




Workstation  
Server  
Enterprise

CHAPTER

## Using Control Panel

# 4

Overview of Control Panel . . . . .	117
Managing Peripherals and Devices . . . . .	119
Accessibility Options . . . . .	119
Devices . . . . .	119
Display . . . . .	120
Keyboard . . . . .	121
Modems . . . . .	121
Mouse . . . . .	123
Multimedia . . . . .	123
PC Card (PCMCIA) . . . . .	123
Ports . . . . .	124
Printers . . . . .	124
SCSI Adapters . . . . .	125
Tape Devices . . . . .	126
UPS . . . . .	126
Licensing . . . . .	127
Networking . . . . .	128
Changing the Computer/Domain Name of a Domain Controller . . . . .	128
Changing the Computer/Domain/Workgroup Name of a Stand-Alone Server or a Windows NT Workstation Computer . . . . .	130
Joining a domain . . . . .	131
Protocols and Services . . . . .	132
Planning for protocols and services . . . . .	137
Installing and Configuring Protocols and Services . . . . .	138
Configuring Bindings and Network Access Order . . . . .	139
Configuring Network Adapters . . . . .	142



Managing Services . . . . .	144
Managing the Server . . . . .	145
Configuring Directory Replication . . . . .	145
Managing the System . . . . .	149
Application Performance and Virtual Memory . . . . .	149
Application performance. . . . .	149
Virtual memory . . . . .	149
Environment Variables . . . . .	150
Startup/Shutdown . . . . .	150
Hardware Profiles . . . . .	152
User Profiles . . . . .	154
Other Control Panel Applications . . . . .	154
Add/Remove Programs . . . . .	154
Console . . . . .	154
Date/Time . . . . .	155
Fonts. . . . .	155
Internet . . . . .	155
ODBC . . . . .	155
Regional Settings . . . . .	155
Sounds . . . . .	156
Telephony . . . . .	156
Troubleshooting Common Configuration Problems . . . . .	156
Key Point Summary. . . . .	158
Applying What You've Learned. . . . .	160
Instant Assessment . . . . .	160
Review Activities . . . . .	161
Control Panel application matching exercise . . . . .	161
Hands-on Lab Exercises . . . . .	163
Lab 4.5: Configuring directory replication . . . . .	163
Lab 4.6: Exploring Control Panel. . . . .	167

## About Chapter 4

**T**his chapter explores Windows NT Control Panel—a collection of mini-applications that are automatically installed during the installation of Windows NT. After a brief overview, Chapter 4 discusses many of the Control Panel applications that are used to install or configure options, hardware, and hardware drivers.

Next, in-depth coverage of the Network application is presented. A comprehensive list of protocols and services is included in this section. Installing and configuring protocols and services is also covered.

The Server application is explained, with emphasis on configuring directory replication. Then the System application, which is used to configure virtual memory, among other things, is discussed. The chapter then describes briefly the remaining Control Panel applications, and concludes by providing tips for troubleshooting common configuration problems.

This chapter also includes two hands-on labs. In the first lab, you create a logon script and configure directory replication. In the second, you explore and use several Control Panel applications.

This chapter is a “must read” no matter which of the three Windows NT 4.0 Microsoft Certified Professional exams you’re preparing for. The information in this chapter covers objectives listed in the Planning, Installation and Configuration, Connectivity, and Troubleshooting sections in these exams’ objectives.

---

## Overview of Control Panel

Windows NT Control Panel is a collection of mini-applications, sometimes called applets. These applications, which are automatically installed during installation of Windows NT Workstation and Windows NT Server, are used to install and/or configure various options, hardware, protocols, and services.

Each Control Panel application is used for a different task. Some software packages and some installable services include their own Control Panel icon, which is displayed in the Control Panel dialog box after the new application or service is installed. (Unless expressly stated otherwise, the information presented about Control Panel applies to both Windows NT Workstation and Windows NT Server.)

You can access Control Panel in several ways:

- Select Start > Settings > Control Panel
- Select Control Panel in Windows NT Explorer
- Open the My Computer dialog box and double-click Control Panel

Figure 4-1 shows a screen shot of Control Panel. Notice that there are twenty-seven icons displayed.



FIGURE 4-1 Windows NT Server Control Panel

You may have additional icons in Control Panel depending on the services or options you chose to install during installation and setup of Windows NT.

This chapter covers all of the common Control Panel applications, and organizes the applications into sections based on each application's functionality. The basic application functions include: managing peripherals and devices, licensing, networking, managing services, managing the server, managing the system, and miscellaneous other functions. The first function is all about the applications you can use to manage peripherals and hardware devices, and is the topic of the next section.

---

# Managing Peripherals and Devices

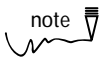
This section examines the Control Panel applications that are used to install and/or configure options, hardware, and hardware drivers.

## Accessibility Options



The *Accessibility Options* application is used to configure the keyboard, sound, and mouse options on a computer to accommodate users that are physically challenged, including persons who have difficulty striking multiple keys simultaneously on a keyboard, persons with hearing disabilities, or persons who have difficulty holding or clicking a mouse.

The Accessibility Options application is available unless you deselected it during the installation of Windows NT, or you performed a compact installation. (Accessibility Options is normally installed by default, but if it's not installed on your computer, you can use the Add/Remove Programs application, discussed later in this chapter, to install it.)



**note** Another Control Panel application, Display, can be used to configure the display so that the visibility of some screen elements is enhanced. See the "Display" section later in this chapter.

## Devices



The *Devices* application is used to start and stop device drivers, to configure the startup behavior of device drivers, to view the status of a device driver, and to enable or disable a device driver within a hardware profile.

The startup behaviors (or types) available in this application include *boot*, *system*, *automatic*, *manual*, and *disabled*. If you choose boot, system, or automatic, Windows NT starts the device driver automatically every time the computer is booted. If you choose manual, a user (or another device driver) must start the device driver. If you select disabled, the device driver can't be started by a user.

caution



Use extreme caution when using the Devices application. Changing the startup type or disabling a device driver, such as Atdisk, can leave your computer in an unbootable state.

## Display



The *Display* application is used to configure a computer's desktop background, screen saver options, desktop appearance, Microsoft Plus! options, and display adapter settings. You can also configure the display to use large fonts, large icons, and a high-contrast color scheme to accommodate a visually challenged person. The Display application can also be accessed by right-clicking the desktop and selecting Properties from the menu that appears.

Use the Settings tab to configure your computer's display adapter settings. Figure 4-2 shows the Settings tab of the Display Properties dialog box. Notice the various display options that you can configure, including: Color Palette, Font Size, Desktop Area, and Refresh Frequency.

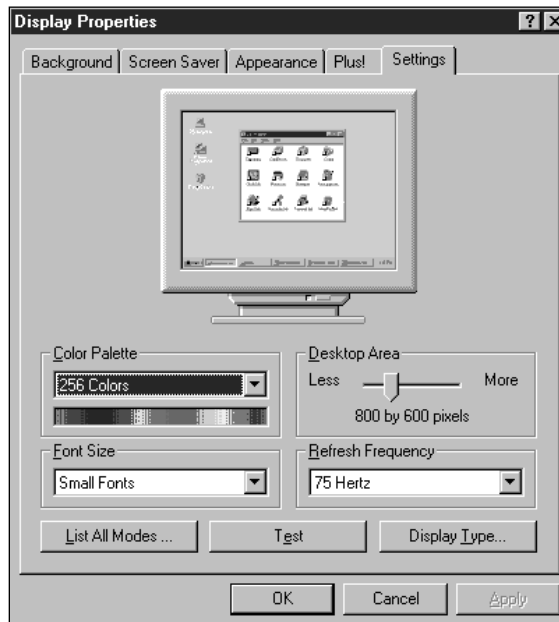


FIGURE 4-2 The Settings tab

If you make any changes on the Settings tab, you must test the changes before you can apply them or save them.

## Keyboard



The *Keyboard* application is used to configure specific keyboard features, including speed of character repeat and cursor blink rate, input locale (including keyboard layout), and keyboard type.

The default input locale is English/United States. You can select other languages (localized for use in other countries) by clicking the Add command button on the Input Locales tab, and then scrolling through the drop-down list box.

A list of keyboard layout options is displayed when you click the Properties command button on the Input Locales tab, and then scroll through the drop-down list box. Figure 4-3 illustrates the different U.S. keyboard layouts that can be selected.

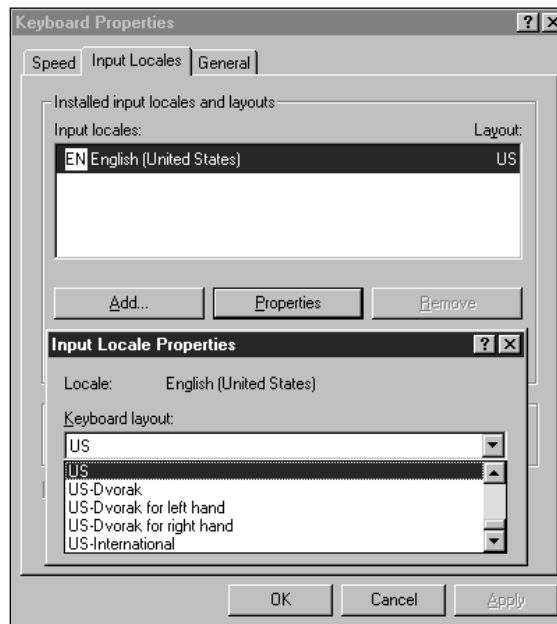


FIGURE 4-3 United States keyboard layouts

## Modems



The *Modems* application is used to install and configure modems and to configure dialing properties.

When you install a modem, you can instruct Windows NT to detect your modem automatically, or you can select your modem manually from a list. If you choose to select your modem manually and your modem does not appear on the list, you can choose from the list of standard modem types.



When you troubleshoot modem connection problems, consider configuring Windows NT to record a log file of your modem connection activity.

To configure Windows NT to record a modem log file follow these steps:

1. Double-click Modems in Control Panel.
2. Highlight your modem in the Modems Properties dialog box, and then click the Properties command button.
3. A specific Modem Properties dialog box is displayed for your particular modem. Click the Connection tab. Then click the Advanced command button to display the Advanced Connection Settings dialog box shown in Figure 4-4.
4. At the bottom left corner of the Advanced Connection Settings dialog box, check the check box next to Record a log file. Then click OK and exit the Modems application.

This log file will contain a detailed record of all commands sent to and from your modem starting from the time that you enable this feature. Windows NT saves this log file in your Windows NT installation directory as `ModemLog_your modem name.txt`. You can use any text editor to view this file.

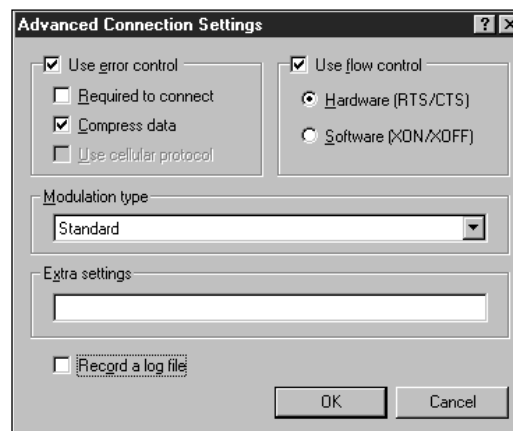


FIGURE 4-4 Configuring the Modems application to record a log file

You can use the Modems application to configure dialing properties, including the area code you are calling from, the country you are in, special



instructions on how to access an outside line, whether to dial using a calling card, instructions on how to disable call waiting, and to specify tone or pulse dialing. To access the Dialing Properties dialog box, double-click Modems in Control Panel, and then click the Dialing Properties command button in the Modems Properties dialog box.

## Mouse



The *Mouse* application is used to install and configure a mouse or other pointing device. You can choose the mouse button configuration, select a different pointer (this is the arrow on your screen that moves as you move your mouse), and configure pointer speed and double-click speed.

## Multimedia



The *Multimedia* application is used to install and configure audio/visual devices. You can specify audio record and playback devices, MIDI output configuration, and how a video is shown on your computer's display. The types of devices you can install with this application include sound cards, MIDI devices and instruments, joysticks, video capture devices, and so on.

## PC Card (PCMCIA)



The *PC Card (PCMCIA)* application is used to install, configure, and manage PC card drivers. However, often PC card drivers are installed and configured by other applications, such as the Modem application (for modem cards), and Network (for network adapters). The PC Card application is a convenient, one-stop application you can use to check the operational status of and resources used by your PC cards.

caution



**Always shut down and turn off your computer before inserting or removing PC cards. Hot swapping (removing or inserting PC cards while the computer is powered on) is *not* supported by Windows NT.**

Figure 4-5 shows a list of the PC cards that are installed in my laptop computer. Note that in the PC Card (PCMCIA) Devices dialog box, the application detects two PC cards: a Megahertz modem card and a 3Com network adapter. After I click the

Properties button, the MEGAHERTZ CC3288 Properties dialog box is displayed, which shows the device status and other information about the modem card.

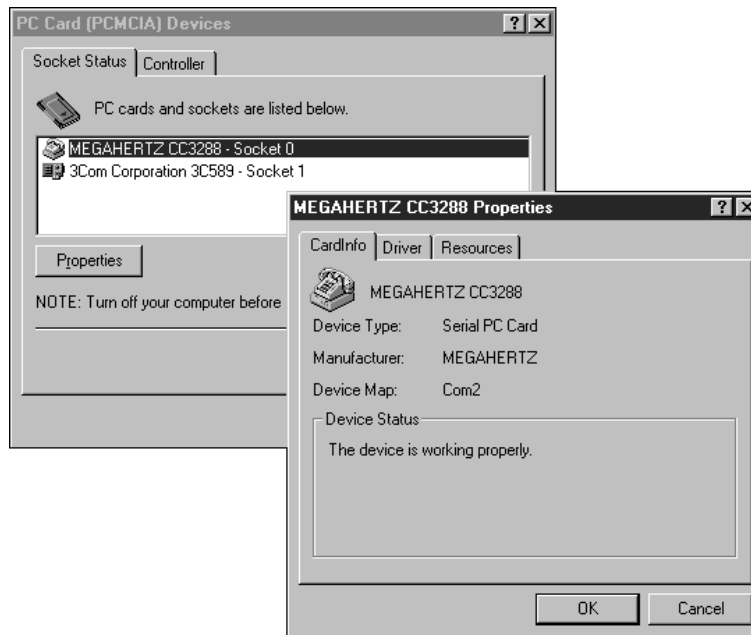


FIGURE 4-5 PC cards installed in a laptop computer

## Ports



The *Ports* application is used to add, configure, and manage the serial communication ports (COM ports) in a computer. You can use the Ports application to configure settings for your serial ports, including baud rate, data bits, I/O port address, and interrupt.

## Printers



The *Printers* application is used to install, configure, manage, and remove printers. It will be covered extensively in Chapter 6.

## SCSI Adapters

➤ The *SCSI Adapters* application is used to install, configure, and manage SCSI adapters. The SCSI Adapters application looks, feels, and functions much the same as the PC Card (PCMCIA) application (discussed earlier in this chapter). SCSI adapter drivers are usually installed and configured during the installation of Windows NT. The SCSI Adapters application, however, is a convenient tool to add additional SCSI adapters after installation, and to view the operational status, configuration, and resources used by your SCSI adapters.

Figure 4-6 shows the two SCSI adapters installed in my desktop computer (a dual channel IDE controller and an Adaptec SCSI adapter), and the devices connected to each adapter. (Note: Windows NT treats dual channel IDE controllers as SCSI adapters.) After I click the Properties button in the SCSI Adapters dialog box, the IDE CD-ROM dialog box is displayed, which shows the driver status and other information about the IDE controller.

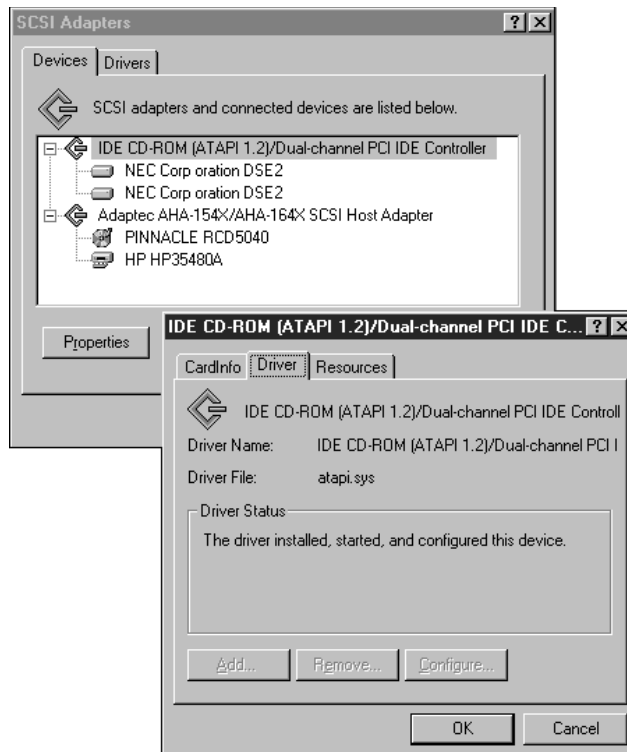


FIGURE 4-6 SCSI adapters installed in a computer

## Tape Devices



The *Tape Devices* application is used to install drivers for tape backup devices and to view the status of tape backup devices connected to your computer. This application functions much like the PC Card (PCMCIA) and SCSI Adapters applications.

You must install a driver for your tape backup device before you can access it in the Windows NT Backup application.

concept link



Using the Windows NT Backup application is discussed in more detail in Chapter 15.

## UPS



The *UPS* application is used to install, configure, and manage an uninterruptible power supply.

in the  
real world



The UPS application is a basic UPS management tool. Most commercial quality UPS devices include application software that is much more sophisticated than the UPS application that ships with Windows NT. I recommend you use the application software that the manufacturer supplies with your UPS.

The Windows NT UPS application is adequate for managing an inexpensive UPS that does not include Windows NT-compatible UPS application software.

Figure 4-7 shows the configuration options available in the Windows NT UPS application. Note that you can configure the UPS interface voltages, expected battery life, the name of an executable program to run thirty seconds before shutdown, and other settings.

in the  
real world



I strongly recommend you use a UPS on any Windows NT Server computer and on any computer that is critical to your operations. A UPS permits an orderly shutdown of your computer to avoid data loss during a power outage.

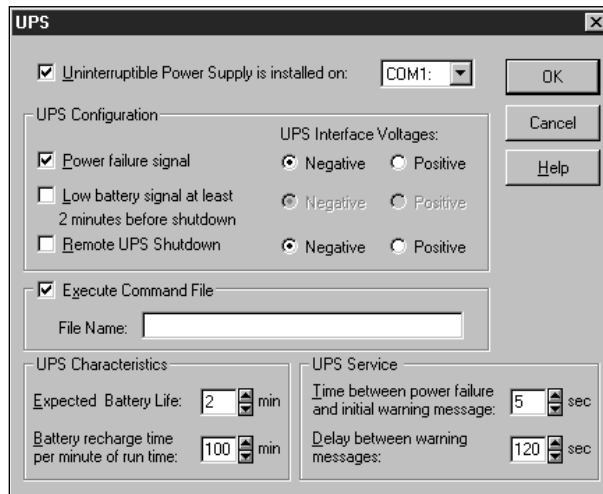


FIGURE 4-7 Configuring a UPS



Also remember that UPS batteries don't last forever. Follow the manufacturer's recommendations for battery replacement and maintenance. There's nothing so dissatisfying as finding out that your UPS battery is dead *after* the power fails. I know. I once spent an entire day during a big Seattle windstorm responding to customer calls concerning damaged hardware and lost data problems that were the result of failed UPS batteries.

## Licensing



The *Licensing* application (available with Windows NT Server only) is used to manage licensing on your Windows NT Server computer. Normally, a licensing mode (Per Server or Per Seat) is chosen and the number of client access licenses is configured during the installation of Windows NT Server. However, if you purchase additional client licenses, or decide after installation to change your licensing mode, you can use the Licensing application to accomplish this.



The Licensing structure of Windows NT is discussed in detail in the "Licensing Mode" section of the Preinstallation Checklist in Chapter 2.

In addition, you can use the Licensing application to replicate licensing information to a centrally located (enterprise) server on your network.

---

## Networking



The *Network* application is used to control all aspects of networking services on the Windows NT computer, including changing the computer/domain/workgroup name, installing and configuring protocols and services, configuring bindings and network access order, and configuring network adapters. The Network application can also be accessed by right-clicking the Network Neighborhood icon and selecting Properties from the menu that appears.

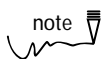
### Changing the Computer/Domain Name of a Domain Controller

Normally you will not change the computer or domain name of a Windows NT Server computer that is configured as a domain controller. However, you may need to change one or both of these names to conform to a naming convention standard that is developed or changed *after* the server is installed. If you want to change a computer or domain name of a domain controller, you can use the Network application to accomplish this.

When you start the Network application on a Windows NT Server that is configured as a domain controller, the Network dialog box is displayed, as shown in Figure 4-8.

Note that the Network dialog box has five tabs: Identification, Services, Protocols, Adapters, and Bindings. The Identification tab is on top initially. If you click the Change command button, the Identification Changes dialog box is displayed, as shown in Figure 4-9.

Notice that in the Identification Changes dialog box you can change the computer name or change the name of the domain.



If you change the domain name of one domain controller in a domain, you *must* change the domain name of all other domain controllers, member servers, and Windows NT Workstation computers in that domain to match the new domain name you assign.

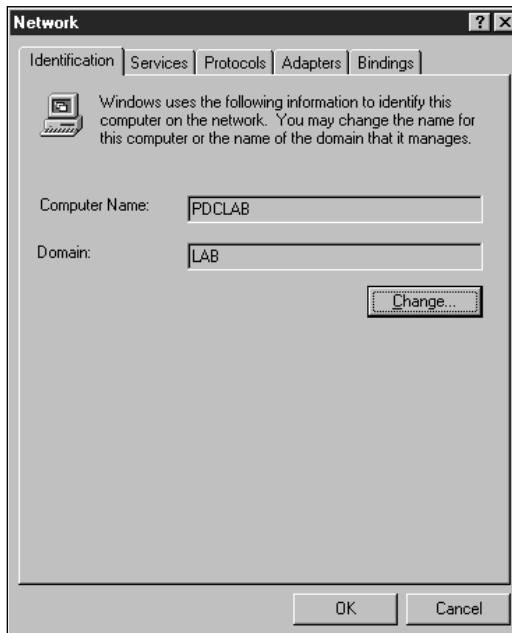


FIGURE 4-8 Starting Network on a Windows NT Server domain controller

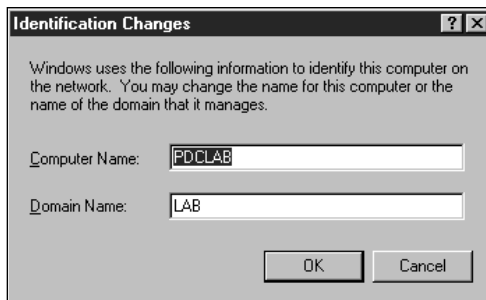


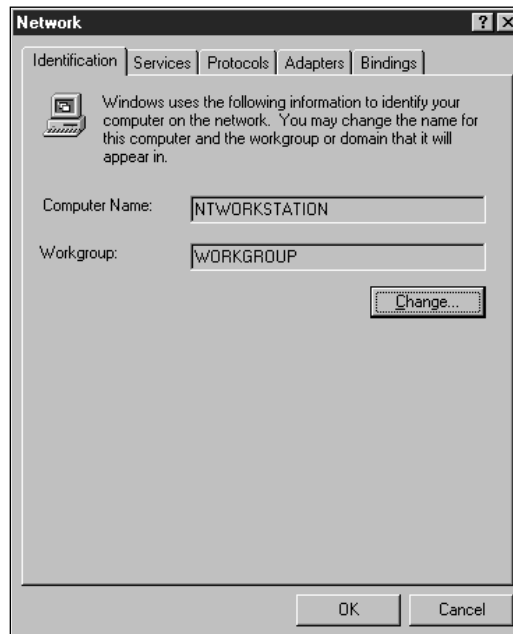
FIGURE 4-9 Making identification changes on a Windows NT Server domain controller

You *cannot* change a domain controller's domain membership by changing its domain name. For example, if you have two domains on your network named EAST and WEST, you can't move a domain controller from the EAST domain to the WEST domain simply by changing the EAST domain controller's name to WEST. You have to reinstall Windows NT Server to move this domain controller from the EAST domain to the WEST domain. However, if you just want to change the name of the EAST domain to the FAR\_EAST domain, you can do this by changing the domain name of all of the domain controllers, member servers, and Windows NT Workstation computers in the EAST domain to FAR\_EAST.

## Changing the Computer/Domain/Workgroup Name of a Stand-Alone Server or a Windows NT Workstation Computer

Occasionally you may want to change the computer, domain, or workgroup name, or change the domain membership status of a stand-alone server or a Windows NT Workstation computer. For example, you might change the computer name of a Windows NT Workstation computer that is assigned to a new employee to match the new user's name, instead of the name of the previous employee who used that computer.

When you start the Network application on a stand-alone/member server or on a Windows NT Workstation computer, the Network dialog box is displayed, as shown in Figure 4-10.



**FIGURE 4-10** Starting Network on a Windows NT Workstation computer

Note that the Network dialog box contains five tabs: Identification, Services, Protocols, Adapters, and Bindings. The Identification tab is on top initially. If you click the Change command button, the Identification Changes dialog box is displayed, as shown in Figure 4-11.



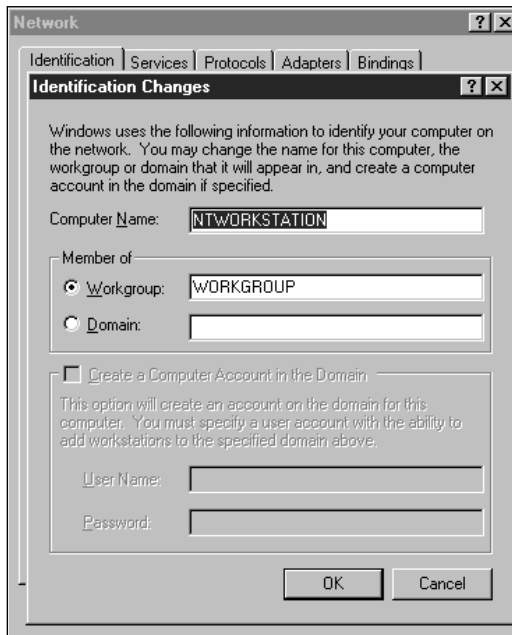


FIGURE 4-11 Making identification changes on a Windows NT Workstation computer

Notice that in the Identification Changes dialog box you can change the computer name or change the domain or workgroup the computer belongs to. A Windows NT computer must belong to either a workgroup or a domain.

If you select the Workgroup radio button you can accept the workgroup name that is displayed, or, if no name is displayed, you must type in a workgroup name. A Windows NT computer can be a member of any existing workgroup, or it can be the only computer in a new workgroup.

### *Joining a domain*

If you select the Domain radio button, you must either accept the domain name that is displayed or type the name of any existing domain on the network. To be a member of a domain, a Windows NT computer must have a computer account in that domain. If a computer account does not exist in the domain for the computer you are configuring, you must check the Create a Computer Account in the Domain check box, and you must supply the administrator's user account name and password (or any other user account that has the right to add computer accounts to the domain). This entire process is called *joining a domain*.

Once a Windows NT computer has joined a domain, a user can log on to this computer interactively (locally) by using a user account in the domain directory database via a process known as *pass through authentication*.



concept link

See the section, “Workgroups Versus Domains” in Chapter 1 for more information on how to determine whether a computer should be a member of a workgroup or a member of a domain. For more information on pass through authentication, see Chapter 10.

## Protocols and Services

Windows NT supports a variety of protocols and services. This section identifies each protocol and service that ships with Windows NT Server and Windows NT Workstation and briefly describes the functionality of each.



concept link

Many of these protocols and services are covered in more depth in the chapters that make up Part IV.

Table 4-1 lists and describes the protocols that ship with Windows NT Workstation and Windows NT Server, and Table 4-2 lists and describes the services that ship with Windows NT Workstation and Windows NT Server.

**TABLE 4-1 WINDOWS NT PROTOCOLS**

PROTOCOL	NT WORKSTATION	NT SERVER	DESCRIPTION
AppleTalk Protocol	X		This protocol enables a Windows NT Workstation computer to connect to AppleTalk network print devices. (AppleTalk is usually associated with Macintosh computers and printers.) Although not listed in the Windows NT Server Network Protocols dialog box, you can install AppleTalk Protocol on a Windows NT Server computer by installing Services for Macintosh.

<i>PROTOCOL</i>	<i>NT WORKSTATION</i>	<i>NT SERVER</i>	<i>DESCRIPTION</i>
DLC Protocol	X	X	This protocol is a datalink protocol. In an NT environment, DLC is primarily used by Windows NT computers to communicate with Hewlett-Packard printers and IBM mainframe computers.
NetBEUI Protocol	X	X	This protocol is designed for small, nonrouted networks. It doesn't require any configuration and has minimal overhead. NetBEUI is included with NT 4.0 primarily to provide backward compatibility with earlier networking software that uses NetBEUI as its only protocol.
NWLink IPX/SPX Compatible Transport	X	X	This protocol is a routable protocol usually associated with NetWare networks. NWLink is fully supported for Windows NT networking.
Point-to-Point Tunneling Protocol	X	X	This protocol is used to provide a secure network communications path between computers over the Internet.
Streams Environment	X	X	Some applications require Streams for correct network functionality. I recommend you install Streams Environment only if it is required by an application or service you want to use.
TCP/IP Protocol	X	X	Of the protocols listed here, TCP/IP provides the most robust capabilities for Windows NT networking. It is a fast, routable enterprise protocol. TCP/IP is the protocol used on the Internet. TCP/IP is supported by many other operating systems, including Windows 95, Macintosh, UNIX, MS-DOS, and IBM mainframes. Its only drawback is the extensive configuration required to implement it.

**TABLE 4-2** WINDOWS NT SERVICES

<i>SERVICE</i>	<i>NT WORKSTATION</i>	<i>NT SERVER</i>	<i>DESCRIPTION</i>
Client Service for NetWare	X		This service enables a Windows NT Workstation computer to access files and printers on a NetWare server.
DHCP Relay Agent		X	This service enables a Windows NT Server computer that is functioning as a TCP/IP router to forward DHCP packets to a DHCP server.
Gateway (and Client) Services for NetWare		X	This service enables a Windows NT Server computer to access files and printers on a NetWare server, and enables the NT Server to share NetWare printers and files with its non-NetWare client computers.
Microsoft DHCP Server		X	This service enables a Windows NT Server computer to provide TCP/IP addresses and other TCP/IP configuration information to DHCP-enabled client computers.
Microsoft DNS Server		X	This service is a TCP/IP-based name resolution service. It is used to resolve a host name to its associated IP address.
Microsoft Internet Information Server		X	This service enables a Windows NT Server computer to function as a WWW, FTP, and a Gopher server. It supports unlimited connections.
Microsoft Peer Web Services	X		This service is a limited version of Microsoft Internet Information Server specifically tailored to the Windows NT Workstation operating system.

<i>SERVICE</i>	<i>NT WORKSTATION</i>	<i>NT SERVER</i>	<i>DESCRIPTION</i>
Microsoft TCP/IP Printing	X	X	This service enables Windows NT to connect to TCP/IP-based printers that use the <i>line printer daemon</i> (LPD). It also enables Windows NT to function as an LPD print server.
NetBIOS Interface	X	X	This service is installed by default and is an integral part of Windows NT networking.
Network Monitor Agent	X	X	This service enables Performance Monitor to obtain statistics about the network segment. In addition, computers that run the Network Monitor program from Systems Management Server can remotely access computers that use the Network Monitor Agent in order to capture packets from the segment and gather network statistics.
Network Monitor Tools and Agent		X	The Network Monitor that ships with NT Server is a limited version of the Network Monitor that ships with Systems Management Server. The NT version can't connect to remote agents. Also, the NT version uses a non-promiscuous network driver. (This means that Network Monitor captures only packets that are addressed to the computer that is running Network Monitor.)
Remote Access Service (RAS)	X	X	This service enables Windows NT to use serial ports and modems as network adapters, for both dial-in and dial-out networking. Windows NT Server supports 256 simultaneous connections. Windows NT Workstation supports only one connection.

*continued*

TABLE 4-2 (continued)

SERVICE	NT WORKSTATION	NT SERVER	DESCRIPTION
Remote Boot Service		X	This service enables client computers that do not have hard drives to load their operating systems across the network from a Windows NT Server computer that is running the Remote Boot Service.
RIP for Internet Protocol		X	This service enables a Windows NT Server computer that is functioning as a TCP/IP router to update its routing tables dynamically based on information from adjacent routers that also run RIP.
RIP for NWLink IPX/SPX Compatible Transport		X	This service enables a Windows NT Server computer to function as an IPX router.
RPC Configuration	X	X	This service is installed by default. It enables a program running on a Windows NT computer to contact a program that is running on another Windows NT computer directly. RPC stands for <i>Remote Procedure Call</i> .
RPC Support for Banyan	X	X	This service is required to support RPC communications on a Banyan Vines network.
SAP Agent	X	X	This service is used to advertise services on an IPX-based network. You should install the SAP Agent when you want to connect a Windows NT computer that runs SQL Server or SNA Server to a NetWare network.

<i>SERVICE</i>	<i>NT WORKSTATION</i>	<i>NT SERVER</i>	<i>DESCRIPTION</i>
Server	X	X	This service is installed by default. It enables a Windows NT computer to share its files and printers with other computers on the network.
Services for Macintosh		X	This service enables a Windows NT Server computer to share its files and printers with Macintosh client computers.
Simple TCP/IP Services	X	X	This service includes client programs such as Character Generator, Daytime, Echo, and Quote of the Day, for simple network protocols.
SNMP Service	X	X	This service enables a Windows NT computer to send trap messages to (and be managed by) an SNMP management station. In addition, this service enables Performance Monitor to obtain TCP/IP statistics. (This service used to be called SNMP Agent.)
Windows Internet Name Service (WINS)		X	This service enables a Windows NT Server computer to function as a TCP/IP-based NetBIOS name server. It enables client computers to resolve NetBIOS names to IP addresses.
Workstation	X	X	This service enables Windows NT computers to access files and printers located on other computers across the network. This service is essentially the Windows NT client redirector software.

### *Planning for protocols and services*

When planning and implementing a Windows NT installation, you should include all of the protocols and services needed to support every type of client computer that is likely to access the server. Sometimes you may want to limit the number of protocols and services used on the network to reduce network traffic. TCP/IP is often the protocol of choice for use in a large, heterogeneous network environment.

## Installing and Configuring Protocols and Services

Once you have determined which protocols and services you want to install, you're ready to begin the installation process. Installing and configuring protocols and services on Windows NT computers are fairly straightforward procedures.

---

TO INSTALL A PROTOCOL OR SERVICE, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel. Double-click Network. Choose either the Protocols or Services tab (depending on which you want to install).
2. Click the Add command button. The Select Network Protocol (or Select Network Service) dialog box appears.
3. Highlight the protocol or service you want to install. Click OK. (If the protocol or service you want to install is not listed, and you have the third-party software you need to install it, click Have Disk and follow the instructions displayed.) The Windows NT Setup dialog box appears.
4. Enter the path to the Windows NT installation source files (such as your Windows NT compact disc), and click Continue. Windows NT copies the files needed to install the protocol or service you selected. The Network dialog box reappears to give you the opportunity to add or configure additional protocols or services. At this point the protocol or service is added, but not yet configured.
5. Click Close. Windows NT examines the newly installed files, and then prompts you to perform any necessary configurations to the protocol or service.
6. Windows NT then prompts you to reboot your computer so that the new settings can take effect.

---

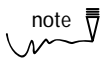
Occasionally you may need to reconfigure a protocol or service that was previously installed.



---

TO CONFIGURE A PROTOCOL OR SERVICE *AFTER* INSTALLATION, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel. Double-click Network. Choose either the Protocols or Services tab (depending on which you want to configure).
2. Highlight the protocol or service you want to configure. Click the Properties command button. A properties dialog box is displayed for the protocol or service you are configuring. Follow the instructions and provide the information requested in this dialog box.



**note** The name and content of this dialog box varies, depending on the specific protocol or service you are configuring. The dialog box may contain several tabs which may each need to be configured.

3. Click OK when you are finished. The Network dialog box reappears.
  4. Click OK to complete the configuration. For some configurations, Windows NT will prompt you to reboot your computer so that the configurations can become effective.
- 

## Configuring Bindings and Network Access Order

*Bindings* and *network access order* specify which protocol or service Windows NT will use first when it attempts to connect to another computer.

Bindings and network access order don't have much effect on the speed of performance of the Server service on Windows NT. (The Server service is normally installed by default on both Windows NT Server and Windows NT Workstation computers.) The Server service's performance is not affected because the Server service replies to the client computer that contacted it by using the same protocol the client computer used. For example, if a client computer uses NetBEUI to contact a server, the server will reply by using NetBEUI, even if TCP/IP is the server's first bound protocol.

Bindings and network access order can be very important to the performance of the Workstation service on Windows NT. (The Workstation service is normally installed by default on both Windows NT Server and Windows NT Workstation

computers.) The Workstation service's performance can be affected because the Workstation service will try each of the protocols installed, in the order they are bound, when attempting to connect to another computer. For this reason, if a Windows NT computer is primarily used as a client computer (workstation), you should configure the protocols and services that are used most often to be at the top of the bindings and network access order lists.

Figure 4-12 illustrates the network bindings order on a computer. Notice that the WINS Client (TCP/IP) is the first protocol listed for the Workstation service, and that NWLink NetBIOS is listed second.

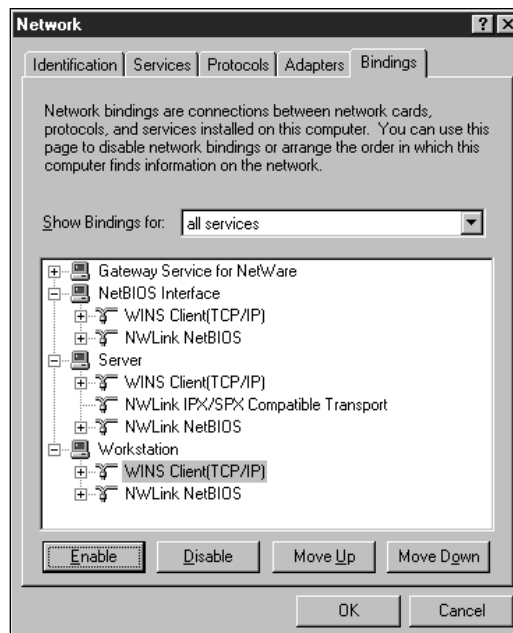
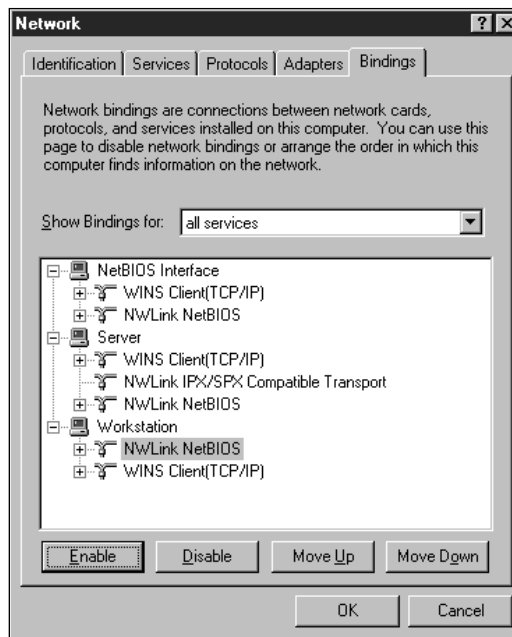


FIGURE 4-12 Bindings order on a Windows NT computer

Assume that most of the servers you want to connect to from this computer use NWLink NetBIOS. If this is the case, you should move NWLink NetBIOS to the top of the Workstation bindings list. To do this, start the Network application in Control Panel. Select the Bindings tab in the Network dialog box, and then highlight the NWLink NetBIOS Workstation binding, and click the Move Up command button. Click OK to complete the configuration. Windows NT will prompt you to reboot your computer.

The result of this configuration change is shown in Figure 4-13. Notice that NWLink NetBIOS is now the first protocol listed for the Workstation service. Making this configuration change will improve the performance of the Workstation service on this computer.



**FIGURE 4-13** Modified Workstation bindings order on a Windows NT computer

Occasionally you may want to disable network services on one or more network adapters in your server. For example, if you have a server that has two network adapters, one of which is connected to your local network, and the other is connected to the Internet, you might want to disable the Server service on the network adapter that is connected to the Internet so that users on the Internet can't connect network drives to your server. To disable a network binding, start the Network application in Control Panel, select the Bindings tab, highlight the protocol or service on which you want to disable the bindings, and click the Disable command button.

When configuring bindings, the primary emphasis is on ordering protocols. When configuring network access order, the primary emphasis is on ordering network service providers, such as Microsoft Windows Network, or NetWare or Compatible Network. Figure 4-14 shows the network access order on a computer. Notice that Microsoft Windows Network is the first provider listed in the Network Providers list, and that NetWare or Compatible Network is listed second.

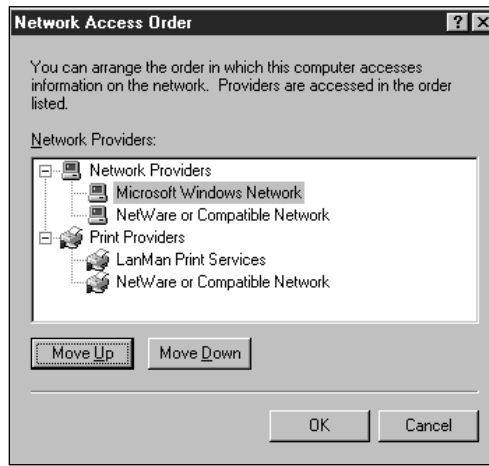
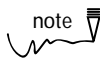


FIGURE 4-14 Network access order on a Windows NT computer

Assume that you use the computer that has the network access order shown in Figure 4-14 primarily to connect to NetWare servers. If this is the case, you should move NetWare or Compatible Network to the top of the Network Providers list. Making this configuration change will improve the performance of the Workstation service on this computer.

To configure network access order, start the Network application in Control Panel. Select the Services tab in the Network dialog box, and then click the Network Access Order command button. Configure the order of Network or Print Providers by highlighting a provider and clicking the Move Up or Move Down command buttons. Click OK. The Services tab in the Network dialog box reappears. Click OK to complete the configuration. Windows NT will prompt you to reboot your computer.

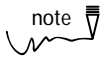


**note** The Network Access Order command button appears on the Services tab in the Network dialog box *only* if you have installed more than one network provider, such as Microsoft Windows Network, or NetWare or Compatible Network.

## Configuring Network Adapters

Occasionally you may need to configure a network adapter. For example, assume that you install an additional card (of any kind) in your computer. You might have to change the settings on your network adapter to resolve an interrupt or an I/O port address conflict between the existing network adapter and the newly installed card.

Configuring a network adapter in Windows NT is usually a two-step process. First, you must configure manually the hardware settings of the network adapter. This can include setting jumpers or switches, or using a manufacturer-supplied configuration program. Second, you must configure the network adapter driver settings used in Windows NT by using the Network application in the Control Panel.



**note** Some PC card network adapters are configurable in a single-step process by using the Network application in Control Panel. It would be great if the two steps required to configure most other network adapters were combined into a single step in a future release of Windows NT that fully supports Plug and Play.

To configure the driver settings for a network adapter, start the Network application in Control Panel. Select the Adapters tab in the Network dialog box. Highlight the adapter you want to configure, and click the Properties command button. An adapter setup dialog box appears. Figure 4-15 shows a setup dialog box for a 3Com Etherlink III network adapter. Notice that you can modify the I/O port address, interrupt, and transceiver type.

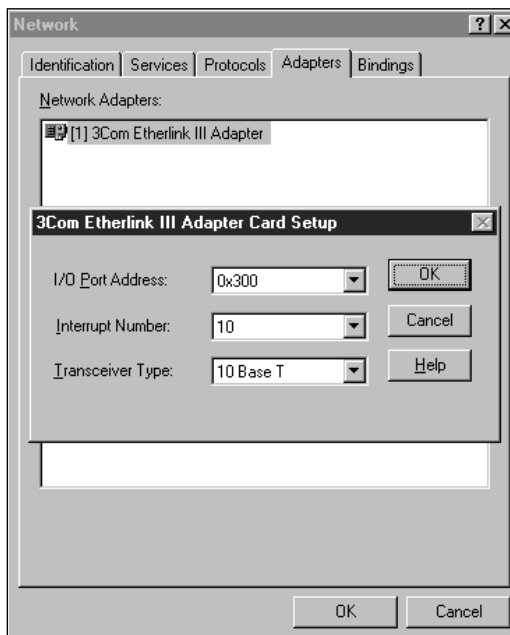


FIGURE 4-15 Configuring a network adapter

Make any necessary modifications to the settings in the dialog box. Click OK when you are finished. The Adapters tab in the Network dialog box reappears. Click OK to complete the configuration. Windows NT will prompt you to reboot the computer.



The options in the adapter setup dialog box vary depending on the specific adapter you select. Some adapters are not configurable at all. For example, to configure the 3Com 3C590 PCI Ethernet adapter, you must boot to DOS and run 3Com's configuration program. There are no configuration options in Windows NT for this adapter.

---

## Managing Services



The *Services* application is used to start and stop services, to configure the startup type of services, to view the status of a service, and to enable or disable a service within a hardware profile.

The startup types available in this application include automatic, manual, and disabled. If you choose automatic, Windows NT starts the service automatically every time the computer is booted. If you choose manual, a user must start the service. If you select disabled, the service can't be started by a user.

caution



Use extreme caution when using the Services application. Changing the startup type or disabling a service, such as Server or Workstation, can render your computer unable to access (or provide) network resources.

concept link



Lab 4.5, at the end of this chapter, includes step-by-step instructions for configuring the startup behavior of the Directory Replicator service.

---

# Managing the Server



The *Server* application is used to view user sessions (including the resources that users are accessing), disconnect users from the computer, view the status of shared resources, configure directory replication, and configure administrative alerts. The Server application is included with both NT Workstation and NT Server.

Most of the functions within the Server application are fairly intuitive and straightforward, but directory replication deserves an in-depth discussion.

## Configuring Directory Replication

*Directory replication* was designed to copy logon scripts from a central location (usually the primary domain controller [PDC]) to all domain controllers, thus enabling all users to execute their own logon scripts no matter which domain controller validates their logon. Directory replication is also used extensively by Microsoft Systems Management Server.

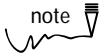
concept link



Directory replication can also be used to replicate system policy. System policy is covered in depth in Chapter 9.

Replication involves copying all subfolders and their files from the source folder on the source server to the destination folder on all Windows NT computers on the network that are configured as replication destinations.

The source replication folder, by default, is `<winntroot>\system32\repl\export`, where `<winntroot>` is the Windows NT installation folder, which by default is `c:\winnt`. During installation, Windows NT creates a folder named `scripts` in the `export` folder. The `scripts` folder is the default source location for logon scripts.



note

Logon scripts are batch files. All MS-DOS 5.0 (and earlier versions) batch commands can be used in logon scripts. Logon scripts are covered in more detail in Chapter 9.

Only subfolders and their files in the `export` folder are replicated. Individual files within the `export` folder are *not* replicated. The `export` folder is shared as the administrative share `REPL$`. This share is not visible in a network browse list.



concept link

**More information on shares is available in Chapter 12.**

The destination replication folder, by default, is `<winntroot>\system32\repl\import`. The `<winntroot>\system32\repl\import\scripts` folder is shared as `NETLOGON`. All client computers look to the `NETLOGON` share on the domain controller that validates their logon for their logon scripts. The `NETLOGON` share is visible in a network browse list.

Replication is configured between source and destination computers. Because of its central location, the primary domain controller (PDC) is usually configured as the source export server, even though any Windows NT Server computer can be configured as the source export server. It seems obvious that the PDC is configured as the export server and that all backup domain controllers (BDCs) are configured as import servers. What is not so obvious is that the PDC should also be configured to import from its *own* export folder. In other words, the PDC should be configured to replicate to itself. If the PDC is not configured this way, users that are validated by the PDC won't be able to access their logon scripts.

exam  
preparation  
pointer

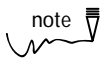
**Configuring directory replication is a fairly complicated task. The key points you should memorize are listed below. After reading the following steps, I recommend you immediately complete Lab 4.5 at the end of this chapter. (Lab 4.5 contains detailed, step-by-step instructions for configuring directory replication.) Then, come back to this section and review these key points.**

---

TO CONFIGURE THE DIRECTORY REPLICATOR SERVICE,  
FOLLOW THESE STEPS:

1. Create and configure a user account for the Directory Replicator service by using User Manager for Domains. This user account must be a member of the Backup Operators group and the Replicator group. In addition, this user account must be granted the "Log on as a service" user right, and must be configured so that its password never expires. Figure 4-16 shows the replication user account being configured in User Manager for Domains. Notice that the user account (Repluser) is a member of the Backup Operators and Replicator groups, as well as the Domain Users group.





note

Windows NT Server 4.0 has a fairly significant bug that requires that the user account used by the Directory Replicator service be a member of the Administrators group (in addition to the Backup Operators and Replicator groups) when configuring directory replication between servers. This is not required when configuring directory replication on a single server from its own export folder to its own import folder.

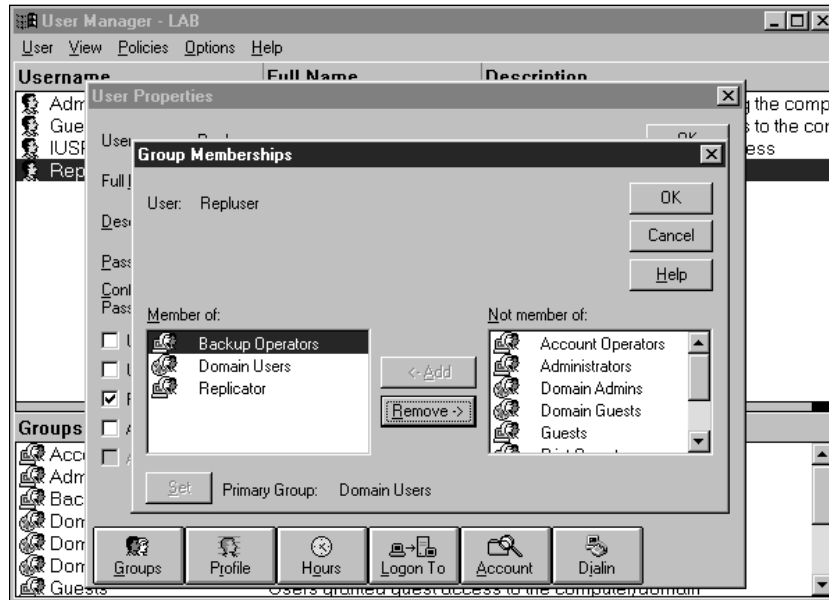


FIGURE 4-16 Configuring the replication user account

2. Configure the startup type of the Directory Replicator service as Automatic, and configure the Directory Replicator service to log on using the user account created in Step 1. (Use the Services application in Control Panel to accomplish this.) Figure 4-17 shows the configuration of the Directory Replicator service on a PDC. Note that the startup type is configured as Automatic, and that the Directory Replicator service is configured to log on as the Repluser account.
3. Configure replication by using the Server application in Control Panel. Figure 4-18 shows a PDC configured for replication. Notice that the PDC (named PDCLAB) is configured to export to all computers in the LAB domain, and that the PDC is configured to import from its own export folder.



FIGURE 4-17 Configuring the Directory Replicator service

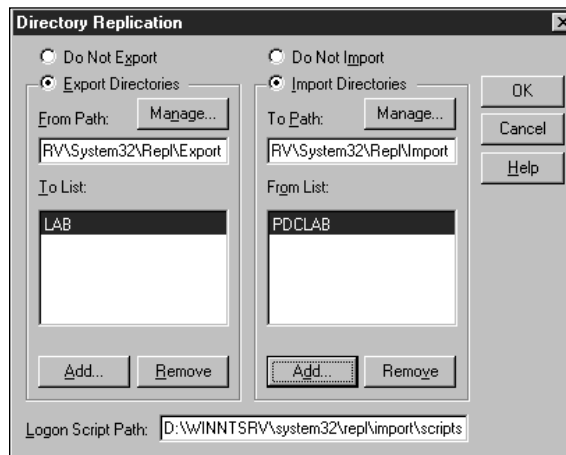


FIGURE 4-18 Configuring replication on a PDC

4. Stop and restart the Directory Replicator service by using the Services application in Control Panel.



---

# Managing the System



The *System* application is used to configure foreground application performance, virtual memory, system and user environment variables, startup and shutdown behavior, hardware profiles, and user profiles. Each of these topics is discussed in the following sections.

## Application Performance and Virtual Memory

You can use the System application to set the performance boost for the foreground application and to configure your virtual memory paging file(s).

### *Application performance*

*Foreground application performance* involves giving a higher priority to the application running in the foreground than to other applications. The purpose of assigning a higher priority is to make the foreground application more responsive to the user.

To configure the foreground application priority, double-click the System icon in the Control Panel, and select the Performance tab. Adjust the slide bar for the amount of performance boost you want.

### *Virtual memory*

*Virtual memory* is implemented in Windows NT by the use of paging files.



Virtual memory and paging files are discussed in detail, as you may recall, in the “NT Memory Model” section of Chapter 1.

You should consider both performance and recoverability when configuring virtual memory paging files.

If you want to configure your system for maximum paging file performance, you should put a small paging file on each physical disk, except on the disk that contains the Windows NT boot partition. This will provide the highest performance for virtual memory.

If you want to configure your system for optimum system recovery, you must put a paging file on the Windows NT boot partition that is at least as large as the amount of RAM in your computer. This paging file is used by Windows NT as a normal paging file, and, additionally, this paging file is required to enable Windows NT to write a `memory.dmp` file when the operating system crashes.

It's up to you to consider the tradeoffs between performance and recoverability, and then to determine the best configuration for your paging files.

You can configure virtual memory paging files by using the System application. On the Performance tab, click the Change command button in the Virtual Memory section. Then configure paging files on each drive as desired.

## Environment Variables

You can use the System application to configure *system* and *user environment variables*. System environment variables apply to all users and to the operating system. User environment variables apply only to a specific user.

To modify a system environment variable, you must be logged on as a user that is a member of the Administrators local group. To modify a user environment variable, you must be logged on as the user whose variable you want to modify.

To configure system and user environment variables, start the System application from the Control Panel, and then select the Environment tab. Highlight the variable you want to modify in the appropriate list box (System or User), edit the value of this variable in the Value text box near the bottom of the dialog box, and then click the Set command button.

To add a new system or user environment variable, highlight any variable in the appropriate list box (System or User), and then type in a new variable name and value in the Variable and Value text boxes near the bottom of the dialog box. Then click the Set command button to create the new variable.

Figure 4-19 shows the layout of the Environment tab within the System application. Notice that the Variable and Value text boxes are located near the bottom of the dialog box.

## Startup/Shutdown

You can use the System application to configure startup and shutdown behavior of Windows NT. Figure 4-20 illustrates the Startup/Shutdown tab within the System application. Notice the System Startup and Recovery options that can be configured.

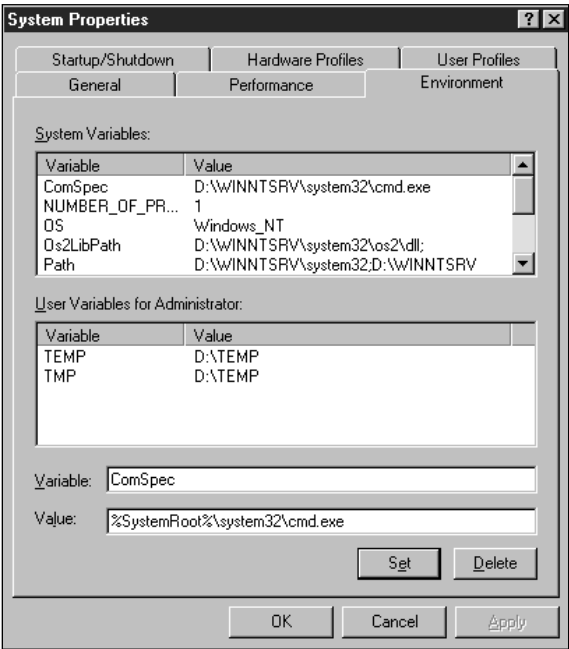


FIGURE 4-19 Configuring system and user environment variables

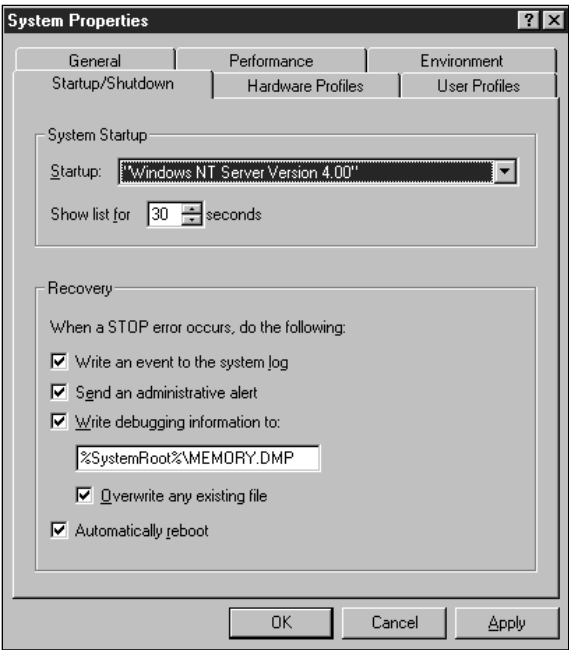


FIGURE 4-20 Configuring system startup and recovery

In the System Startup section of the Startup/Shutdown tab you can configure which operating system will boot by default if no other selection is made from the boot loader menu. You can also configure the length of time the boot loader menu is displayed.

In the Recovery section of the Startup/Shutdown tab you can configure the actions Windows NT takes when a STOP error occurs. A STOP error is an error from which Windows NT cannot recover (in other words, a system crash).

The two most important options you can configure in the Recovery section are the “Write debugging information to” check box and the “Automatically reboot” check box.

The “Write debugging information to” option specifies a file that Windows NT writes the contents of RAM to in the event of a system crash. Remember that Windows NT requires a paging file that is at least as large as the amount of physical RAM on its boot partition in order to create the `memory.dmp` file.



**In the unlikely event you experience recurrent system crashes, the `memory.dmp` file will be needed when you contact Microsoft Technical Support. Microsoft Technical Support personnel can use a debugger on your `memory.dmp` file to identify and resolve the cause of your system crashes.**

The “Automatically reboot” option, when selected, causes Windows NT to reboot the computer in the event of a system crash. If you select the “Automatically reboot” option, you should also select the “Write an event to the system log” option, so that you will be able to tell, when you view the system log, that the system has crashed and rebooted.

## Hardware Profiles

You can use the System application to create and configure *hardware profiles*. Windows NT creates an initial hardware profile during installation.

The primary reason for creating hardware profiles is to manage the different hardware configurations of laptop computers. (A laptop computer that is used at the office in a docking station has a different hardware configuration than the same laptop computer when it is used at home or on the road without a docking station.) Hardware profiles make it possible to create custom configurations for the same laptop computer that is used both with and without a docking station.

Figure 4-21 shows the Hardware Profiles tab within the System application. Note that you can use the arrows on the right hand side to move profiles up or down in the Available Hardware Profiles list box. Windows NT uses the first profile in this list when no other selection is made during the boot process.

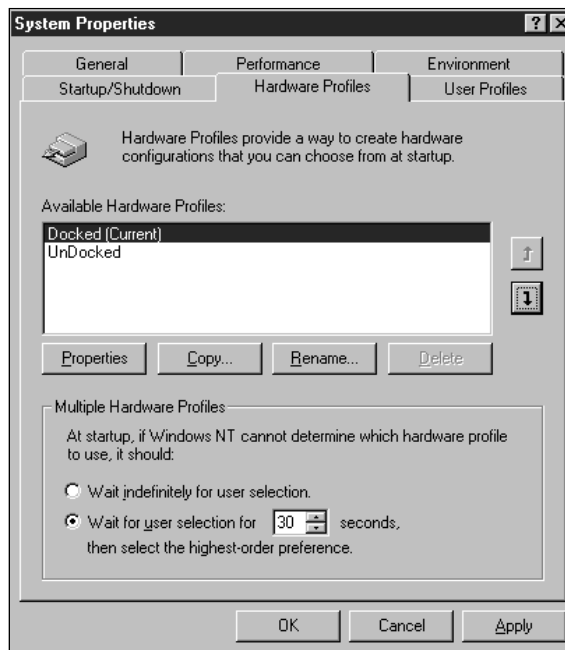


FIGURE 4-21 Managing hardware profiles

To create a new hardware profile, start the System application from Control Panel, and select the Hardware Profiles tab. Highlight any profile in the Available Hardware Profiles list box, and click the Copy command button. A Copy Profile dialog appears, permitting you to type in a name for your new hardware profile. The new hardware profile now has the same properties as the profile you highlighted and copied. You can configure this new profile as necessary.

To configure a new or existing hardware profile, highlight the profile in the Available Hardware Profiles list box and click the Properties command button. Then select the docking status for this hardware profile, and specify whether this is a network disabled profile. (A network disabled profile prevents any network services from starting on a computer.)

You can also use the Services and Devices applications to enable and disable services and device drivers within each hardware profile.

Once you have created multiple profiles, Windows NT displays the Hardware Profile/Configuration Recovery menu after the boot loader menu when your computer boots to Windows NT. This menu permits you to select the hardware profile you want Windows NT to use. You can configure the length of time this menu is displayed in the Multiple Hardware Profiles section on the Hardware Profiles tab.

## User Profiles

You can use the User Profiles tab within the System application to copy, delete, and change the type of user profiles. The System application is the only application in Windows NT that can copy user profiles. You can't copy user profiles by using Windows NT Explorer.



concept link

User profiles are covered in depth in Chapter 9.

---

## Other Control Panel Applications

Control Panel has several other applications. These applications are all fairly straightforward to use. Each application is briefly discussed in the following sections.

### Add/Remove Programs



The *Add/Remove Programs* application is used to install and remove third-party software and to add and remove Windows NT optional components.

### Console



The *Console* application is used to configure how MS-DOS windows appear in Windows NT. You can customize the cursor size, display options (such as window and full screen), font size and type, number of columns and rows, and colors used in each MS-DOS window.



## Date/Time



The *Date/Time* application is used to configure the date, time, time zone, and optional adjustment for daylight saving time.

You can also access the Date/Time application by double-clicking the clock in the right-hand corner of the taskbar on your desktop.

## Fonts



The *Fonts* application is used to install, delete, and manage fonts.

## Internet



The *Internet* application is used to configure whether a proxy server (such as Microsoft Proxy Server) is used when you use applications (such as Microsoft Internet Explorer, `FTP.exe`, and so on) to access the Internet.

## ODBC



The *ODBC* application is used to install and remove ODBC drivers. In addition, this application enables you to configure ODBC data sources.

ODBC-enabled applications (such as Microsoft Excel) can use the installed ODBC drivers to connect to data sources (such as Microsoft SQL Server and Microsoft Access).

## Regional Settings



The *Regional Settings* application is used to configure how certain objects, such as numbers, currency, date, and time are displayed in applications.

You can also use this application to configure your keyboard layout.

## Sounds



The *Sounds* application is used to assign sounds to system events. Some of the Windows NT system events that sounds can be assigned to are exit Windows, new mail notification, empty recycle bin, and many more.

Windows NT supports various sound schemes, including Jungle, Musica, Robotz, and Utopia. You can record new sounds and assign them to the system event you desire. You can also use the Sounds application to select the No Sounds sound scheme if you don't want sounds.

## Telephony



The *Telephony* application is used to configure dialing properties for your computer, such as the area code you are calling from, the country you are in, special instructions on how to access an outside line, whether or not to dial using a calling card, instructions on how to disable call waiting, and to specify tone or pulse dialing. In addition, you can use this application to install, configure, and remove telephony drivers.

---

# Troubleshooting Common Configuration Problems

Configuration problems are common and usually arise in three major areas: hardware, directory replication, and protocols. Troubleshooting configuration problems can be difficult, because it's easy to overlook a simple configuration issue, and to look instead for some complicated (and usually nonexistent) cause.

Some of the most common hardware configuration problems occur when two cards installed in the same computer are configured to use the same interrupt, I/O port address, or DMA address. To resolve this type of problem, you must reconfigure one of the cards to use a nonconflicting setting.

Another common hardware configuration problem occurs when a card is physically configured in one way (via switches or jumpers), and the software driver for that card is configured with different settings. To resolve this type of problem, you must either change the hardware settings or the software driver settings so that both use the same settings.



**Most of the troubleshooting problems I have seen were caused by omitting a step in a configuration process or setting configuration options incorrectly. The successful troubleshooter looks first to make sure that all steps in a configuration process have been completed and to verify that all configuration options are set correctly.**

Directory replication is fairly straightforward to troubleshoot. Verify that each step necessary to configure replication has been properly completed. Ensure that the replication user account is a member of the Backup Operators and Replicator groups, has the “Log on as a service” user right, and is configured so that its password never expires. Make sure the Directory Replicator service is configured to start automatically, and that it is configured to log on by using the replication user account. Verify the password for the replication user account, and ensure that this password is being used by the Directory Replicator service. Verify that the source and destination servers are configured for replication. Finally, make sure to stop and restart the Directory Replicator service on all replication servers.

Troubleshooting protocols can be a detailed, painstaking task.

TCP/IP, for example, is easy to configure improperly. Several settings must be typed on each computer that uses this protocol, including IP address, subnet mask, and default gateway. The best way to prevent configuration problems in a TCP/IP environment is to use a DHCP server to configure TCP/IP automatically on each computer on the network. If you don’t use DHCP, you should manually verify that the settings are correctly entered on each computer that experiences a network communications problem.

NWLink IPX/SPX Compatible Transport also has several configuration settings, and thus is prone to human error during protocol configuration. Verify that all of the settings for this (and every) protocol are correctly entered on each computer that experiences a network communications problem.

---

## Key Point Summary

This chapter introduced Control Panel and its numerous applications.

- Many Control Panel applications are used when managing peripherals and devices, including *Accessibility Options*, *Devices*, *Display*, *Keyboard*, *Modems*, *Mouse*, *Multimedia*, *PC Card (PCMCIA)*, *Ports*, *Printers*, *SCSI Adapters*, *Tape Devices*, and *UPS*.
- The *Licensing* application (on Windows NT Server) permits you to change your Windows NT Server licensing mode or to reflect a change in the number of client licenses you have purchased.
- The *Network* application is used to change a computer/domain/workgroup name, to join a domain, to install and configure protocols and services, to configure bindings and network access order, and to configure network adapters. Remember that you can't change a domain controller's domain membership just by changing its domain name.
- The *protocols and services* that ship with Windows NT Workstation and Windows NT Server are identified and described. Of all the protocols listed, TCP/IP is often the protocol of choice for use in a large, heterogeneous network environment because of its routability, speed, and support by numerous operating systems. When planning a Windows NT installation, you should include all of the protocols and services needed to support every type of client computer that is likely to access the server, keeping in mind that you may need to limit the number of protocols and services used to reduce network traffic.
- To improve the performance of the Workstation service, *bindings and network access order* should be configured so that the protocol and service that are used most often are listed at the top of their respective lists.
- The *Services* application is used to start and stop services, to configure the startup type of services, to view the status of a service, and to enable or disable a service within a hardware profile.
- The *Server* application is used to view user sessions, disconnect users from the computer, view the status of shared resources, configure directory replication, and configure administrative alerts.

- *Directory replication*, which was designed to copy logon scripts from a central location to all domain controllers, involves copying folders and their files from a source folder on a source server to a destination folder on all Windows NT computers on the network that are configured as replication destinations. Follow these steps to configure the *Directory Replicator service*:
  1. Create and configure a user account for the Directory Replicator service using User Manager for Domains. This account must be a member of the Backup Operators group and the Replicator group. This user account must also be granted the “Log on as a service” user right, and must be configured so that its password never expires.
  2. Configure the startup type of the Directory Replicator service as Automatic (using the Services application). Configure the Directory Replicator service to log on using the user account created in Step 1.
  3. Configure replication by using the Server application. Remember that the PDC should be configured to replicate to itself.
  4. Stop and restart the Directory Replicator service by using the Services application.
- The *System* application is used to configure foreground application performance, virtual memory (paging files), system and user environment variables, startup and shutdown behavior, hardware profiles, and user profiles.
  - Consider both performance and recoverability when configuring paging files.
  - When configuring startup/shutdown behavior, consider selecting the “Write debugging to” and “Automatically reboot” options, so that Windows NT will write the contents of RAM to a `memory.dmp` file (as long as it has a paging file that is at least as large as the amount of RAM on its boot partition) and so that NT will automatically reboot in the event of a system crash.
  - The primary reason for creating hardware profiles is to manage the different hardware configurations of laptop computers.
  - The System application is the only application in Windows NT that can copy user profiles.
- Other applications in Control Panel are briefly described, including *Add/Remove Programs*, *Console*, *Date/Time*, *Fonts*, *Internet*, *ODBC*, *Regional Settings*, *Sounds*, and *Telephony*.

- Some tips on troubleshooting common configuration problems are presented. Configuration problems normally arise in three major areas: hardware, directory replication, and protocols. When you troubleshoot, make sure that all steps in a configuration process have been completed and verify that all configuration options are set correctly. Also, verify that hardware devices do not have conflicting interrupt, I/O port addresses, or DMA addresses.

---

## Applying What You've Learned

Now it's time to regroup, review, and apply what you've learned in this chapter.

The questions in the following Instant Assessment section bring to mind key facts and concepts. In addition, the review activity tests your knowledge of specific Control Panel applications.

The hands-on lab exercises will really reinforce what you've learned, and provide you an opportunity to practice several of the tasks tested by the Microsoft Certified Professional exams.

### Instant Assessment

1. What three ways can you access Control Panel?
2. What is the Accessibility Options application used for?
3. Which Control Panel application is used to configure a computer's desktop background, screen saver options, desktop appearance, and Microsoft Plus! options?
4. If you change the domain name of one domain controller in a domain, what else must you do?
5. Which of the protocols that ship with Windows NT is a routable protocol usually associated with NetWare networks?
6. Which of the protocols that ship with Windows NT is usually associated with Macintosh computers and printers?

7. Which of the protocols that ship with Windows NT is a fast, routable enterprise protocol that is used on the Internet and is supported by many operating systems, including Windows NT, Windows 95, Macintosh, UNIX, MS-DOS, and IBM mainframes?
  8. When configuring bindings and network access order, where should the protocol and service that are used most often be placed (ordered) on their respective lists to achieve the best Workstation service performance?
  9. What are the four tasks that must be accomplished to configure the Directory Replicator service?
  10. If you want to configure your Windows NT computer for optimum system recovery, how large must the paging file on your Windows NT boot partition be?
  11. What is the only Windows NT application that you can use to copy user profiles?
  12. You are troubleshooting what you believe is a configuration problem. What actions should you take?
- T/F
13. You can't change a domain controller's domain membership by changing its name. \_\_\_\_\_



concept link

For answers to the Instant Assessment questions see Appendix D.

## Review Activity

The following review activity tests your knowledge of when to use specific Control Panel applications.



Workstation  
Server  
Enterprise

### *Control Panel application matching exercise*

Do you know which Control Panel application you should use to perform various tasks? Match the letter of the Control Panel application from the list on the left that you should use to perform each task listed on the right. Applications may be used more than once.

**Control Panel Application****Task**

- A. Accessibility Options
- B. Add/Remove Programs
- C. Console
- D. Date/Time
- E. Devices
- F. Display
- G. Fonts
- H. Internet
- I. Keyboard
- J. Licensing
- K. Modems
- L. Mouse
- M. Multimedia
- N. Network
- O. ODBC
- P. PC Card (PCMCIA)
- Q. Ports
- R. Printers
- S. Regional Settings
- T. SCSI Adapters
- U. Server
- V. Services
- W. Sounds
- X. System
- Y. Tape Devices
- Z. Telephony
- Zz. UPS

1. \_\_\_\_ You want to install the Windows NT games on your Windows NT computer.
2. \_\_\_\_ You want to change the screen saver settings on your Windows NT computer.
3. \_\_\_\_ You want to change your Windows NT Server licensing mode.
4. \_\_\_\_ You want to change your keyboard layout to a US-Dvorak layout.
5. \_\_\_\_ You want to change the computer name of a domain controller.
6. \_\_\_\_ You want to install the TCP/IP Protocol on your Windows NT computer
7. \_\_\_\_ You want to configure bindings and network access order on your Windows NT computer.
8. \_\_\_\_ You want to stop and start the Directory Replicator service.
9. \_\_\_\_ You want to configure the replication import and export options on your Windows NT computer.
10. \_\_\_\_ You want to copy a user profile.
11. \_\_\_\_ You want to create a new hardware profile on your Windows NT computer.
12. \_\_\_\_ You want to configure a paging file on your Windows NT computer.



concept link

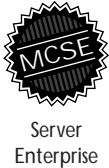
For answers to the Review Activity see Appendix D.



## Hands-on Lab Exercises

The following hands-on lab exercises provide excellent opportunities to explore and use the Control Panel applications you've learned about in this chapter.

### Lab 4.5 *Configuring directory replication*



The purpose of this lab is to provide you with hands-on experience and the skills needed to configure and use the Directory Replicator service.

There are seven parts to this lab:

- Part 1: Creating a logon script
- Part 2: Creating a directory replication user account
- Part 3: Configuring the startup type of the Directory Replicator service
- Part 4: Configuring replication
- Part 5: Stopping and restarting the Directory Replicator service
- Part 6: Viewing the replication of the logon script
- Part 7: Testing your logon script

Follow the steps below carefully.

#### Part 1: Creating a logon script

1. Boot your computer to Windows NT Server.
2. Select Start > Programs > Accessories > Notepad.
3. In the Untitled—Notepad dialog box, type the following:

**@echo This is the logon script I created in Lab 4.5.**

**@echo**

**@echo**

**@pause**

(Note: Make sure to type the text *exactly* as it is presented above.)

4. Select File > Save As. Edit the "File name" text box to read as follows:  
**c:\winntsrv\system32\repl\export\scripts\logonscript.bat**
5. Click Save.
6. Exit Notepad.

#### Part 2: Creating a directory replication user account

1. Select Start > Programs > Administrative Tools (Common) > User Manager for Domains.

2. Select User ➤ New User in the User Manager dialog box.
3. In the New User dialog box, type in the username **Repluser**. Type in a password of **password** (remember that passwords are case-sensitive in Windows NT). Confirm the password by retyping it in the Confirm Password box. Deselect the check box next to User Must Change Password at Next Logon. Select the check box next to Password Never Expires. Click the Groups command button at the lower left-hand corner of the dialog box.
4. The Group Memberships dialog box appears. In the "Not member of" text box, highlight Backup Operators and click the Add command button. In the "Not member of" text box, highlight Replicator and click the Add command button. There should be three groups listed in the "Member of" text box: Backup Operators, Domain Users, and Replicator. Click OK.
5. The New User dialog box reappears. Click Add. Then click Close.
6. The User Manager dialog box reappears. Exit User Manager.

### Part 3: Configuring the startup type of the Directory Replicator service

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click Services.
3. The Services dialog box appears. Highlight Directory Replicator. Click Startup.
4. The Service dialog box appears. In the Startup Type section, select the Automatic radio button. In the Log On As section, select the This Account radio button. Click the ... command button at the end of the This Account text box.
5. The Add User dialog box appears. In the Names list box, highlight Repluser, and click Add. Click OK.
6. The Service dialog box reappears. Highlight the asterisks in the Password text box and type **password**. In the Confirm Password text box, highlight the asterisks and type **password**. Click OK.
7. A Services dialog box appears indicating that the account LAB\Repluser has been granted the Log On As A Service right. Click OK.
8. The Services dialog box reappears. Click Close. The Control Panel dialog box reappears.

### Part 4: Configuring replication

1. In Control Panel, double-click Server.
2. In the Server dialog box, click Replication.

3. The Directory Replication dialog box appears. Click the Export Directories radio button. Click the Add command button at the bottom of the Export Directories section.
4. The Select Domain dialog box appears. In the Select Domain list box, click LAB. LAB should now appear in the Domain text box. Click OK.
5. The Directory Replication dialog box reappears. LAB should appear in the To List box. Click the Import Directories radio button. Click the Add command button at the bottom of the Import Directories section.
6. The Select Domain dialog box appears. In the Select Domain list box, double-click LAB. Click PDCLAB. \\PDCLAB should now appear in the Domain text box. Click OK.
7. The Directory Replication dialog box reappears. PDCLAB should appear in the From list box. Click OK to save the directory replication configuration and automatically start the Directory Replicator service.
8. In the Server dialog box, click OK. The Control Panel dialog box reappears.

### **Part 5: Stopping and restarting the Directory Replicator service**

1. In Control Panel, double-click Services.
2. The Services dialog box appears. In the Service list box, highlight Directory Replicator. Click Stop. A warning message appears, asking if you want to stop the Directory Replicator service. Click Yes.
3. A Service Control dialog box appears, indicating that NT is attempting to stop the Directory Replicator service.
4. The Services dialog box reappears. Note that the Status column no longer shows "Started" for the Directory Replicator service. Click Start.
5. A Service Control dialog box appears, indicating that NT is attempting to start the Directory Replicator service.
6. The Services dialog box reappears. Note that the Status column now shows "Started" for the Directory Replicator service. Click Close.
7. The Control Panel dialog box reappears. Exit Control Panel.

### **Part 6: Viewing the replication of the logon script**

1. Select Start > Programs > Windows NT Explorer.
2. Maximize the Exploring dialog box. In the All Folders column on the left, click the + sign next to the Winntsrv folder. Then click the + sign next to the system32 folder. Click the + sign next to the Repl folder. Click the + sign next to the Export folder. Click the Scripts folder. Notice that the logonscript.bat file you created in the first part of this lab appears

in the Contents window. (Remember that you saved this file in the `c:\winntsrv\system32\repl\export\scripts` folder in the first part of this lab.)

- Click the + sign next to the Import folder (in the All Folders column on the left). Click the Scripts folder beneath the Import folder. Notice that the `logonscript.bat` file has been replicated from the `Export\Scripts` folder to the `Import\Scripts` folder. The Directory Replicator service is now fully functional. Exit Windows NT Explorer.

### Part 7: Testing your logon script

- Select **Start > Programs > Administrative Tools (Common) > User Manager for Domains**.
- In the User Manager dialog box, select **User > Properties**.
- The User Properties dialog box appears. Click the Profile command button.
- The User Environment Profile dialog box appears. In the Logon Script Name text box, type **logonscript.bat**. (Don't type the period at the end.) Click OK.
- The User Properties dialog box reappears. Click OK.
- Close User Manager.
- Select **Start > Shut Down**. The Shut Down Windows dialog box appears. Click the "Close all programs and log on as a different user" radio button. Then click Yes.
- In the Begin Logon dialog box, press **Ctrl + Alt + Delete** to log on.
- The Logon Information dialog box appears. Type in your password in the Password text box. Click OK.
- A command prompt window should appear. The logon script you created in part one of this lab has run and appears like the following:
 

```
This is the logon script I created in Lab 4.5.
ECHO is on.
ECHO is on.
Press any key to continue . . .
```
- Press the spacebar to complete this lab.



This logon script will appear every time you log on from this point. If you'd like to remove it, start User Manager for Domains, and then double-click the Administrator user. Click Profile. Highlight `logonscript.bat` in the User Environment Profile dialog box, and

press Delete. Click OK. In the User Properties dialog box, click OK. Exit User Manager for Domains.

### Lab 4.6 *Exploring Control Panel*



Workstation  
Server

The purpose of this hands-on lab exercise is to provide you the skills required to use Control Panel applications.

This lab is divided into three parts. You'll use the following Control Panel applications in the following three sections:

Part 1: Using Add/Remove Programs

Part 2: Using System

Part 3: Becoming familiar with Display, Keyboard, Modems, Mouse, Ports, SCSI Adapters, Tape Devices, and UPS

Begin this lab by booting your computer to Windows NT Server.

#### **Part 1: Using Add/Remove Programs**

In this part you use Add/Remove Programs to install an optional Windows NT component.

TO INSTALL MAIL, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel.
2. Double-click Add/Remove Programs.
3. In the Add/Remove Programs Properties dialog box, click the Windows NT Setup tab. Scroll to the bottom of the Components list box. Click in the check box next to Windows Messaging. Click the Details command button. Ensure that the Internet Mail, Microsoft Mail, and Windows Messaging check boxes are all selected. Click OK.
4. In the Windows NT Setup tab in the Add/Remove Programs Properties dialog box, click OK.
5. NT copies files to your hard disk. If prompted, supply the path to your Windows NT installation source files (usually on your Windows NT compact disc). This process takes a few minutes.
6. The Control Panel dialog box reappears. Windows Messaging (Mail) is now installed. Exit Control Panel.
7. Optional: If you want, you can install games on your computer using the same steps, except click the check box next to Games (instead of Windows Messaging) in the Windows NT Setup tab. (Try Pinball if you have a sound card—it's really fun!)

## Part 2: Using System

In this part you use System to create an additional paging file and create a hardware profile.

TO CREATE AN ADDITIONAL PAGING FILE, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel.
2. Double-click System.
3. Click the Performance tab in the System Properties dialog box. In the Virtual Memory section, click Change.
4. The Virtual Memory dialog box appears. Click D: in the Drive list box. In the Paging File Size for Selected Drive section, type **5** in the Initial Size (MB) text box, and type **5** in the Maximum Size (MB) text box. Click Set. Notice that Drive D: now shows a Paging File Size of 5-5 in the list box at the top of the screen. Click OK.
5. On the Performance tab click Close.
6. Click Yes to restart your computer so the new settings can take effect.

TO CREATE A HARDWARE PROFILE, FOLLOW THESE STEPS:

Hardware profiles were originally designed to handle the unique needs of laptop computers. In this lab you create two hardware profiles: **docked** (connected to the network) and **undocked** (not connected to the network) to simulate the use of a laptop computer at work and at home.

1. Select Start > Settings > Control Panel.
2. Double-click System.
3. Click the Hardware Profiles tab. Highlight Original Configuration (Current) in the Available Hardware Profiles list box. Click the Rename command button.
4. In the Rename Profile dialog box, edit the To: text box to read as follows: **Docked**. (Don't type the period at the end.) Click OK.
5. The Hardware Profiles tab reappears. Highlight Docked (Current) in the Available Hardware Profiles list box. Click Copy.
6. In the Copy Profile dialog box, edit the To: text box to read as follows: **UnDocked**. (Don't type the period at the end.) Click OK.
7. The Hardware Profiles tab reappears. Notice that two profiles now appear in the Available Hardware Profiles list box: Docked (Current) and UnDocked. Highlight UnDocked and click the Properties command button.

8. In the UnDocked Properties dialog box, click the Network tab. Click the check box next to Network-disabled hardware profile. Click OK.
9. The Hardware Profiles tab reappears. Click OK. Exit Control Panel.
10. Select Start > Shut Down. Click the "Restart the computer" radio button in the Shut Down Windows dialog box. Click Yes.
11. After you select Windows NT Server 4.0 from the boot loader menu, press the spacebar when the "Press spacebar now to invoke the Hardware Profile/Last Known Good menu" appears.
12. A Hardware Profile/Configuration Recovery Menu is displayed. You can select a Docked or UnDocked hardware profile at this point. (Select Docked if you are connected to a network; select UnDocked if you are not connected to a network.) Press Enter to continue booting Windows NT Server.

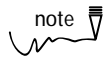
### **Part 3: Becoming familiar with Display, Keyboard, Modems, Mouse, Ports, SCSI Adapters, Tape Devices, and UPS**

In this part you explore several Control Panel applications. (You may even use a few of these applications to install devices that you have but which may not yet be installed.)

#### **DISPLAY**

1. Select Start > Settings > Control Panel.
2. Double-click Display.
3. In the Display Properties dialog box, click the Screen Saver tab.
4. In the Screen Saver drop-down list box, select 3D Pipes (OpenGL). Click the Settings command button.
5. In the 3D Pipes Setup dialog box, click the Textured radio button in the Surface Style section. Click the Choose Texture command button.
6. In the Choose Texture File dialog box, double-click 1anmann.t.bmp.
7. The 3D Pipes Setup dialog box reappears. Click OK.
8. The Screen Saver tab reappears. Click Apply. (Your screen saver now consists of 3D Pipes that say "Windows NT Server" on them.)
9. Click the Settings tab. In the Desktop Area section, click and hold the slide bar and move it to the right until the display reads "800 by 600 pixels." (Note: If your computer does not support a display setting larger than "640 by 480 pixels", you can click the slide bar, but it won't move.) Continue to Step 10.
10. Click the Test command button. Click OK in the Testing Mode dialog box.

11. A test screen appears for about five seconds. When the Testing Mode dialog box appears, click Yes if you saw the test bitmap.
12. The Settings tab reappears. Click OK to apply your new display settings.



**If you do not like the appearance of an 800 by 600 display, or your computer can't accommodate this setting, you can change your display settings to any resolution you desire. Follow Steps 9 through 12 to change your display settings.**

#### KEYBOARD

1. Select Start > Settings > Control Panel.
2. Double-click Keyboard.
3. In the Keyboard Properties dialog box, click the Input Locales tab. Click the Properties command button. Click the drop-down arrow in the Keyboard layout drop-down list box to view the optional keyboard layouts. Notice that US, several Dvorak options, and US-International are listed. Click US, and then click OK.
4. In the Input Locales tab in the Keyboard Properties dialog box, click Cancel.

#### MODEMS

**You don't have to have a modem to complete this section. If you have already installed a modem in your computer using the Modems application in Control Panel, skip this section.**

1. Select Start > Settings > Control Panel.
2. Double-click Modems.
3. The Install New Modem dialog box appears. Select the check box next to "Don't detect my modem; I will select it from a list." Click the Next command button.
4. The Install Modem dialog box appears. Select your modem's manufacturer from the Manufacturers list box. If your manufacturer is not listed, or if you don't have a modem, highlight (Standard Modem Types). Select your modem speed or model in the Models list box, or select Dial-Up Networking Serial Cable between 2 PCs if you don't have a modem. Then click Next.
5. The Install New Modem dialog box appears. Click the "Selected ports" radio button.



6. Highlight the COM port to which your modem is connected, or any available COM port (to which your mouse or another device isn't connected) if you don't have a modem. Click Next. Windows NT installs your modem.
7. A dialog box may appear at this point requesting the area code you are in and other information. If this box appears, enter the requested information and continue. If a dialog box does not appear, skip to Step 8.
8. Click the Finish command button.
9. In the Modems Properties dialog box, click the Dialing Properties command button.
10. In the Dialing Properties dialog box, configure the dialing properties for your location. Then click OK.
11. In the Modems Properties dialog box, click Close.

#### MOUSE

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click Mouse.
3. In the Mouse Properties dialog box, click each tab and view the configuration options available. Customize your mouse to suit your personal preferences. Click OK to return to Control Panel.

#### PORTS

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click Ports.
3. In the Ports dialog box, highlight a COM port, and click Settings.
4. In the Settings dialog box, notice the settings that you can configure for your COM port. Customize your COM port settings as desired. Click Advanced.
5. In the Advanced Settings dialog box, notice the settings that you can configure. Click OK.
6. In the Settings dialog box, click OK.
7. In the Ports dialog box, click Close.

#### SCSI ADAPTERS

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click SCSI Adapters.

3. View the configuration options available on both the Devices tab and the Drivers tab by clicking each of the tabs. If you have a SCSI adapter but have not yet installed drivers for it, you may want to do so now. You can do this by clicking the Add command button on the Drivers tab and then selecting the appropriate manufacturer and SCSI adapter from the lists displayed. Click OK.

#### TAPE DEVICES

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click Tape Devices.
3. View the configuration options available on both the Devices tab and the Drivers tab by clicking each of the tabs. If you have a tape drive but have not yet installed drivers for it, you may want to do so now. You can do this by clicking the Add command button on the Drivers tab and then selecting the appropriate manufacturer and tape device from the lists displayed. Click OK.

#### UPS

1. Select Start ➤ Settings ➤ Control Panel.
2. Double-click UPS.
3. In the UPS dialog box, view the configuration options available. Click Help.
4. Read through the UPS help topics. Exit Windows NT Help.
5. If you do not have a UPS, skip to Step 6 now. If you have a UPS but have not yet configured it, you may want to do so now. Configure the settings in the UPS dialog box to match your UPS. Click OK. Stop here if you have a UPS (don't do Step 6).
6. Click Cancel in the UPS dialog box. Exit Control Panel.