). If your Class B system contains a NIC, it may be considered to be a Class A system at the time that the NIC is connected to a network. When the NIC is not connected to a network, your system is considered to be a Class B digital device.

Most Dell computer systems are classified for Class B environments. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

FCC Notices (U.S. Only)

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry an FCC Class B rating as distinguished by either an FCC ID number or the FCC logo, (FC), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Class A

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Class B

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Product name: Dell PowerVault 720N, 740N, and 760N
- Model number: LMM
- Company name: Dell Computer Corporation
  EMC Engineering Department
  One Dell Way
  Round Rock, Texas 78682 USA
  512-338-4400

IC Notice (Canada Only)

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom or the back panel of your computer (or other digital apparatus).

A statement in the form of "IC Class A ICES-3" or "IC Class B ICES-3" will be located on one of these labels. Note that Industry Canada regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistration) respecte toutes les exigences du Reglement sur le Materiel Brouilleur du Canada.

CE Notice (European Union)

Marking by the symbol CE indicates compliance of this Dell system to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1: 1992 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry."
- EN 60950 — "Safety of Information Technology Equipment."

NOTE: EN 55022 emissions requirements provide for two classifications:

- *Class A is for typical commercial areas.*
- *Class B is for typical domestic areas.*

RF INTERFERENCE WARNING: This is a Class A product. In a domestic environment this product may cause radio frequency (RF) interference, in which case the user may be required to take adequate measures.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at Dell Products Europe BV, Limerick, Ireland.

Battery Disposal

Your computer system uses a lithium-ion battery. The lithium-ion battery is a long-life battery, and it is very possible that you will never need to replace it. However, should you need to replace it, refer to your service manual for instructions.

Do not dispose of the battery along with household waste. Contact your local waste disposal agency for the address of the nearest battery deposit site.

NOTE: Your system may also include circuit cards or other components that contain batteries. These batteries must also be disposed of in a battery deposit site. For information about such batteries, refer to the documentation for the specific card or component.

EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štitku počítače uvedeno, že spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařízení zařazená do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jinych zařízení, je uživatel povinen provést taková opatření, aby rušení odstranil.

VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system, should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see Figures E-1 and E-2) located on the bottom or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

VCCI-A

Figure E-1. VCCI Class A ITE Regulatory Mark

Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスＢ情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Figure E-2. VCCI Class B ITE Regulatory Mark

MOC Notice (South Korea Only)

To determine which classification (Class A or B) applies to your computer system (or other Dell digital device), examine the South Korean Ministry of Communications (MOC) registration labels located on your computer (or other Dell digital device). The MOC label may be located separately from the other regulatory marking applied to your product. The English text, "EMI (A)," for Class A products, or "EMI (B)" for Class B products, appears in the center of the MOC label (see Figures E-3 and E-4).

NOTE: MOC emissions requirements provide for two classifications:

- *Class A devices are for business purposes.*
- *Class B devices are for nonbusiness purposes.*

Class A Device

장치 종류	사용자 안내문
A급 기기	이 장치는 업무용으로 전자파 적합등록을 한 장치이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you may exchange it for a nonbusiness device.

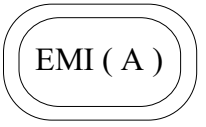


Figure E-3. MOC Class A Regulatory Mark

Class B Device

장치 종류	사용자 안내문
B급 기기	이 장치는 가정용으로 전자파 적합등록을 한 장치로서 주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Note that this device has been approved for nonbusiness purposes and may be used in any environment, including residential areas.

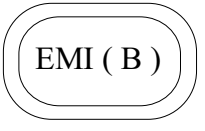


Figure E-4. MOC Class B Regulatory Mark

Polish Center for Testing and Certification Notice

The equipment should draw power from a socket with an attached protection circuit (a three-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 16 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark "B" confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-89/E-06251.

Wymagania Polskiego Centrum Badań i Certyfikacji

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 16A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczkę kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne.

Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkowania zawartymi w PN-93/T-42107 i PN-89/E-06251.

Pozostałe instrukcje bezpieczeństwa

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym.
- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłóceniowego źródła zasilania.
- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byłoby na nie nadeptywać lub potykać się o nie.
- Nie należy rozlewać napojów ani innych płynów na system komputerowy.
- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.
- System komputerowy powinien znajdować się z dala od grzejników i źródeł ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kładzenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego.

NOM Information (Mexico Only)

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM):

Exporter:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importer:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.
Ship to:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Supply voltage:	100-240 VAC
Frequency:	60/50 Hz
Input current rating:	Input current rating: 5.0 A

Información para NOM (únicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM):

Exportador:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importador:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.

Exportador:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Embarcar a:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Tensión alimentación:	100-240 VAC
Frecuencia:	60/50 Hz
Consumo de corriente:	5.0 A

BSMI Notice (Taiwan Only)

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

APPENDIX F

Warranty, Return Policy, and Year 2000 Statement of Compliance

Limited Three-Year Warranty (U.S. Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this warranty. Otherwise, this warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare[SM] products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this warranty.

Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement

products to you freight prepaid if you use an address in the continental U.S., where applicable. Shipments to other locations will be made freight collect.

NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

General Provisions

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION). DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF AND CONDITIONS OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD SET FORTH ABOVE AND NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER SUCH PERIOD.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE PRECEDING LIMITATION MAY NOT APPLY TO YOU.

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's limited three-year warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Material Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the warranty.

NOTE: If you chose one of the available warranty and service options in place of the standard limited three-year warranty described in the preceding text, the option you chose will be listed on your invoice.

Limited Three-Year Warranty (Canada Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this warranty. Otherwise, this warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare℠ products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this warranty.

Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's trouble-shooting documentation to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement products to you freight prepaid if you use an address in Canada, where applicable. Shipments to other locations will be made freight collect.

NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for lost data or software.

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

General Provisions

DELL MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS WARRANTY STATEMENT. DELL DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION).

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's limited three-year warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Material Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the warranty.

NOTE: If you chose one of the available warranty and service options in place of the standard limited three-year warranty described in the preceding text, the option you chose will be listed on your invoice.

"Total Satisfaction" Return Policy (U.S. and Canada Only)

If you are an end-user customer who bought new products directly from a Dell company, you may return them to Dell within 30 days of the date of invoice for a refund or credit of the product purchase price. If you are an end-user customer who bought reconditioned or refurbished products from a Dell company, you may return them to Dell within 14 days of the date of invoice for a refund or credit of the product purchase price. In either case, the refund or credit will not include any shipping and handling charges shown on your invoice. If you are an organization that bought the products under a written agreement with Dell, the agreement may contain different terms for the return of products than specified by this policy.

To return products, you must call Dell Customer Service to receive a Credit Return Authorization Number. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. To expedite the processing of your refund or credit, Dell expects you to return the products to Dell in their original packaging within five days of the date that Dell issues the Credit Return Authorization Number. You must also prepay shipping charges and insure the shipment or accept the risk of loss or damage during shipment. You may return software for refund or credit only if the sealed package containing the diskette(s) or CD(s) is unopened. Returned products must be in as-new condition, and all of the manuals, diskette(s), CD(s), power cables, and other items included with a product must be returned with it. For customers who want to return, for refund or credit only, either applications software or an operating system that has been installed by Dell, the whole system must be returned, along with any media and documentation that may have been included in the original shipment.

This "Total Satisfaction" Return Policy does not apply to DellWare products, which may be returned under DellWare's then-current return policy. In addition, reconditioned parts purchased through Dell Spare Parts Sales in Canada are nonreturnable.

Year 2000 Statement of Compliance for Dell-Branded Hardware Products

Dell-branded hardware products shipped on or after January 1, 1997, are eligible to carry the "NSTL Hardware Tested Year 2000 Compliant" logo by virtue of formal testing with, and successful completion of, the National Software Testing Laboratories (NSTL) YMARK2000 test.* Dell will treat a failure to pass the YMARK2000 test as a covered event under Dell's warranty for the product, subject to the normal warranty limitations.** For a complete copy of Dell's warranty, see the product's documentation. Dell-branded hardware products will also recognize the year 2000 as a leap year.

*The YMARK2000 standard tests the ability of system hardware and firmware to support the transition to the year 2000 (and to recognize leap years, when appropriate, for years 2000 through 2009 inclusive) and not that of options, operating systems, or applications software. Dell-branded hardware products that pass the YMARK2000 test conform to BSI-DISC PD 2000-1.

** Except for this clarification of Dell's warranty for NSTL logo hardware, all other warranties, conditions and remedies, express or implied, relating to year 2000 readiness or compliance are disclaimed. To make a claim under this warranty for NSTL logo hardware, customers must contact Dell prior to January 1, 2001.

To make a claim, write to:

Dell Computer Corporation
P.O. Box 149258
Austin, Texas 78714-9258
Attention: Year 2000

Despite a system's ability to pass the YMARK2000 test, actual rollover results in specific operating environments may vary depending on other factors including, but not limited to, other hardware, operating systems, and applications software.

Previous Products

For Dell-branded hardware products shipped prior to January 1, 1997, that have an upgradable basic input/output system (BIOS), Dell makes available a BIOS upgrade. Although these products may not have been tested under the YMARK2000 test, Dell believes that the hardware would pass the YMARK2000 test, provided the appropriate BIOS upgrade is properly loaded.

For Dell-branded hardware products that do not have an upgradable BIOS, Dell has made available, as a convenience to customers, the Dell Program Patch, a software utility designed to assist customers in managing the year 2000 rollover.

Software

Dell specifically excludes all non-Dell-developed software from this compliance statement. All software run on Dell-branded hardware products should be independently verified by customers to be year 2000-compliant.

Additional Information

For additional information on year 2000 compliance of Dell-branded hardware products, refer to Dell's Year 2000 Web site at **http://www.dell.com/year2000** or contact a Dell customer service representative in your area.

Glossary

The following list defines or identifies technical terms, abbreviations, and acronyms used in Dell™ user documents.

A
Abbreviation for ampere(s).

AC
Abbreviation for alternating current.

ACL
Access control list. A list that contains the users' or groups' access rights to each share.

adapter card
An expansion card that plugs into an expansion-card connector on the computer's system board. An adapter card adds some specialized function to the computer by providing an interface between the expansion bus and a peripheral device. Examples of adapter cards include network cards, sound boards, and SCSI adapters.

ADC
Abbreviation for analog-to-digital converter.

ADI
Abbreviation for Autodesk Device Interface.

administration host
The client you specify during filer setup for managing the filer. The `setup` program automatically configures the filer to accept `telnet` and `rsh` connections from this client, to give permission to this client for mounting the */* and */home* directories, and to use this client as the mailhost for sending autosupport email messages. At any time after you run the `setup` program, you can configure the filer to work with other clients in the same way as it does with the administration host.

AI
Abbreviation for artificial intelligence.

ANSI
Acronym for American National Standards Institute.

APC
Abbreviation for American Power Conversion.

application program
Software designed to help you perform a specific task, such as a spreadsheet or word processor. Application programs are distinct from operating system and utility software.

ASCII
Acronym for American Standard Code for Information Interchange. A text file containing only characters from the ASCII character set (usually created with a text editor, such as MS-DOS® Editor or Notepad in Windows), is called an ASCII file.

ASIC
Acronym for application-specific integrated circuit.

ASPI
Advanced SCSI programming interface.

authentication
A security step performed by a domain controller for the filer's domain, or by the filer itself, using its */etc/passwd* file.

autoexec.bat *file*
When you boot your computer, MS-DOS runs any commands contained in the text file, **autoexec.bat** (after running any commands in the **config.sys** file). An **autoexec.bat** file is not required to boot MS-DOS, but provides a convenient place to run commands that are essential for setting up a consistent computing environment—such as loading mouse or network software.

backup
A copy of a program or data file. As a precaution, you should back up your computer's hard-disk drive on a regular basis. Before making a change to the configuration of your computer, you should back up important start-up files, such as **autoexec.bat** and **config.sys** for MS-DOS or **win.ini** and **system.ini** for Windows.

base memory
Synonym for conventional memory. See also **conventional memory**.

BASIC
Acronym for Beginner's All-Purpose Symbolic Instruction Code, a programming language. MS-DOS includes a version of BASIC.

batch file
An ASCII text file containing a list of commands that run in sequence. Batch files must have a filename extension of **bat**.

baud rate
Data transmission speed. For example, modems are designed to transmit data at one or more specified baud rate(s) through the COM (serial) port of a computer.

BBS
Abbreviation for bulletin board service. A computer system that serves as a central location for accessing data or relaying messages by modem. For example, Dell's TechConnect BBS contains the latest version of software such as video drivers and the *Dell Directory*. If your system has a modem, you can access the BBS and download the most recent version of this software.

beep code
A diagnostic system message in the form of a series of beeps from your computer's speaker. Refer to your *Diagnostics and Troubleshooting Guide* for a complete discussion of system beep codes.

BIOS
Acronym for basic input/output system. Your computer's BIOS contains programs stored on a ROM chip. The BIOS controls the following:

- Communications between the microprocessor and peripheral devices, such as the keyboard and the video adapter
- Miscellaneous functions, such as system messages

bit
The smallest unit of information interpreted by your computer.

block size
The size of a block. See also block and striping.

boot routine
When you start your computer, it clears all memory, initializes devices, and loads the operating system. Unless the operating system fails to respond, you can reboot (also called warm boot) your computer by pressing <Ctrl><Alt><Del>; otherwise, you must perform a cold boot by pressing the reset button (if your computer has one) or by turning the computer off, then back on.

bootable diskette
You can start your computer from a diskette in drive A. To make a bootable diskette, insert a diskette in drive A, type `sys a:` at the command line prompt, then press <Enter>. Use this bootable diskette

if your computer will not boot from the hard-disk drive.

bpi
Abbreviation for bits per inch.

bps
Abbreviation for bits per second.

BTU
Abbreviation for British thermal unit.

bus
A bus forms an information pathway between the components of a computer. Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for all the various peripheral devices connected to the computer. Your computer also contains an address bus and a data bus for communications between the microprocessor and RAM.

byte
Eight contiguous bits of information, the basic data unit used by your computer.

BZT
Abbreviation for *Bundesamt fur Zulassungen in der Telekommunikation*.

C
Abbreviation for Celsius.

cache
To facilitate quicker data retrieval, a storage area for keeping a copy of data or instructions. For example, your computer's BIOS may cache ROM code in faster RAM. Or, a disk-cache utility may reserve RAM in which to store frequently accessed information from your computer's disk drives; when a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

card-edge connector
On the bottom of an expansion card, the metal-contact section that plugs into an expansion-card connector.

CBT
Abbreviation for computer-based training.

CCFT
Abbreviation for cold cathode fluorescent tube.

CD-ROM
Abbreviation for compact disc read-only memory. CD-ROM drives use optical technology to read data from compact discs. Compact discs are read-only storage devices; you cannot write new data to a compact disc with standard CD-ROM drives.

CGA
Abbreviation for color graphics adapter.

CIFS
Common Internet File System. A protocol for networking PCs.

client
A computer that shares files on a filer.

CIO
Abbreviation for comprehensive input/output.

cm
Abbreviation for centimeter(s).

CMOS
Acronym for complementary metal-oxide semiconductor. In computers, CMOS memory chips are often used for NVRAM storage.

***COM*n**
The MS-DOS device names for the first through fourth serial ports on your computer are COM1, COM2, COM3, and COM4. MS-DOS supports up to four serial ports. However, the default interrupt for COM1 and COM3 is IRQ4, and the default interrupt for COM2 and COM4 is IRQ3. Therefore, you must be careful when configuring software that runs a serial device so that you don't create an interrupt conflict.

CON
The MS-DOS device name for the console, which includes your computer's keyboard and text displayed on the screen.

config.sys *file*
When you boot your computer, MS-DOS runs any commands contained in the text file, **config.sys** (before running any commands in the **autoexec.bat** file). A **config.sys** file is not required to boot MS-DOS, but provides a convenient place to run commands that are essential for setting up a consistent computing environment—such as loading device drivers with a **device=** statement.

console
A terminal that is attached to a filer's serial port and is used to monitor and manage filer operation.

controller
A chip or expansion card that controls the transfer of data between the microprocessor and a peripheral, such as a disk drive or the keyboard.

conventional memory
The first 640 KB of RAM. Unless they are specially designed, MS-DOS programs are limited to running in conventional memory. See also **EMM**, **expanded memory**, **extended memory**, **HMA**, **memory manager**, **upper memory area**, and **XMM**.

coprocessor
A coprocessor relieves the computer's microprocessor of specific processing tasks. A math coprocessor, for example, handles numeric processing. A graphics coprocessor handles video rendering. The Intel® Pentium® microprocessor includes a built-in math coprocessor.

cpi
Abbreviation for characters per inch.

CPU
Abbreviation for central processing unit. See also **microprocessor**.

cursor
In character-based MS-DOS programs, the cursor is usually a block or an underscore (possibly blinking) that represents the position at which the next character typed will appear. Windows programs can design their own cursors—common cursor symbols include the pointer arrow and the text-insertion I-beam.

DAC
Acronym for digital-to-analog converter.

DAT
Acronym for digital audio tape.

dB
Abbreviation for decibel(s).

dBA
Abbreviation for adjusted decibel(s).

DC
Abbreviation for direct current.

DDC
Acronym for display data channel. A VESA® standard mechanism that allows the system to communicate with the monitor and retrieve information about its capabilities.

Dell OpenManage Client and Client Administrator
The Dell OpenManage program is a DMI browser that allows you to view information about various components of your system.

device driver
A device driver allows the operating system or a program to interface correctly with a peripheral, such as a printer or network card. Some device drivers—such as network drivers—must be loaded from the **config.sys** file (with a **device=** statement) or as memory-resident programs (usually, from the **autoexec.bat** file). Others—such as video drivers—must load when you start the program for which they were designed.

Desktop Manager
Desktop Manager, a component of the Intel LANDesk® Configuration Manager system management software, is used to manage clients after installing an operating system, management agents, and applications.

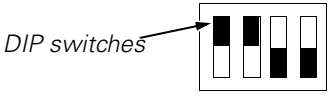
DHCP
Acronym for Dynamic Host Configuration Protocol.

diagnostics
See **diskette-based diagnostics**.

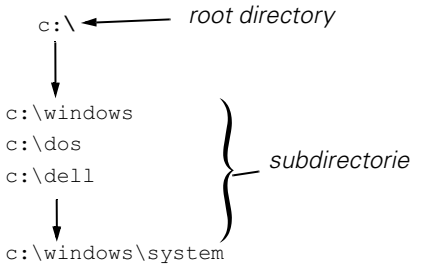
DIMM
Acronym for dual in-line memory module.

DIN
Acronym for *Deutsche Industrie Norm*.

DIP
Acronym for dual in-line package. A circuit board, such as a system board or expansion card, may contain DIP switches for configuring the circuit board. DIP switches are always toggle switches, with an ON position and an OFF position.



directory
Directories help keep related files organized on a disk in a hierarchical, "inverted tree" structure. Each disk has a "root" directory; for example, a `C:\>` prompt normally indicates that you are at the root directory of hard-disk drive C. Additional directories that branch off of the root directory are called *subdirectories*. Subdirectories may contain additional directories branching off of them.



diskette-based diagnostics
A comprehensive set of diagnostic tests for your Dell computer. To use the diskette-based diagnostics, you must boot your computer from the *Dell Diagnostics* diskette. Refer to your *Installation and Troubleshooting Guide* for a complete discussion about how to use the diskette-based diagnostics.

display adapter
See **video adapter**.

DMA
Abbreviation for direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the microprocessor.

DMI
Abbreviation for Desktop Management Interface. DMI enables the management of your computer system's software and hardware. DMI defines the software, interfaces, and data files that enable your system to determine and report information about its components.

If DMI is installed on your system, you can enable DMI support as you complete the setup of your system by double-clicking the DMI icon in the Windows Control Panel. For further instructions on enabling DMI support or for more information about DMI, refer to the DMI online help.

DMTF
Acronym for Desktop Management Task Force, a consortium of companies representing hardware and software providers, of which Dell Computer Corporation is a steering committee member.

DOC
Abbreviation for Department of Communications (in Canada).

dpi
Abbreviation for dots per inch.

DPMS
Abbreviation for Display Power Management Signaling. A standard developed by the Video Electronics Standards Association that defines the hardware signals sent by a video controller to activate power management states in a video display or monitor. A monitor is said to be DPMS-compliant when it is designed to enter a power management state after receiving the appropriate signal from a computer's video controller.

DRAC
Acronym for Dell Remote Assistant Card.

DRAM
Abbreviation for dynamic random-access memory. A computer's RAM is usually made up entirely of DRAM chips. Because DRAM chips cannot store an electrical charge indefinitely, your computer continually refreshes each DRAM chip in the computer.

drive-type number
Your computer can recognize a number of specific hard-disk drives. Each is assigned a drive-type number that is stored in NVRAM. The hard-disk drive(s) specified in your computer's System Setup program must match the actual drive(s) installed in the computer. The System Setup program also allows you to specify physical parameters (cylinders, heads, write precomp, landing zone, and capacity) for drives not included in the table of drive types stored in NVRAM.

DS/DD
Abbreviation for double-sided/double-density.

DS/HD
Abbreviation for double-sided/high-density.

DTE
Abbreviation for data terminal equipment. Any device (such as a computer system) that can send data in digital form by means of a cable or communications line. The DTE is connected to the cable or communications line through a data communications equipment (DCE) device, such as a modem.

ECC
Abbreviation for error checking and correction.

ECP
Abbreviation for Extended Capabilities Port.

EDO
Abbreviation for extended-data output. A type of RAM chip that holds data on the chip's output data lines for a longer period of time than fast-page mode RAM chips. The EDO RAM chips are also faster than fast-page mode RAM chips.

EEPROM
Acronym for electrically erasable programmable read-only memory.

EGA
Abbreviation for enhanced graphics adapter.

EISA
Acronym for Extended Industry-Standard Architecture, a 32-bit expansion-bus design. The expansion-card connectors in an EISA computer are also compatible with 8- or 16-bit ISA expansion cards.

To avoid a configuration conflict when installing an EISA expansion card, you must use the EISA Configuration Utility. This utility allows you to specify which expansion slot contains the card and obtains information about the card's required system resources from a corresponding EISA configuration file.

EMC
Abbreviation for Electromagnetic Compatibility.

EMI
Abbreviation for electromagnetic interference.

EMM
Abbreviation for expanded memory manager. A software utility that uses extended memory to emulate expanded memory on computers with an Intel386™ or higher microprocessor. See also **conventional memory**, **expanded memory**, **extended memory**, **memory manager**, and **XMM**.

EMS
Abbreviation for Expanded Memory Specification. See also **expanded memory**, **memory manager**, and **XMS**.

enterprise
A systems-management software product that is either a source or a receiver of SNMP traps.

EPROM
Acronym for erasable programmable read-only memory.

ESD
Abbreviation for electrostatic discharge. Refer to "Safety Instructions" at the front of your *User's Guide* for a complete discussion of ESD.

ESM
Abbreviation for embedded server management.

ESDI
Acronym for enhanced small-device interface.

expanded memory
A technique for accessing RAM above 1 MB. To enable expanded memory on your computer, you must use an EMM. You should configure your system to support expanded memory only if you run application programs that can use (or require) expanded memory. See also **conventional memory**, **EMM**, **extended memory**, and **memory manager**.

expansion bus
Your computer contains an expansion bus that allows the microprocessor to communicate with controllers for peripheral devices, such as a network card or an internal modem.

expansion card
A SCSI card, NVRAM card, network card, hot swap card, or console card that plugs into a filer expansion slot.

expansion-card connector
A connector on the computer's system board for plugging in an expansion card.

extended memory
RAM above 1 MB. Most software that can use it, such as Windows, requires that extended memory be under the control of an XMM. See also **conventional memory**, **expanded memory**, **memory manager**, and **XMM**.

external cache memory
A RAM cache using SRAM chips. Because SRAM chips operate at several times the speed of DRAM chips, the microprocessor can retrieve data and instructions faster from external cache memory than from RAM.

F
Abbreviation for Fahrenheit.

FAT
Acronym for file allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Microsoft® Windows NT® operating system can optionally use a FAT file system structure.

FCC
Abbreviation for Federal Communications Commission.

filer
A filer is a dedicated, special-purpose network data server that provides fast and reliable file service to network clients connected to Ethernet networks.

flash memory
A type of EEPROM chip that can be reprogrammed from a utility on diskette while still installed in a computer; most EEPROM chips can only be rewritten with special programming equipment.

format
To prepare a hard-disk drive or diskette for storing files. An unconditional format deletes all data stored on the disk. The **format** command in MS-DOS 5.0 or higher includes an option that allows you to unformat a disk, if you have not yet used the disk for file storage.

ft
Abbreviation for feet.

FTP
Abbreviation for file transport protocol.

g
Abbreviation for gram(s).

G
Abbreviation for gravities.

GB
Abbreviation for gigabyte(s). A gigabyte equals 1,024 megabytes or 1,073,741,824 bytes.

GID
Group identification number.

group
A group of users defined in the filer's */etc/group* file.

graphics coprocessor
See **coprocessor**.

graphics mode
See **video mode**.

guarding
A type of data redundancy that uses a set of physical drives to store data and a single, additional drive to store parity data. Using guarding, the user's data is protected from the loss of a single drive. Guarding is sometimes preferred over mirroring because it is more cost effective in systems with a very high storage capacity. However, guarded configurations are significantly slower for applications that frequently write to the array, because each attempt to write to the array requires multiple read and write commands to maintain the parity information. If this is a problem, mirroring or duplexing is a better choice. See also mirroring, RAID 4, and RAID 5.

GUI
Acronym for graphical user interface.

h
Abbreviation for hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the computer's RAM and I/O memory addresses for devices. The sequence of decimal numbers from 0 through 16, for example, is expressed in hexadecimal notation as: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10. In text, hexadecimal numbers are often followed by *h* or preceded by *0x*. MS-DOS conventional memory—the first 640 KB of memory addresses—is from 00000h to 9FFFFh; the MS-DOS upper memory area—memory addresses between 640 KB and 1 MB—is from A0000h to FFFFFh.

heat sink
A metal plate with metal pegs or ribs that help dissipate heat. Some microprocessors include a heat sink.

HMA
Abbreviation for high memory area. The first 64 KB of extended memory above 1 MB. A memory manager that conforms to the XMS can make the HMA a direct extension of conventional memory. See also **conventional memory**, **memory manager**, **upper memory area**, and **XMM**.

HIP
Acronym for the Dell OpenManage Hardware Instrumentation Package. HIP provides seamless integration with the Intel LANDesk Server Manager. Together, HIP and LANDesk Server Manager allow you to monitor your Dell servers and track status information about Dell server components.

host adapter
A host adapter implements communication between the computer's bus and the controller for a peripheral. (Hard-disk drive controller subsystems include integrated host adapter circuitry.) To add a SCSI expansion bus to your system, you must install the appropriate host adapter.

HPFS
Abbreviation for the High Performance File System option in the Windows NT operating system.

HTTP
Hypertext Transfer Protocol. An object-oriented protocol that can be used for many tasks, such as name servers and distributed object management systems, through extension of its request methods (commands).

Hz
Abbreviation for hertz.

I/O
Abbreviation for input/output. The keyboard and a printer, for example, are I/O devices. In general, I/O activity can be differentiated from computational activity. For example, when a program sends a document to the printer, it is engaging in I/O activity; when the program sorts a list of terms, it is engaging in computational activity.

ID
Abbreviation for identification.

IHV
Abbreviation for independent hardware vendor.

in-band
Communication across the network between the console and server.

interlacing
A technique for increasing video resolution by only updating alternate horizontal lines on the screen. Because interlacing can result in noticeable screen flicker, most users prefer noninterlaced video adapter resolutions.

internal microprocessor cache
An instruction and data cache built in to the microprocessor. The Pentium microprocessor, for example, includes a 16-KB internal cache, which is set up as an 8-KB read-only instruction cache and an 8-KB read/write data cache.

IP
Acronym for Internet Protocol.

IPX
Acronym for internetwork packet exchange.

IRQ
Abbreviation for interrupt request. A signal that data is about to be sent to or received by a peripheral travels by an IRQ line to the microprocessor. Each peripheral connection must be assigned an IRQ number. For example, the first serial port in your computer (COM1) is assigned to IRQ4 by default. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

ISA
Acronym for Industry-Standard Architecture. A 16-bit expansion bus design. The expansion-card connectors in an ISA computer are also compatible with 8-bit ISA expansion cards.

ISM
Abbreviation for Internet Service Manager.

ITE
Abbreviation for information technology equipment.

JEIDA
Acronym for Japanese Electronic Industry Development Association.

K
Abbreviation for kilo-, indicating 1,000.

KB
Abbreviation for kilobyte(s), 1,024 bytes.

KB/sec
Abbreviation for kilobyte(s) per second.

Kbit(s)
Abbreviation for kilobit(s), 1,024 bits.

Kbit(s)/sec
Abbreviation for kilobit(s) per second.

key combination
A command requiring that you press multiple keys at the same time. For example, you can reboot your computer by pressing the <Ctrl><Alt><Del> key combination.

kg
Abbreviation for kilogram(s), 1,000 grams.

kHz
Abbreviation for kilohertz, 1,000 hertz.

LAN
Acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

lb
Abbreviation for pound(s).

LCD
Abbreviation for liquid crystal display. A low-power display often used for notebook computers. An LCD consists of a liquid crystal solution between two sheets of polarizing material. An electric current causes each crystal to act like a shutter that can open to allow light past or close to block the light.

LDSM
Abbreviation for LANDesk Server Manager.

LED
Abbreviation for light-emitting diode. An electronic device that lights up when a current is passed through it.

LIF
Acronym for low insertion force. Some computers use LIF sockets and connectors to allow devices such as the microprocessor chip to be installed or removed with minimal stress to the device.

LIM
Acronym for Lotus/Intel/Microsoft. LIM usually refers to version 4.0 of the EMS.

LN
Abbreviation for load number.

local bus
On a computer with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. Some local-bus designs allow peripherals to run at the same speed and with the same width data path as the computer's microprocessor.

LPTn
The MS-DOS device names for the first through third parallel printer ports on your computer are LPT1, LPT2, and LPT3.

LUN
Acronym for logical unit number.

m
Abbreviation for meter(s).

mA
Abbreviation for milliampere(s).

mAh
Abbreviation for milliampere-hour(s).

math coprocessor
See **coprocessor**.

MB
Abbreviation for megabyte(s). The term *megabyte* means 1,048,576 bytes; however, when referring to hard-disk drive storage, the term is often rounded to mean 1,000,000 bytes.

MBR
Abbreviation for master boot record.

MDA
Abbreviation for monochrome display adapter.

memory
A computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word *memory* is used as a synonym for RAM; for example, an unqualified statement such as "…a computer with 8 MB of memory" refers to a computer with 8 MB of RAM.

memory address
A specific location, usually expressed as a hexadecimal number, in the computer's RAM.

memory manager
A utility that controls the implementation of memory in addition to conventional memory, such as extended or expanded memory. See also **conventional memory**, **EMM**, **expanded memory**, **extended memory**, **HMA**, **upper memory area**, and **XMM**.

MGA
Abbreviation for monochrome graphics adapter.

MHz
Abbreviation for megahertz.

MIB
Acronym for management information base.

MIF
Abbreviation for management information format.

microprocessor
Because it is the primary computational chip inside the computer, it is customary to refer to the microprocessor as "the computer's brain." The microprocessor contains an arithmetic processing unit and a control unit. Software written for one microprocessor must usually be revised to run on another microprocessor. *CPU* is a synonym for microprocessor.

min
Abbreviation for minute(s).

mirroring
A type of data redundancy that uses a set of physical drives to store data and one or more sets of additional drives to store duplicate copies of the data. Mirroring is the preferred data redundancy technique in lower-capacity systems and in systems where performance is extremely important. See also guarding, RAID 1, and RAID 10.

mm
Abbreviation for millimeter(s).

mouse
A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows you to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

ms
Abbreviation for millisecond(s).

MS-DOS
Abbreviation for Microsoft Disk Operating System.

MTBF
Abbreviation for mean time between failures.

multifrequency monitor
A monitor that supports several video standards. A multifrequency monitor can adjust to the frequency range of the signal from a variety of video adapters.

mV
Abbreviation for millivolt(s).

NFS
Network File System. A protocol for networking PCs.

NIC
Acronym for network interface card.

NiCad
Acronym for nickel cadmium.

NiMH
Abbreviation for nickel-metal hydride.

NLM

Acronym for Novell® NetWare® Loadable Module.

NMI

Abbreviation for nonmaskable interrupt. A device sends an NMI to signal the microprocessor about hardware errors, such as a parity error.

noninterlaced

A technique for decreasing screen flicker by sequentially refreshing each horizontal line on the screen.

ns

Abbreviation for nanosecond(s), one billionth of a second.

NTFS

Abbreviation for the NT File System option in the Windows NT operating system.

NVRAM

Abbreviation for nonvolatile random-access memory. Memory that does not lose its contents when you turn off your computer. NVRAM is used for maintaining the date, time, and system setup options.

OS/2

Abbreviation for Operating System/2.

out-of-band

Communications that do not use the network but are passed via modem. The out-of-band path is used for remote management of a server or for accessing server information when the server or network is down.

OTP

Abbreviation for one-time programmable.

parallel port

An I/O port used most often to connect a parallel printer to your computer. You can usually identify a parallel port on your computer by its 25-hole connector.

parameter

A value or option that you specify to a program. A parameter is sometimes called a *switch* or an *argument*.

partition

You can divide a hard-disk drive into multiple physical sections called *partitions* with the **fdisk** command. Each partition can contain multiple logical drives. For example, you could partition a 200-MB hard-disk drive into two physically separate partitions with three logical drive assignments, as shown in the following table.

Partitioning the Hard-Disk Drive

Physical Partitions and Sizes
Partition 1 120 MB Partition 2 80 MB
Logical Drive Assignments and Sizes
Drive C 120 MB Drive D 50 MB Drive E 30 MB

After partitioning the hard-disk drive, you must format each logical drive with the **format** command.

PC Card

Slightly larger than a credit card, a PC Card is a removable I/O card—such as a modem, LAN, SRAM, or flash memory card—that adheres to the PCMCIA standards. See also **PCMCIA**.

PCI

Abbreviation for Peripheral Component Interconnect. A standard for local-bus implementation developed by Intel Corporation.

PCMCIA

Abbreviation for Personal Computer Memory Card International Association. See also **PC Card**.

PDC

Primary Domain Controller. The domain controller that has negotiated to be, or has been assigned as, the primary authentication server for the domain.

peripheral device
An internal or external device—such as a printer, a disk drive, or a keyboard—connected to a computer.

PGA
Abbreviation for pin grid array, a type of microprocessor socket that allows you to remove the microprocessor chip.

pixel
Arranged in rows and columns, a pixel is a single point on a video display. Video resolution—640 x 480, for example—is expressed as the number of pixels across by the number of pixels up and down.

POST
Acronym for power-on self-test. Before the operating system loads when you turn on your computer, the POST tests various system components such as RAM, the disk drives, and the keyboard.

ppm
Abbreviation for pages per minute.

PQFP
Abbreviation for plastic quad flat pack, a type of microprocessor socket in which the microprocessor chip is permanently mounted.

PRN
A synonym for the MS-DOS device name LPT1.

program diskette set
The set of diskettes from which you can perform a complete installation of an application program. When you reconfigure a program, you often need its program diskette set.

protected mode
An operating mode supported by 80286 or higher microprocessors, protected mode allows operating systems to implement:

- A memory address space of 16 MB (80286 microprocessor) to 4 GB (Intel386 or higher microprocessor)
- Multitasking
- Virtual memory, a method for increasing addressable memory by using the hard-disk drive

The Windows NT 32-bit operating system runs in protected mode. MS-DOS cannot run in protected mode; however, some programs that you can start from MS-DOS—such as Windows—are able to put the computer into protected mode.

PS/2
Abbreviation for Personal System/2.

PSPB
Abbreviation for power-supply paralleling board.

PVC
Abbreviation for polyvinyl chloride.

QIC
Abbreviation for quarter-inch cartridge.

RAID
Acronym for redundant arrays of independent disks. This phrase was introduced by David Patterson, Garth Gibson, and Randy Katz at the University of California at Berkeley in 1987. The goal of RAID is to use multiple small, inexpensive disk drives to provide high storage capacity and performance while maintaining or improving the reliability of the disk subsystem.

Patterson, Gibson, and Katz described five different methods, which are known as RAID levels 1 through 5. Each level uses one or more extra drives to provide a means of recovering data lost when a disk fails, so that the effective failure rate of the whole disk subsystem becomes very low.

Recently, Katz has defined a sixth method, RAID 6, which improves reliability even further, and a configuration that provides no data recovery has popularly become known as RAID 0.

RAID 0
RAID 0 is commonly called *striping*. This was not originally defined as a RAID level but has since come into popular use. In this array configuration, data is written

sequentially across the available disks and no redundancy is provided. RAID 0 configurations provide very high performance but relatively low reliability. RAID 0 is the best choice when DSA controller cards are duplexed. See also **striping**.

RAID 1
RAID 1 is commonly called *mirroring*. RAID 1 also uses striping, so RAID 1 may be regarded as the mirroring of RAID 0 configurations. RAID 1 is the best choice in high-availability applications that require high performance or relatively low data capacity. See also **mirroring**, **RAID 10**, **striping**.

RAID 4
RAID 4 is commonly called *guarding*. It uses data striping, like RAID 0, but adds a single, dedicated parity drive. The parity data stored on this drive can be used to recover data lost from a single failed drive. RAID 4 configurations write data slowly because parity data has to be generated and written to the parity drive, and the generation of the parity data frequently requires reading data from multiple physical drives. See also **guarding** and **striping**.

RAID 5
RAID 5, like RAID 4, is commonly called *guarding*. RAID 5 is identical to RAID 4, except that the parity data is distributed evenly across all physical drives instead of a parity drive. In configurations using a large number of physical drives in which a large number of simultaneous small write operations are being performed, RAID 5 offers potentially higher performance than RAID 4. RAID 4 and RAID 5 configurations are appropriate in high-availability applications where performance is less critical or where high data capacity is required. See also **guarding**.

RAID 10
RAID 10 is a mirroring technique in which data is duplicated across two identical RAID 0 arrays or hard-disk drives. All data on a physical drive in one array is duplicated, or *mirrored*, on a drive in the second array. Mirroring offers complete redundancy of data for greater data security. See also mirroring, RAID 1, and striping.

RAM
Acronym for random-access memory. The computer's primary temporary storage area for program instructions and data. Each location in RAM is identified by a number called a *memory address*. Any information stored in RAM is lost when you turn off your computer.

RAMDAC
Acronym for random-access memory digital-to-analog converter.

read-only file
A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if:

- Its read-only attribute is enabled.
- It resides on a physically write-protected diskette.
- It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

real mode
An operating mode supported by 80286 or higher microprocessors, real mode imitates the architecture of an 8086 microprocessor. Designed to run in real mode, MS-DOS (unassisted by additional software techniques) can address only 640 KB of conventional memory.

refresh rate
The frequency, measured in Hz, at which the screen's horizontal lines are recharged. A monitor's refresh rate is also referred to as its *vertical frequency*.

REN
Abbreviation for ringer equivalence number.

RFI
Abbreviation for radio frequency interference.

RGB
Abbreviation for red/green/blue.

ROM
Acronym for read-only memory. Your computer contains some programs essential to its operation in ROM code. Unlike RAM, a ROM chip retains its contents even after you turn off your computer. Examples of code in ROM include the program that initiates your computer's boot routine and the POST.

rpm
Abbreviation for revolutions per minute.

RTC
Abbreviation for real-time clock. Battery-powered clock circuitry inside the computer that keeps the date and time after you turn off the computer.

SCSI
Acronym for small computer system interface. An I/O bus interface with faster data transmission rates than standard ports. You can connect up to seven devices to one SCSI interface.

SDMS
Abbreviation for SCSI device management system.

SDRAM
Abbreviation for Synchronous Dynamic Random Access Memory.

SDS
Abbreviation for scalable disk system.

SEC
Abbreviation for single-edge connector cartridge.

sec
Abbreviation for second(s).

sector
The fundamental unit of data access for a hard-disk drive. For PC-compatible systems, a sector is usually 512 bytes. See also block and block size.

serial console
An ASCII or ANSI terminal attached to a filer's serial port. Used to monitor and manage filer operations.

serial port
An I/O port used most often to connect a modem or a mouse to your computer. You can usually identify a serial port on your computer by its 9-pin connector.

shadowing
A computer's system and video BIOS code is usually stored on ROM chips. Shadowing refers to the performance-enhancement technique that copies BIOS code to faster RAM chips in the upper memory area (above 640 KB) during the boot routine.

share
A directory or directory structure on the filer that has been made available to network users and can be mapped to a drive letter on a CIFS client.

SMART
Acronym for Self-Monitoring Analysis Reporting Technology. A technology that allows hard-disk drives to report errors and failures to the system BIOS, which then displays an error message on the screen. To take advantage of this technology, you must have a SMART-compliant hard-disk drive and the proper support in the system BIOS.

SMB
Acronym for system management bus.

SMM
Abbreviation for server monitor module. An ISA expansion card that provides a modem interface for out-of-band monitoring and control of a server.

SMP
Abbreviation for symmetric mutiprocessing.

SMS
Abbreviation for Systems Management Server.

SNMP
Abbreviation for Simple Network Management Protocol.

SQL
Abbreviation for Structured Query Language.

striping
In composite drivers with two or more physical drives, the drive array subsystem uses a method of data storage called striping. With this method, data is divided into a series of pieces called blocks and each data block is stored on a different physical drive. When each drive contains a block of data, the process starts over with the first physical drive. By carefully selecting the size of the data block, the chance that the information needed can be read from or written to multiple physical drives at once is increased, greatly increasing the performance of the composite drive. See also block, block size, and RAID.

SRAM
Abbreviation for static random-access memory. Because SRAM chips do not require continual refreshing, they are substantially faster than DRAM chips. SRAM is used mostly for external cache memory.

SVGA
Abbreviation for super video graphics array. See also **VGA**.

switch
See **parameter**.

sync negotiation
Sync negotiation is a SCSI feature that allows the host adapter and its attached SCSI devices to transfer data in synchronous mode. Synchronous data transfer is faster than asynchronous data transfer.

syntax
The rules that dictate how you must type a command or instruction so that the computer will understand it.

system board
As the main circuit board, the system board usually contains most of your filer's integral components, such as the microprocessor, RAM, and expansion-card connectors.

system diskette
System diskette is a synonym for *bootable diskette*.

system memory
System memory is a synonym for *RAM*.

System Setup program
System Setup program options allow you to configure your computer's hardware. Some options in the System Setup program require that you reboot the computer in order to make a hardware-configuration change. Because the System Setup program is stored in NVRAM, any options that you set remain in effect until you change them again.

system.ini *file*
When you start Windows, it consults the **system.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **system.ini** file records which video, mouse, and keyboard drivers are installed for Windows.

Running the Control Panel or Windows Setup program may change options in the **system.ini** file. On other occasions, you may need to change or add options to the **system.ini** file manually with a text editor, such as Notepad.

TCP/IP
Abbreviation for Transmission Control Protocol/Internet Protocol.

TIRCP
Abbreviation for Transport Independent Remote Procedure Call.

terminator
Some devices, especially disk drives, contain a terminator to absorb and dissipate excess current. When more than one such device is connected in a series, you may need to remove the terminator—or change a jumper setting to disable it—unless it is the last device in the series. However, some devices have terminators that should never be removed or disabled.

text editor
An application program for editing text files consisting exclusively of ASCII characters. MS-DOS Editor and Notepad (in Windows) are text editors, for example. Most word processors use proprietary file formats containing binary characters, although some can read and write text files.

text mode
See **video mode**.

TFT
Abbreviation for thin film transistor. A flat-panel display for notebook computers where each pixel is controlled by one to four transistors.

tpi
Abbreviation for tracks per inch.

trap
An alert, error, or system message from a server reporting an exception (for example, a device failure or a threshold violation) in a server.

TSR
Abbreviation for terminate-and-stay-resident. A TSR program runs "in the background." Most TSR programs implement a predefined key combination (sometimes referred to as a "hot key") that allows you to activate the TSR program's interface while running another MS-DOS program. When you finish using the TSR program, you can return to the other application program and leave the TSR program resident in memory for later use.

Because MS-DOS is not designed to support multiple programs running simultaneously, TSR programs can sometimes cause memory conflicts. When troubleshooting, rule out the possibility of such a conflict by rebooting your computer without starting any TSR programs.

UDA
Acronym for user-defined attribute.

UDP
Abbreviation for User Datagram Protocol.

UID

User identification number.

UL
Abbreviation for Underwriters Laboratories.

UMB
Abbreviation for upper memory blocks. See also **conventional memory**, **HMA**, **memory manager**, and **upper memory area**.

upper memory area
The 384 KB of RAM located between 640 KB and 1 MB. If the computer has an Intel386 or higher microprocessor, a software utility called a *memory manager* can create UMBs in the upper memory area, in which you can load device drivers and memory-resident programs. See also **conventional memory**, **HMA**, and **memory manager**.

UPS
Abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your computer in the event of an electrical failure.

USOC
Abbreviation for Universal Service Ordering Code.

utility
A program used to manage system resources— memory, disk drives, or printers, for example. The **diskcopy** command for duplicating diskettes and the **himem.sys** device driver for managing extended memory are utilities included in MS-DOS.

V
Abbreviation for volt(s).

VAC
Abbreviation for volt(s) alternating current.

VCCI
Abbreviation for Voluntary Control Council for Interference.

VDC
Abbreviation for volt(s) direct current.

VDE
Abbreviation for *Verband Deutscher Elektrotechniker*.

VDS
Abbreviation for Virtual Direct Memory Access Services.

VESA
Acronym for Video Electronics Standards Association.

VGA
Abbreviation for video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than EGA and CGA, the previous standards.

To display a program at a specific resolution, you must install the appropriate video drivers and your monitor must support the resolution. Similarly, the number of colors that a program can display depends on the capabilities of the monitor, the video driver, and the amount of memory installed for the video adapter.

VGA feature connector
On some systems with a built-in VGA video adapter, a VGA feature connector allows you to add an enhancement adapter, such as a video accelerator, to your computer. A VGA feature connector can also be called a *VGA pass-through connector*.

video adapter
The logical circuitry that provides—in combination with the monitor or display—your computer's video capabilities. A video adapter may support more or fewer features than a specific monitor offers. Typically, a video adapter comes with video drivers for displaying popular application programs and operating environments in a variety of video modes.

On most current Dell computers, a video adapter is integrated into the system board. Also available are many video adapter cards that plug into an expansion-card connector.

Video adapters can include memory separate from RAM on the system board. The amount of video memory, along with the adapter's video drivers, may affect the number of colors that can be simultaneously displayed. Video adapters can also include their own coprocessor chip for faster graphics rendering.

video driver
Graphics-mode application programs and operating environments, such as Windows, often require video drivers in order to display at a chosen resolution with the desired number of colors. A program may include some "generic" video drivers. Any additional video drivers may need to match the video adapter; you can find these drivers on a separate diskette with your computer or video adapter.

video memory
Most VGA and SVGA video adapters include VRAM or DRAM memory chips in addition to your computer's RAM. The amount of video memory installed primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capability).

video mode
Video adapters normally support multiple text and graphics display modes. Character-based software (such as MS-DOS) displays in text modes that can be defined as *x* columns by *y* rows of characters. Graphics-based software (such as Windows) displays in graphics modes that can be defined as *x* horizontal by *y* vertical pixels by *z* colors.

video resolution
Video resolution—640 x 480, for example—is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific

graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

viewer
A system running the remote control viewer window, usually the console.

virtual 8086 mode
An operating mode supported by Intel386 or higher microprocessors, virtual 8086 mode allows operating environments—such as Windows—to run multiple programs in separate 1-MB sections of memory. Each 1-MB section is called a *virtual machine*.

virtual memory
A method for increasing addressable RAM by using the hard-disk drive. (MS-DOS does not support true virtual memory, which must be implemented at the operating system level.) For example, in a computer with 8 MB of RAM and 16 MB of virtual memory set up on the hard-disk drive, the operating system would manage the system as though it had 24 MB of physical RAM.

virus
A self-starting program designed to inconvenience you. Virus programs have been known to corrupt the files stored on a hard-disk drive or to replicate themselves until a system or network runs out of memory.

The most common way that virus programs move from one system to another is via "infected" diskettes, from which they copy themselves to the hard-disk drive. To guard against virus programs, you should do the following:

- Periodically run a virus-checking utility on your computer's hard-disk drive
- Always run a virus-checking utility on any diskettes (including commercially sold software) before using them

VL-Bus™
An abbreviation for VESA local bus. A standard for local bus implementation developed by the Video Electronics Standards Association.

VLSI
Abbreviation for very-large-scale integration.

Vpp
Abbreviation for peak-point voltage.

VRAM
Abbreviation for video random-access memory. Some video adapters use VRAM chips (or a combination of VRAM and DRAM) to improve video performance. VRAM is dual-ported, allowing the video adapter to update the screen and receive new image data at the same time.

W
Abbreviation for watt(s).

win.ini *file*
When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **win.ini** file records what printer(s) and fonts are installed for Windows. The **win.ini** file also usually includes sections that contain optional settings for Windows application programs that are installed on the hard-disk drive.

Running the Control Panel or Windows Setup program may change options in the **win.ini** file. On other occasions, you may need to change or add options to the **win.ini** file manually with a text editor, such as Notepad.

workgroup
A collection of computers running Microsoft Windows NT or Windows for Workgroups™ operating systems that is grouped for browsing and sharing.

write-protected
Read-only files are said to be *write-protected*. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position and a 5.25-inch diskette by

placing an adhesive label over its write-protect notch.

WWW
Abbreviation for World Wide Web.

XMM
Abbreviation for extended memory manager, a utility that allows application programs and operating environments to use extended memory in accordance with the XMS. See also **conventional memory**, **EMM**, **expanded memory**, **extended memory**, and **memory manager**.

XMS
Abbreviation for eXtended Memory Specification. See also **EMS**, **extended memory**, and **memory manager**.

ZIF
Acronym for zero insertion force. Some computers use ZIF sockets and connectors to allow devices such as the microprocessor chip to be installed or removed with no stress applied to the device.

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