
Workstation
Server
Enterprise

CHAPTER

# 2

# Installing Windows NT Workstation and Windows NT Server

## About Chapter 2

This chapter spells out everything you need to know to install Windows NT Workstation and Windows NT Server, including the hardware requirements. It also includes a very practical preinstallation checklist for gathering all the information you'll need to perform the installation.

Chapter 2 explains how to start an NT installation locally from a CD-ROM drive and over the network using `Winnt.exe` or `Winnt32.exe`. Then it takes you through the entire installation process, step-by-step and phase-by-phase.

Next, this chapter discusses how to deinstall Windows NT, in the event that you want to remove it from a computer.

Finally, this chapter explores troubleshooting solutions to common NT installation problems.

This chapter includes two extensive labs—one that walks you through the process of installing Windows NT Workstation on your own computer, and a second that takes you through the process of installing Windows NT Server and configuring your computer to dual boot between Windows NT Server and Windows NT Workstation.

No matter which of the three Windows NT 4.0 Microsoft Certified Professional exams you're preparing for, you'll want to read this chapter. The information in this chapter covers several objectives listed in the Installation and Configuration and Troubleshooting sections in these exams' objectives.

# Hardware Requirements for Installation

Before you can install NT, you need to make sure you have the appropriate hardware. To avoid problems, only use hardware that appears on the Windows NT *Hardware Compatibility List* (HCL). The HCL, which is updated periodically, ships with the NT products.


**You can also access the latest HCL via Microsoft's Web site at** `http://www.microsoft.com/ntworkstation/`**, or** `http://www.microsoft.com/ntserver/`**.**

If you have hardware that is *not* listed on the HCL, contact the manufacturer of your equipment to see if the correct Windows NT 4.0 drivers for that device can be obtained.

Table 2-1 shows the minimum hardware required for installing Windows NT Workstation and Windows NT Server. The requirements listed apply only to Intel-based platforms. Windows NT can also be installed on DEC Alpha AXP, PowerPC, and MIPS R4000 platforms, but additional hardware may be necessary, depending on the type of processor you plan to use.

**TABLE 2-1** MINIMUM HARDWARE REQUIRED FOR INSTALLATION OF WINDOWS NT

| *HARDWARE COMPONENT* | *WINDOWS NT WORKSTATION* | *WINDOWS NT SERVER* |
|---|---|---|
| Processor | 486/33 | 486/33 |
| Memory | 12MB of RAM | 16MB of RAM |
| Hard disk space | 117MB | 124MB |
| Display | VGA or better | VGA or better |
| Floppy disk drive | 3.5-inch high-density | 3.5-inch high-density |
| CD-ROM drive | Required (If your computer does not have a CD-ROM drive, you can still install NT Workstation by using an over-the-network installation.) | Required (If your computer does not have a CD-ROM drive, you can still install NT Server by using an over-the-network installation.) |
| Network adapter | Optional (Required for over-the-network installation) | Optional (Required for over-the-network installation) |
| Mouse | Optional | Optional |

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**Table 2-1 shows the *minimum* hardware required for installation purposes only. More hard disk space is needed for applications and data files. Additional memory is required for some applications, and to speed up operations while running applications.**

Do you know exactly what hardware you have in your computer? You can use the *NT Hardware Qualifier* (NTHQ) utility that comes with Windows NT to examine and identify your hardware configuration. NTHQ helps you determine if Windows NT can detect your hardware, and it identifies the hardware settings used

for each adapter. To use NTHQ, you must create an NTHQ diskette, which you then use to boot your computer. (You can create an NTHQ diskette with a blank, formatted 3.5-inch floppy diskette by running `Makedisk.bat` from the `\support\hqtool` directory on the Windows NT compact disc.) NTHQ makes a text file you can print to help you complete the preinstallation checklist in the next section of this chapter.

# Information Required to Install Windows NT

A substantial amount of user input is required during the Windows NT installation process. To make the installation go smoother and to avoid the possibility of having to redo it, you should gather all the information you will need before doing the installation. This will enable you to give the appropriate responses as you are prompted by the Windows NT installation program.

## Preinstallation Checklist

To assist you in gathering information about your computer and network environment so you can successfully complete the installation, I have designed a multipart preinstallation checklist for you. A detailed explanation accompanies each checklist item.


**The preinstallation checklist is reproduced *without* the detailed explanations of each item in Appendix G. I encourage you to copy and use this checklist as well as the other planning forms.**

### *Mass storage devices: SCSI, IDE, and CD-ROM adapter information*

You need to know the manufacturer's name, adapter name and model, and hardware settings for each SCSI, IDE, and CD-ROM adapter in your computer. Windows NT automatically detects ESDI and some older IDE controllers, and might display a message during installation stating that there are no adapters present. If you see

such a message during installation, it simply means NT didn't detect any adapters that could have a CD-ROM drive attached. Standard IDE adapters are not displayed, but are used by Windows NT. IDE dual-channel PCI adapters are displayed. If your hard disk controller is not displayed, continue with the installation. Your hard disk(s) should appear in the partitioning stage. You can choose to specify manually which adapters you have and skip the automatic detection process.

| SCSI/IDE/CD-ROM Adapter | IRQ | I/O Port | DMA Channel |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |


**Use the NTHQ utility described in the previous section, "Hardware Requirements for Installation," to examine and identify your hardware configuration, and to print out a text file that will help you complete the preinstallation checklist.**

### *Hardware and software components*

- **Computer type:** _____

  This refers to the type of architecture your PC uses, such as MPS Multiprocessor, IBM PS/2, Standard PC, and so on.

- **Display:** _____

  This refers to the video display adapter in your computer. This component setting defaults to Auto Detect. If your display adapter is not on the HCL and you have the NT 4.0 drivers provided by the manufacturer of your display adapter, you can change this setting at the end of Phase 3 of the installation process.

- **Keyboard:** _____

  This component's default is a single setting that includes XT, AT, or Enhanced Keyboard (83-104 keys). You can change this setting if you have a different keyboard and the appropriate drivers for it.

- **Keyboard layout**: _____

  This setting defaults to U.S. Change this setting if necessary to support your keyboard layout correctly.

- **Pointing device:** _____

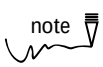
  Setup should automatically detect your mouse or other pointing device. You can change the setting by selecting another pointing device from the list, or you can supply your own driver from a diskette.

## *Upgrade*

**Upgrade previous version of Windows?** Yes____ No____

If the Windows NT Setup program detects a previous installation of Windows or Windows NT on your computer, it will ask if you want to upgrade that version of Windows or Windows NT to Windows NT 4.0.

Windows 3.*x* and previous versions of Windows NT can be upgraded in this manner. When you install Windows NT 4.0 in the *same* directory as the previous Windows installation to perform an upgrade, all application and user preference settings will be upgraded. You should install Windows NT 4.0 in a *different* directory than the previous Windows installation if you are upgrading from a previous version of Windows NT and you want to continue to use the previously installed version. When you install Windows NT 4.0 in a different directory than your previously installed Windows operating system, you must reinstall all applications that will be used with Windows NT and reconfigure all user preferences within those applications, such as screen colors, desktop settings, and so on.




**When you install Windows NT 4.0 in a different directory than the original operating system, Windows NT automatically configures itself to *dual boot* between Windows NT 4.0 and the previously installed operating system. In addition, Windows NT 4.0 configures itself to dual boot between Windows NT 4.0 and Windows 3.*x* when you upgrade from Windows 3.*x* by installing Windows NT 4.0 in the same directory as Windows 3.*x*.**

Windows 95 and OS/2 cannot be upgraded to Windows NT 4.0 in this manner. You must install Windows NT 4.0 in a different directory than Windows 95 or OS/2 if you have previously installed either of these operating systems.

If you previously installed Windows 95 and you install Windows NT 4.0 in a different directory, you must reinstall all applications that will be used with Windows NT, and reconfigure all user preferences within those applications. If you previously installed MS-DOS or OS/2 1.*x* and you install Windows NT 4.0 in a different directory, you do not need to reinstall the applications that will be used with Windows NT, nor do you need to reconfigure the user application preferences.

### Hard disk partition information

The space on hard disks is divided into areas called *partitions*. The Windows NT Setup program requires you to choose which partition you will use for the NT installation. Refer to Table 2-1 to make sure the partition you choose has enough available disk space.

| Disk Partition Number | Type of Partition | Available Disk Space |
|---|---|---|
| 1 | _____ | _____ |
| 2 | _____ | _____ |
| 3 | _____ | _____ |

Partition # to be used for installation of Windows NT: _____

Within the Windows NT operating system there are two important, required types of partitions: a *system partition* and a *boot partition*. These two terms are Windows NT jargon for primary and extended partitions that contain specific files and perform specific functions in Windows NT.

- **System Partition:** The *system partition* is located on the active primary partition of the first hard disk in the computer. (This is usually the C: drive.) The system partition contains several files that are required to boot Windows NT, including: `ntldr`, `Ntdetect.com`, `Boot.ini`, and sometimes `Bootsect.dos`, and `Ntbootdd.sys`, depending on the installation type and hardware configuration.
- **Boot Partition:** The *boot partition* can be located on either a primary or extended partition. The boot partition contains the Windows NT installation directory (usually the `Winnt` directory). This partition also contains all of the Windows NT operating system files.


**The names of these two partitions often confuse people. Because of the types of files the partitions contain, many people think the boot partition should be called the system partition, and vice versa. You might find it helpful to make a mental note that these two partitions are named the opposite of what you intuitively think they should be!**

In many cases, the system partition and the boot partition are physically located on the same partition of the hard drive. For example, suppose your computer's hard drive contains two partitions: an 800MB primary partition and a 200MB extended partition. If you install Windows NT on the 800MB partition, both the system partition and the boot partition will be physically located on the 800MB partition.

### *File system used for installation (choose one)*

**FAT** _____ **NTFS** _____

Windows NT supports two file system types: FAT and NTFS.

- **FAT:** The *file allocation table* (FAT) file system is supported by Windows NT and many other operating systems, including: MS-DOS, OS/2, Windows 3.*x*, and Windows 95. Normally, if you want your computer to dual boot between Windows NT and one of these other operating systems (and both operating systems are located on the same hard disk partition), choose the FAT file system. The FAT file system supports neither extended attributes nor file-level security.
- **NTFS:** The *Windows NT file system* (NTFS) is supported only by Windows NT. In general, choose NTFS if you do not want your computer to dual boot between Windows NT and another operating system and you want the added advantages provided by NTFS, including extended attributes and file-level security.

You can select FAT as the file system to be used during installation of Windows NT, and then later choose to convert the file system to NTFS; however, if you choose NTFS as the file system to be used during installation of Windows NT and then later want to convert to FAT, the process isn't so easy. To convert from NTFS to FAT, you need to back up all files, repartition and format the drive, reinstall Windows NT, and restore all the files from backup.


**To avoid these time-consuming processes, plan ahead as much as possible when deciding which file system you will use.**

Windows NT 4.0 does not support the *high performance file system* (HPFS) used by OS/2. If you want to install Windows NT 4.0 on a computer that uses HPFS, you must back up all data, repartition and format the computer's drive with FAT or NTFS, and then restore all the files from backup before you can install Windows NT 4.0.


**For a more in-depth discussion of file systems, see Chapter 3.**

### *Installation directory*

**Installation directory for new installation:**

_____

In this step you choose in which directory Windows NT 4.0 files will be installed. You may either accept the default directory displayed during setup (usually `c:\winnt`), or type the name of another directory. Be sure the directory you choose has enough free space for the Windows NT 4.0 files.

### *Setup options (Windows NT Workstation only)*

Choose one:

Typical ____ Portable ____ Compact ____ Custom ____

Four setup options are offered during the installation of Windows NT Workstation: *typical*, *portable*, *compact*, and *custom*. Select one of these four options.

- **Typical:** You should use the typical setup for most installations. In this option, the Windows NT Setup program presents a list of optional software components that can be added. The typical setup preselects the most popular components by placing a check in the box next to the component; however, you still choose either to accept these preselected components or to modify the list, so the components you want are installed. (See the "Select components" section of this chapter for a listing of the optional software components.) The typical setup partially automates the installation/setup process; therefore, some screens, such as Network Services and Network Bindings, are not displayed during installation. (The Windows NT Setup program accepts and applies the default settings for these options anyway.)

- **Portable:** The portable setup is designed for laptop computers. In this option, the Windows NT Setup program presents the same list of software components as the typical setup option, but preselects different components for the portable setup that are popular for mobile computing. Again, you choose either to accept the preselected components or to modify the list, so the components you want are installed. The portable setup also automates some of the installation/setup process.
- **Compact:** The compact setup is designed for computers where disk space is limited. Only components required by Windows NT are automatically installed. When the list of optional software components that can be added is displayed, setup preselects none of the components. However, as with the typical and portable setup options, you can still override and modify this list. The compact setup also automates some of the installation/setup process.
- **Custom:** The custom setup option is nearly identical to the typical setup, except that none of the installation/setup process is automated. You get to see all of the screens, make all of the choices, and verify all selections before they are implemented.

### *Registration*

**10 Digit CD Key #:** _____-_____

You need to enter the ten-digit CD key number (located on the back of the Windows NT compact disc case) during the Windows NT installation. This entry is required.

### *Licensing mode (Windows NT Server only)*

**Per server** _____ **Per seat** _____

**Number of client access licenses:** _____

At this point during the installation, a licensing mode must be chosen, and its terms agreed to, in order to continue the installation. Windows NT Server has two licensing modes: *per server* and *per seat*.

- **Per server:** In the per server licensing mode, you must have one client access license for each concurrent connection to the server. For example, if you have 150 client computers (workstations), but only 100 of them would be logged on to the Windows NT Server computer at any one time, then

you would need 100 client access licenses. You should enter the number of client access licenses you have purchased for this server in the box next to concurrent connections in the Choose Licensing Mode dialog box.

- **Per seat:** In the per seat licensing mode, you must have one client access license for each client computer that will *ever* connect to a Windows NT Server computer.

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**The advantage to using the per seat licensing mode becomes apparent when you have multiple servers on a network. In such a situation, you only have to buy one client access license for each client computer, even if a client computer accesses multiple servers at the same time.**

**For example, suppose you have 500 client computers and 6 Windows NT Server computers on a network, and the client computers access several servers at a time. If you choose the per seat licensing mode, you only need to purchase 500 client access licenses, whereas if you choose the per server licensing mode, you probably need to have more than one client access license per client computer.**

### Computer name

**Computer name**: _____

During installation you need to enter the name your computer will use on the network. The *computer name* is also called a *NetBIOS name*, and can be up to fifteen characters long. All computers on the network *must* use different NetBIOS names. Uniqueness is the key here. If you have a small network, you can probably get by with naming the computers after the characters in your favorite movie, television series, or comic strip. If you have a large network, however, you will probably want to use some type of systematic naming scheme to ensure that each computer has a unique NetBIOS name.

### Server type (Windows NT Server only)

You need to choose the role this server will play on the network. Planning is very important here, because once a server is installed as either a *primary domain controller* (PDC) or a *backup domain controller* (BDC), it *can't* become a stand-alone server or a member server.

Choose one of the following server types:


**Careful here! Once a computer is installed as a domain controller in a domain, the domain controller cannot migrate to another domain without a complete reinstall of Windows NT Server.**

- **Primary Domain Controller**

  Domain name: _____

  Choose *primary domain controller* (PDC) if you want the server to participate in a domain instead of a workgroup, and if you have not already installed any servers in this domain. If you are installing the only server to be used for a small network, you should choose this option.

- **Backup Domain Controller**

  Domain name: _____

  Administrator's account name: _____

  Administrator's password: _____

  Choose *backup domain controller* (BDC) if you want the server to participate in a domain instead of a workgroup, and if you have already installed a server in this domain. Additionally, you need to enter the administrator's user account name and password to complete the installation of a BDC.

- **Member Server**

  Domain name: _____

  Administrator's account name: _____

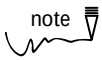
  Administrator's password: _____

  Choose member server if you want the server to join a domain but do not want the server to have to expend its resources authenticating user logon requests in the domain. Or, choose member server if you plan to move this server from one domain to another. If you want the server to be a member server in a domain, you will also need to enter the administrator's user account name and password to complete the installation.

- **Stand-Alone Server**

  Workgroup name: _____

  Choose stand-alone server if you want the server to participate in a workgroup instead of a domain.




**If a stand-alone server later joins a domain, it becomes a member server at that point (and is no longer a stand-alone server). If, at some point after that, this member server no longer participates in a domain (unjoins a domain), it reverts to stand-alone server status.**

### Administrator password

Although you may not want to write down the password on this worksheet, you need to enter an administrator password during the installation process.

### Emergency Repair Disk

**Will an Emergency Repair Disk be created during installation?** Yes___ No___

Here you choose whether to make an Emergency Repair Disk during the installation process. The Emergency Repair Disk is used to repair Windows NT when its configuration files have been damaged or corrupted. Always make an Emergency Repair Disk. A blank 3.5-inch high-density floppy disk is required during installation to make this disk.


**You can update your Emergency Repair Disk by using the `Rdisk.exe` utility. You should do this every time you change or update your computer's hardware configuration. (You'll get a chance to do this in Lab 3.4.)**

### Select components

This list represents a myriad of optional software components that can be added during the Windows NT installation/setup process. Choose the components you want to install. I've provided explanation for some of the components—others are self-explanatory.

- **Accessibility options** Yes___ No___

  This component includes options to change the keyboard, sound, video display and mouse attributes for people with mobility, hearing, or visual impairments. This option is either selected or not selected—it has no discrete components.

- **Accessories**

  Calculator ___ Character Map ___

  Clipboard Viewer ___ Clock ___

Desktop Wallpaper ___ Document Templates ___

Imaging ___ Mouse Pointers ___

Object Packager ___ Paint ___

Quick View ___ Screen Savers ___

Wordpad ___

- **Communications**

  Chat ___ HyperTerminal ___

  Phone Dialer ___

- **Games**

  Freecell ___ Minesweeper ___

  Pinball ___ Solitaire ___

- **Multimedia**

  CD Player ___

  Jungle Sound Scheme ___ Media Player ___

  Musica Sound Scheme ___ Robotz Sound Scheme ___

  Sample Sounds ___ Sound Recorder ___

  Utopia Sound Scheme ___ Volume Control ___

- **Windows Messaging**

  Internet Mail ___ Microsoft Mail ___

  Windows Messaging ___

### *Participation on a network*

- **Participate on a network (Windows NT Workstation only)?** Yes___ No___

  If you are installing Windows NT Workstation, you must choose whether this computer will be part of a network.

- **Wired to the network: ___**
- **Remote access to the network: ___**

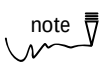
  *Wired to the network* means your computer has a direct physical connection to the network and uses either a network adapter or an ISDN

adapter. *Remote access to the network* means your computer uses a modem to connect remotely to the network by using Dial-Up Networking to connect to a *Remote Access Service* (RAS) server.

### Microsoft Internet Information Server (Windows NT Server Only)

**Install Microsoft Internet Information Server?** Yes___ No___

Here you choose whether or not to install *Microsoft Internet Information Server* (IIS). IIS can be used as a *World Wide Web* (WWW) server, a *File Transfer Protocol* (FTP) server, and as a Gopher server.




**Windows NT 4.0 does not include an FTP server. You must install IIS to get FTP server functionality.**

### Network adapter

**Network adapter manufacturer (if applicable):** _____

**Network adapter name (if applicable):** _____

**Interrupt:** _____ **I/O Port:** _____

You have two choices at this point of the installation: You can enable NT to detect your network adapter (if you have one) automatically, or you can select your network adapter manually from a list displayed by the Windows NT Setup program. Select your network adapter manually by choosing Select from list. If you use this option you have the opportunity to install drivers from a disk supplied by the manufacturer of the network adapter. If you want to install networking but do not have a network adapter, choose *MS Loopback Adapter* from the list. This adapter doesn't have any hardware associated with it—it is a fake adapter that will enable you to install networking services without having a network adapter.

You need to obtain the hardware settings (interrupt and I/O port) for your network adapter, because the Windows NT Setup program may prompt you for them later. (Some drivers automatically detect the network adapter configuration and will not prompt you for input.)

### Network protocols

Each of the protocols below has strengths and weaknesses. Evaluate the needs of your network, and then choose all the protocols you need. NT 4.0 ships with support for TCP/IP, NWLink IPX/SPX Compatible Transport, and NetBEUI.

- **TCP/IP:** Yes ___ No ___

  (If Yes, then Windows NT Setup offers you an opportunity to configure TCP/IP by using DHCP.)

  **DHCP:** Yes ___ No ___ (If No, fill in information below)

  IP address: _____

  Subnet mask: _____

  Default gateway: _____

  DNS server #1: _____

  DNS server #2: _____

  WINS server #1: _____

  WINS server #2: _____

The *TCP/IP* protocol provides the most capability of the three protocols. It is routable, fast, and has powerful network-wide name resolution capabilities. It can be used on much larger networks than either of the other protocols. TCP/IP is the most commonly supported protocol. It is supported on many operating systems, including Windows NT, Windows 95, UNIX, MS-DOS, Macintosh, and IBM Mainframes. TCP/IP is the protocol used on the Internet.

The main drawback to using TCP/IP is that it requires substantial planning and configuration to implement.


**For more information on TCP/IP configuration properties, see Chapter 16.**

- **NWLink IPX/SPX Compatible Transport:** Yes___ No___

  (If Yes) Frame Type: _____

*NWLink IPX/SPX Compatible Transport* is a protocol originally developed by Novell. It was designed for use on Novell NetWare servers. NWLink IPX/SPX is a routable protocol, but has some limitations when used on large NetBIOS-based networks such as Windows NT. It has no name resolution capabilities, so all broadcasts are forwarded across routers.

NWLink IPX/SPX is very easy to configure, and is a good choice for a small, routed network. NWLink IPX/SPX should be used on any network that has NetWare servers on it if Windows NT computers on the network need to access the NetWare servers.

You should choose autodetect for the frame type selection, unless you know which frame types you want to support.


**For more information on NWLink IPX/SPX Compatible Transport, coexistence with NetWare, and frame types, see Chapter 17.**

- **NetBEUI:** Yes___ No___

The NetBEUI protocol is designed for small, nonrouted networks. It does not require any configuration, and has minimal overhead. NetBEUI is included primarily to provide backward compatibility with earlier networking software that uses NetBEUI as its only protocol.

### *Network services*

**Network services to add:**

_____

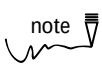
At this point in the installation, several network services are preselected by default, and you cannot deselect them. You can also add additional services by clicking the Select from list command button.


**Network services are examined in detail later in this book. Some of the services are covered in Chapter 6, and others are mentioned throughout the chapters in Part IV.**

### *Network bindings*

**Network bindings to disable:** _____

You have an option to disable and enable *bindings* of various services to protocols, and bindings of protocols to various network adapters. A binding is an association. For example, you might want to associate one protocol with one network adapter, and another protocol with a second network adapter. By default, all services are bound to all protocols that support that service, and all protocols are bound to all network adapters.




**This is an advanced feature. You should accept the default setting unless you have a specific reason to change it.**

### Make this computer a member of

This section applies only to NT Workstation and to NT Server when installed as a stand-alone server.

You *must* choose to participate in either a workgroup or a domain. (See the "Workgroups Versus Domains" section in Chapter 1 for more information on this topic.) Only Windows NT Workstation computers and Windows NT Server computers that are configured as stand-alone servers have this option.

- **Workgroup:** Yes____ No____

  (If Yes) Workgroup name: _____

  If you elect to be a member of a workgroup, only users that have user accounts physically located in this computer's directory database will be able to log on to this computer locally or to access it over the network. You need to supply a workgroup name during installation.

- **Domain:** Yes____ No____

  (If Yes) Domain name: _____

  Create a computer account in the domain? Yes ___ No ___

  Administrator's account name: _____

  Administrator's password: _____

If you decide to join a domain, two kinds of users will be able to log on to this computer locally or to access it over the network: users that have accounts in this computer's directory database, and users that have accounts in the domain directory database.

You also need to create a computer account in the domain. An administrator can do this before the Windows NT installation using Server Manager on another NT computer in the domain, or, you can create the computer account in the domain during the NT installation process. If you choose to create a computer account in the domain during installation, you need to supply an administrator's user account name and password.

### Internet Information Server (Windows NT Server only)

**Select the publishing directories you want to install:**

World Wide Web publishing directory _____

FTP publishing directory _____

Gopher publishing directory _____

If you elected to install IIS earlier in the Windows NT installation process, you are now asked to choose publishing directories for it. The default directories are acceptable for most installations.


**For more information on IIS, see Chapter 16 or the *Microsoft Windows NT Server Internet Guide*, which is included in the *Microsoft Windows NT Server Resource Kit for version 4.0* (Microsoft Press, 1996).**

### *Time zone*

**Time zone**: _____

Select the time zone for your location, and choose whether to adjust for daylight saving time.

### *Video adapter display settings*

**Video adapter type:** _____

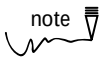
**Display settings desired:**

_____

You need to know what type of video adapter is installed in your computer and how you want your display to appear. Appearance settings include: Color Palette, Desktop Area (640 by 480, 800 by 600, and so on), Font Size, and Refresh Frequency. Windows NT will preselect some of these settings for you, but you can modify them during or after installation using Control Panel.

## The Installation Process

Now that you know the minimum hardware required to install Windows NT and have all the information required to perform the installation, you're ready to move on to the actual installation process.




**My intent is to explain the basic Windows NT installation process. The steps *you* take to perform your installation may be different than the steps listed here, depending on your hardware configuration, any previously installed operating systems on your computer, and so on. This description is only a basic guide—modify it to meet your needs. See Labs 2.1 and 2.2 at the end of this chapter for detailed installation instructions.**

## Starting Setup

Windows NT uses a program called Setup to accomplish the installation. There are three ways to start the installation process: from a CD-ROM drive, by using `Winnt.exe`, and by using `Winnt32.exe`. Installation can be done locally, from a CD-ROM drive; or over the network.

### *Starting from a CD-ROM drive*

To start Setup from a CD-ROM drive, your computer must be configured with a local CD-ROM drive that is on the HCL. Place the Windows NT Workstation or Windows NT Server compact disc in the CD-ROM drive. Then boot the computer from the Windows NT Setup Boot Disk.

### *Using Winnt.exe*

You can use `Winnt.exe` to start Setup from an unsupported CD-ROM drive (a CD-ROM drive that is not listed on the HCL), or to start an over-the-network installation. First boot the computer to MS-DOS, and then load either the CD-ROM drivers or network drivers (depending on the type of installation you're doing). Then use `Winnt.exe` to start Setup.

`Winnt.exe` has several command-line switches that enable customization of the setup process. Table 2-2 lists these switches and describes their functions. The syntax for the `Winnt.exe` command is:

```
WINNT [/S[:]sourcepath] [/T[:]tempdrive] [/I[:]inffile
 [/OX] [/X | [/F] [/C]] [/B] [/U[:scriptfile]]
 [/RX]:directory] [/E:command]
```

**TABLE 2-2** WINNT.EXE COMMAND-LINE SWITCHES

| *SWITCH* | *WHAT THE SWITCH DOES* |
|---|---|
| `/S[:]sourcepath` | Specifies the source location of NT files. You must specify a full path, in the form `x:\[path]` or `\\server\share[\path]`. Default sourcepath is the current directory. |
| `/T[:]tempdrive` | Specifies the drive that contains NT's temporary setup files during installation. If not specified, Setup uses the first drive it finds (that it thinks has enough free space) for the tempdrive. |
| `/I[:]inffile` | Specifies the filename (no path) of the file containing setup information. Default inffile is `DOSNET.INF`. |
| `/OX` | Instructs Setup to create the Setup Boot Disk set. |
| `/X` | Instructs Setup *not* to create the Setup Boot Disk set. |
| `/F` | Instructs Setup *not* to verify files as they are copied to the Setup Boot Disk set (during the creation of the Setup Boot Disk set). |
| `/C` | Instructs Setup to skip the free-space check during the creation of the Setup Boot Disk set. |
| `/B` | Enables you to install NT without using the Setup Boot Disk set. Requires you to specify the sourcepath by using the `/S` switch. |
| `/U` | Allows you to perform an unattended NT installation and use an optional script file. Requires you to specify the sourcepath by using the `/S` switch. |
| `/R` | Specifies an optional directory to be installed during installation. |
| `/RX` | Specifies an optional directory to be copied to the local hard drive during installation. |
| `/E` | Specifies a command to be executed at the end of the installation/setup process. |
| `/UDF` | Specifies that a Uniqueness Database File is used during an unattended NT installation. |


**These switches are *not* case-sensitive. You may type them in either upper- or lowercase.**

To illustrate how the switches are used, suppose that you want to install Windows NT from a network drive (named drive K:) without using the Setup Boot Disk set. (This is often referred to as a *floppyless installation*). To accomplish this, use the following command:

```
K:\I386\Winnt /B /S:K:\I386
```

Notice the `/B` switch is used to permit you to perform a floppyless installation, and the `/S` switch is used to specify that the sourcepath (the location of the NT files that will be installed on your computer) is a network drive named K:.


**For more information on unattended installation/setup, see Chapter 5.**

### Using Winnt32.exe

`Winnt32.exe` functions in the same way as `Winnt.exe`, except that `Winnt.exe` is designed to run on a MS-DOS-based computer, and `Winnt32.exe` is designed to be used on a Windows NT 3.*x* computer. All `Winnt32.exe` command-line options are the same as `Winnt.exe`, with the exception of `/F` and `/C`, which are not supported by `Winnt32.exe`.

## Setup Flow

The installation of Windows NT takes place in four or five phases, depending on whether you install from a CD-ROM or use `Winnt.exe`. These phases are: the Pre-Copy Phase, Phase 0, and Phases 1-3. During each phase, you perform specific tasks and enter requested information. The Windows NT installation program (Setup) causes the computer to reboot after the Pre-Copy Phase, and again after Phase 0.

Here's a detailed description of what takes place during each phase of the Windows NT installation.

### Pre-Copy Phase (Winnt.exe and Winnt32.exe only)

The Pre-Copy Phase is the initial phase of the installation process. This phase applies only when the `Winnt.exe` or `Winnt32.exe` installation option is used. The Windows NT Setup program performs the following tasks:

1. Setup creates a set of three floppy disks to use during the installation process. These diskettes are similar to the diskettes used to perform an installation from a CD-ROM drive, except that they point to the directory

that has a copy of the installation files instead of to a CD-ROM drive. The floppy disks are not created if the `/B` or `/U` switches are used.

2. Setup creates a `$Win_NT$.~ls` folder on the first local drive with enough free space, then copies the installation files from the source directory to this folder. (The installation program deletes this folder after the installation is complete.)
3. Setup prompts you to restart the computer with the Setup Boot Disk.

### Phase 0

Phase 0 begins when you boot the computer with the Setup Boot Disk, or when you reboot the computer after using `Winnt.exe /B`. Setup prompts you to take the following steps during this phase:

1. Confirm all SCSI and CD-ROM adapters, and add drivers for adapters by using driver disks supplied by the manufacturer.
2. Agree to the terms of the Windows NT Licensing Agreement.
3. Choose the installation directory. Choose whether to upgrade previously installed versions of Windows 3.*x* or Windows NT, or to install Windows NT in a different directory to create a dual boot system, which can boot to more than one operating system.
4. Verify the hardware and software components in the computer.
5. Choose the disk partition on which to install Windows NT, and choose the type of file system to use on this partition.

Setup will then examine your computer's hard disk for corruption, and then cause the computer to reboot. After the computer reboots, Setup prompts you to remove the floppy disk from drive `A:` if one is there.

### Phase 1

In Phase 1, the NT Setup Wizard starts. Setup gathers more information from you about your computer and specific installation details. You are prompted to make the following choices and perform the following tasks during this phase:

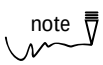
1. (Windows NT Workstation only) Choose the setup option type.
2. Enter your name and the name of your organization.
3. Enter your CD key number.

4. (Windows NT Server only) Choose a Licensing mode.
5. Enter your computer name.
6. (Windows NT Server only) Choose a server type.
7. Enter and confirm a password for the Administrator account.
8. Choose whether to create an Emergency Repair Disk. (The Emergency Repair Disk is made at the end of the installation, but you must choose whether or not to make one at this point).
9. Choose the optional components to install.

### *Phase 2*

In Phase 2, Setup installs and configures networking components. To accomplish this, you provide more information and make the following additional choices:

1. Specify how (or if) the computer connects to the network.




**If you are installing Windows NT Workstation and you choose no network, Phase 2 will end and Phase 3 will start.**

2. (Windows NT Server only) Choose whether to install Microsoft Internet Information Server (IIS).
3. Indicate which network adapters are installed in your computer.
4. Choose the network protocol(s) you want to use, and enter related information requested depending on the protocol(s) chosen.
5. (Windows NT Server and Windows NT Workstation custom setup option only) Choose additional network services to install.
6. Verify network adapter settings.
7. (Windows NT Server and Windows NT Workstation custom setup option only) Configure network bindings for network services, protocols, and adapters.
8. (Windows NT Server installed as a stand-alone server and Windows NT Workstation only) Choose whether to make your computer part of either a workgroup or a domain. Enter your workgroup or domain name. If you join a domain, create a computer account in the domain and supply the domain administrator's user account name and password.

### *Phase 3*

In Phase 3, Setup completes the installation. It is very short. You are prompted to do the following:

1. (Windows NT Server only) If you elected to install IIS in an earlier step, you must enter specific IIS setup and publishing directory information now.
2. Configure the date, time, and time zone information.
3. Configure and test the computer's video adapter settings.


**You *must* test the display configuration before the Setup Wizard will let you continue the installation process.**

4. Make an Emergency Repair Disk. Then remove this disk from Drive A:.
5. (Installation from CD-ROM only) Remove the Windows NT compact disc from the CD-ROM drive.
6. Restart the computer.

The Windows NT installation is complete.

# Deinstalling Windows NT

If you have incorrectly installed Windows NT, or want to remove it from your computer for any other reason, this section outlines the necessary steps.

## Deinstalling Windows NT from a FAT Partition

If your computer is configured to dual boot between Windows NT and MS-DOS (or to dual boot between Windows NT and Windows 95), it is fairly easy to deinstall Windows NT.

TO DEINSTALL WINDOWS NT FROM A FAT PARTITION, FOLLOW THESE STEPS:

1. Boot your computer to MS-DOS (or Windows 95) from a floppy disk that has the `Sys.com` utility on it.
2. At the command prompt type **Sys a: c:** (and press Enter). This will replace the Windows NT boot sector with the boot sector for your other operating system (MS-DOS or Windows 95).
3. Remove the floppy disk from drive A: and reboot the computer. MS-DOS or Windows 95 should start automatically.
4. Now that you have disabled NT, you can complete the removal of NT files from your computer. Free up hard disk space by removing `pagefile.sys`, `ntldr`, `Boot.ini`, `Ntdetect.com`, `Bootsect.dos`, and `Ntbootdd.sys`. (Because some of these files have attributes of hidden, system, and read-only, you will have to remove the file attributes before you can delete these files.) You can also remove the entire Windows NT installation folder (usually `C:\Winnt`), and the `\Program files\Windows NT` folder. This completes the deinstallation of Windows NT.

## Deinstalling Windows NT from an NTFS Partition

If you want to deinstall Windows NT from an NTFS partition, you must delete that partition, because no other operating system supports NTFS.

Depending on your situation, to accomplish this you need to either delete an NTFS primary partition, or delete NTFS from an extended partition.

### *Deleting an NTFS primary partition*

There are several ways to delete an NTFS primary partition:

- You can use MS-DOS `Fdisk.exe` from MS-DOS 6.*x*.
- You can use the `Delpart.exe` utility.


**The `Delpart.exe` utility is not included in the basic NT product. However, you can download this free utility from CompuServe (go to the Winnt Forum, Library 4). The filename is `delprt.exe`. You can also get this utility, free, from the Internet by accessing `ftp://ftp.teleprint.ch/pub/ms`. The filename at this location is `delpart.exe`.**

- You can use the Windows NT Setup Boot Disk set. Boot the computer from the Setup Boot Disk. Go through the installation process until you get to the disk partition information section. Highlight the NTFS partition you want to delete, and press the D key to delete it. Then press F3 to exit Setup.

Other operating systems also have partitioning utilities that are capable of deleting an NTFS partition.

### *Deleting NTFS from an extended partition*

You can't use MS-DOS `Fdisk.exe` to delete NTFS from an extended partition. You must either use `Delpart.exe` or the Windows NT Setup Boot Disk set, as described above.

## Troubleshooting Common Installation Problems

There are many common problems that can cause your installation of Windows NT to fail. Most of these problems occur because of hardware incompatibilities. Most of the time your first troubleshooting step should be to ensure that all of your hardware is on the HCL or is supported by the manufacturer. Table 2-3 lists some common Windows NT installation problems and their possible causes and solutions.

**TABLE 2-3** TROUBLESHOOTING COMMON INSTALLATION PROBLEMS

| *PROBLEM:* | *POSSIBLE CAUSE/SOLUTION:* |
|---|---|
| You have the recommended amount of free disk space, but still run out of disk space during installation. | The recommended amount of disk space is based on the expectation that you are using 16K sectors on your hard disk. If you have a very large partition, you could be using 32K or 64K sectors. You would then need significantly more free disk space to complete your installation. |
| A blue screen or STOP message is displayed during installation or after a reboot. | This can be caused by several things. Some of the most common causes are a *corrupt boot sector* or a *boot sector virus*, which you can usually repair by using `Fdisk /mbr` from MS-DOS (many virus scanners can also repair this error); and *hardware conflicts*, which you can check for by using NTHQ to examine all of your hardware settings. Look for two pieces of hardware with the same I/O port, interrupt, or DMA address. Reconfigure hardware so that there are no hardware conflicts. |
| You can't install from your CD-ROM drive. | This could be caused by an unsupported CD-ROM drive or by an unsupported SCSI adapter. Some SCSI adapters, such as PC card SCSI adapters, are not supported during installation, but you can install the drivers for them after the installation is complete. Try installing using `Winnt.exe`. |
| You can't join a domain during installation. | Make sure that all network settings, both hardware and software, are correct. Confirm that you have correctly typed in the domain name and the administrator's user account name and password. (All passwords in Windows NT are case-sensitive.) Check the network cable and connections and verify that the PDC is up and accessible on the network. |
| Network services don't start correctly. | Verify that all network adapter and network protocol settings are correct, including interrupt, I/O port, and transceiver type. Confirm that the newly assigned computer name is unique—that it does not match any other computer, domain, or workgroup name used on the network. If you are installing a PDC, ensure that the new domain name is unique—that it does not match any other computer or domain name used on the network. |

# Key Point Summary

Chapter 2 covered all of the important topics surrounding the installation and configuration of Windows NT Workstation and Windows NT Server, including the hardware requirements for installation, the information required to perform an installation, the installation process, deinstalling Windows NT, and troubleshooting common Windows NT installation problems.

- It's important that you are thoroughly familiar with the *hardware requirements* for installing Windows NT. Only hardware on the *Windows NT Hardware Compatibility List* (HCL) should be used. You can use the *NTHQ* utility to examine and identify your hardware configuration, and to get a printout of information needed to perform the installation.
- You need a substantial amount of detailed information to install Windows NT. It's a good idea to complete the Preinstallation Checklist to make sure you have all of the information you need *before* you start the installation.
- There are three ways to begin the Windows NT installation process: from a CD-ROM drive, by using `Winnt.exe`, and by using `Winnt32.exe`. Installation can be done locally from a CD-ROM drive or over the network. The installation process takes place in phases:
  - The *Pre-Copy Phase* applies only when the `Winnt.exe` or `Winnt32.exe` installation options are used. In this phase, Setup creates a set of floppy disks to use during the installation process and copies installation files from the source directory to a folder on your computer's hard disk.
  - In *Phase 0,* Setup identifies your computer's hardware, introduces the Windows NT Licensing Agreement, prompts you to choose an installation directory, and prompts you to choose a disk partition and corresponding file system.
  - In *Phase 1,* the NT Setup Wizard starts. You enter more information about your computer and specific installation details. You enter your name, your organization's name, and your CD key number. You choose a setup option type (Windows NT Workstation only). You choose a licensing mode and a server type (Windows NT Server only). You choose whether to create an Emergency Repair Disk. Finally, you select optional software components for installation.

- In *Phase 2*, Setup installs and configures networking components. You select a network connection type. Then you select and configure network adapters, protocols, services, and bindings. You choose whether to make this computer a part of a workgroup or a domain.
- In *Phase 3*, you configure date, time, and time zone information, then configure and test your computer's video display. Setup creates the Emergency Repair Disk. Then the installation is complete.

- It is possible to deinstall Windows NT, both from a file allocation table (FAT) partition and from a Windows NT file system (NTFS) partition. Remember, no other operating system supports NTFS.
- Several common problems can arise during installation that require troubleshooting. Many installation problems occur because of hardware incompatibilities. Most of the time your first troubleshooting step should be to ensure that all of your hardware is on the HCL. Table 2-3 illustrates several common installation problems and their possible causes and solutions.

# 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 Instant Assessment section that follows bring to mind key facts and concepts. In addition, the troubleshooting practice exercise in the Review Activity section tests your ability to solve common Windows NT installation problems.

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

## Instant Assessment

1. What is the minimum processor, amount of RAM, and hard disk space required to install Windows NT Workstation on an Intel-based computer?
2. What is the minimum processor, amount of RAM, and hard disk space required to install Windows NT Server on an Intel-based computer?

3. What is NTHQ and what can it do?
4. When you install Windows NT 4.0 in a different directory than a previously installed operating system, what will Windows NT automatically configure itself to do?
5. Which partition is the active partition that contains the files required to load and boot Windows NT?
6. Which partition contains the Windows NT installation directory (usually `Winnt`) and all of the Windows NT operating system files?
7. What are the two file system types that Windows NT supports?
8. What is the only operating system that supports NTFS?
9. You want to install Windows NT on an MS-DOS-based computer that does *not* have a local CD-ROM drive. Which of the three methods of starting Setup should you use?


**For answers to the Instant Assessment questions see Appendix D.**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## Review Activity

The following activity tests your ability to troubleshoot common Windows NT installation problems.

### *Installing Windows NT troubleshooting practice exercise*

In each of the following problems, consider the given facts and determine what you think are the possible causes of the problem and what course of action you might take to resolve the problem.

**Problem 1** You are attempting to install Windows NT. During the installation, the process stops and you see a blue screen containing error information on your display.

**Problem 2** You are installing Windows NT. You try to join a domain and an error message is displayed stating the domain controller for this domain cannot be located.


**For answers to the Review Activity see Appendix D.**

## Hands-on Lab Exercises

Now it's time to apply all of this head knowledge by doing a couple of hands-on lab exercises.

exam preparation pointer

**These lab exercises are extremely important for your exam preparation. Don't even think about skipping them! There's no substitute for using Windows NT to master the skills that the Microsoft Certified Professional exams test.**

Refer to the "Hardware and Software You'll Need" section in the Preface if you're not sure you have the necessary equipment to do the labs.

caution

**Warning! Some of the lab exercises in this book have the potential to erase or corrupt data on existing hard disk drives. Make sure you back up all important data and programs *before* you attempt to perform any of the lab exercises. Or, better yet, do the labs on a computer that does not contain any vital data or programs.**

### Lab 2.1 *Installing Windows NT Workstation*


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The objective of this hands-on exercise is for you to experience the process of installing Microsoft Windows NT Workstation and to develop the skills used to perform this task.

note

**For you to complete some of the remaining labs in this book, you will need at least a 10MB partition on your hard disk that will be formatted in a later lab with NTFS. (If you don't partition your hard disk in this manner, you will not be able to do the labs on NTFS security and auditing.) You may create an extended MS-DOS partition for this use. This task should be done *before* MS-DOS is installed, and before you proceed with the rest of this lab. I recommend that you partition your hard drive into two partitions. The first partition should contain *all but* 10MB of the disk's capacity. The extended (second) partition should consist of the remaining 10MB of disk space.**

**I assume, in all of the labs in this book, that drive C: is the large partition, and that drive D: is the 10MB partition. Your actual drive letters may vary from this configuration. If your drives are lettered differently, substitute your drive letters for the ones I use.**

To perform this lab, first install MS-DOS on your computer's hard drive, and load the drivers for your CD-ROM drive. Make sure the Windows NT Workstation compact disc is in your CD-ROM drive. You need one blank, 3.5-inch high-density floppy disk for this lab exercise.

Follow the steps below carefully to perform the installation:

### PRE-COPY PHASE

1. Change the default drive to your CD-ROM drive by typing in the CD-ROM drive letter followed by a colon (for example, **D:**). Then press Enter.
2. Type **cd I386**, and then press Enter.
3. Type **winnt /b**, then press Enter. (This command instructs Setup to perform the `Winnt.exe` installation without creating the Setup Boot Disk set.)
4. When Windows NT Setup asks you to enter the path where NT files are located, press Enter.
5. Setup copies files to your hard disk. (This process takes a few minutes. How about a stretch break or a fresh cup of coffee?)
6. When the Windows NT Workstation Setup screen appears, press Enter to restart your computer and continue Windows NT Setup.

### PHASE 0

1. After a couple of minutes, the Windows NT Workstation Setup screen appears, welcoming you to Setup. Press Enter to set up Windows NT now.
2. Setup displays a screen indicating any mass storage devices, such as SCSI adapters, CD-ROM drives, and so on. Some older IDE controllers are not displayed here, but they will still function and be recognized by NT. Specify additional devices by making changes on this screen if you need to. When you have completed all necessary changes, press Enter to continue.
3. The Windows NT Licensing Agreement screen appears. Read the licensing agreement, pressing PgDn to view additional screens. When you reach the bottom of the agreement, press F8 to continue setup.
4. Setup displays a screen indicating your computer's hardware and software components. Make any changes necessary. When you are finished, highlight "The above list matches my computer" and press Enter.
5. If you have a previous version of Microsoft Windows installed on your computer, Setup displays a screen indicating that it has found a previous version. If this screen appears, press N to install Windows NT Workstation in a different directory.

6. Setup displays a screen listing your computer's hard disk partitions. Highlight the partition on which you want to install Windows NT, then press Enter. (Make sure the partition you choose has at least 117MB free.)
7. Setup asks you to select the type of file system you want on this partition. Highlight "Leave the current file system intact <no changes>," and press Enter.
8. Setup displays a location where it will install the NT Workstation files. In the highlighted area, edit the text so that it reads: **\WINNTWKS**. (Don't type the period at the end.) Then press Enter.
9. Setup offers to examine your computer's hard disk for corruption. Press Enter to allow this. (This takes a few minutes.)
10. Setup displays a screen indicating that this portion of Setup is complete. If you have a floppy disk inserted in drive A:, remove it now. Then press Enter to restart your computer and to continue with setup.

PHASE 1

1. After your computer reboots, the Windows NT Workstation Setup dialog box appears. Click Next to continue.
2. A Setup Options screen appears. Select Custom. Click Next to continue.
3. Type in your name, press Tab, then type in the name of your organization. Click Next to continue.
4. Type in the ten-digit CD key number from the back of your Windows NT Workstation compact disc case (press Tab after you type the first three digits). Click Next to continue.
5. When Setup prompts you to type in a computer name, type **NTW40**. Click Next to continue.
6. Type **password** when Setup prompts you to enter an administrator password. Press Tab. Confirm the password by retyping it. Click Next to continue.
7. Setup asks you if you want to create an Emergency Repair Disk. Accept the Yes default. Click Next to continue.
8. Setup displays a screen indicating you are to Select Components. Add any components that you want to install, but do *not* deselect any components that are selected by default. (I recommend you install FreeCell and all of the games . . . I'm an addict!) Click Next to continue.

PHASE 2

1. Setup displays a screen indicating that Phase 2, Installing Windows NT Networking, is about to begin. Click Next to continue.

2. Select “This computer will participate on a network.” Then click the check box next to “Wired to the network.” (It’s OK to select these options even if you don’t have a network adapter in your computer.) Click Next to continue.
3. Setup displays the Network Adapters box. If you have a network adapter, click Start Search. Your network adapter should appear in the Network Adapters window. If your network adapter did not appear, or if you do not have a network adapter in your computer, click Select from list. If your network adapter is shown in the list, highlight it and click OK. If your network adapter is not on the list, and you have a driver disk from its manufacturer, highlight any network adapter and click Have Disk. Setup then prompts you to insert this disk. Do so and click OK. Highlight your network adapter from the list and click OK. If you do not have a network adapter, highlight MS Loopback Adapter and click OK. You should now have either the MS Loopback Adapter or your network adapter displayed in the Network Adapters box. Click Next to continue.
4. Setup displays the Network Protocols list box. Accept the default selection of TCP/IP Protocol. Click Next to continue.
5. Setup displays the Network Services list box. Accept all of the defaults selected in this list box. Click Next to continue.
6. Click Next to continue and to have Setup install the selected components.
7. Setup prompts you to enter your network adapter card settings. (This screen may not appear for some network adapters.) Verify that the settings shown match the ones that you used when you installed and configured your network adapter. Make changes only as needed. Click Continue.
8. A TCP/IP Setup warning screen appears. If you are on a network that has a DHCP server, click Yes. Otherwise, click No.
9. The Microsoft TCP/IP Properties dialog box eventually appears if you clicked No in the previous step. *If you are on a network that uses TCP/IP, or if you are connected to the Internet, obtain an IP address, subnet mask, and default gateway from your network administrator.* Otherwise, type an IP address of: **192.168.59.5** and a subnet mask of: **255.255.255.0**.


Do ***not*** use this IP address if you are on a network that uses TCP/IP, or if you are connected to the Internet.

10. Leave the Default Gateway blank. Click OK to continue.
11. Setup displays a screen showing network binding information. Click Next to continue.

12. Click Next to start the network.
13. Setup displays a screen asking you to choose whether your computer will participate in a workgroup or domain configuration. Accept the default selection of Workgroup, and the default workgroup name WORKGROUP. Click Next to continue.

PHASE 3

1. Click Finish to continue the setup process.
2. In the drop-down list box under the Time Zone tab, highlight and click your time zone. As an option, you may also click the Date & Time tab and set the correct date and time. Click Close to continue when you are finished.
3. Setup displays a screen indicating that it has found your video display adapter. Click OK in the Detected Display dialog box to continue.
4. Adjust the display settings to suit your preferences. Click Test. The Testing Mode dialog box appears. Click OK to test. When the Testing Mode dialog box reappears, click Yes if you saw the test bitmap. When the Display Settings dialog box appears, click OK to continue. Click OK in the Display Properties dialog box to complete the installation. (This takes a few minutes.)
5. When prompted, label and insert a blank 3.5-inch floppy disk into drive A:. Setup formats this disk and makes it into your Emergency Repair Disk. Click OK to continue. (This takes a couple of minutes.)
6. Setup displays a window indicating that Windows NT 4.0 is successfully installed. Remove your newly created Emergency Repair Disk from drive A: (and save it for future use). Also remove the compact disc from your CD-ROM drive. Then click Restart Computer to reboot and start Windows NT Workstation. The setup is complete.

## Lab 2.2 *Installing Windows NT Server and configuring dual boot with Windows NT Workstation*


Workstation
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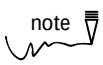
Enterprise

The purpose of this lab exercise is for you to experience the process of installing Microsoft Windows NT Server and to develop the skills used to perform this task. During the installation process you will configure your computer to dual boot between Windows NT Server and Windows NT Workstation.




**Before you can successfully perform this lab, you must complete Lab 2.1. You need one blank, 3.5-inch high-density floppy disk for this lab exercise.**

Follow the steps below carefully to perform the installation:

Boot your computer to Windows NT Workstation, and log on as Administrator (remember, the administrator password is *password*). Make sure the Windows NT Server compact disc is in your CD-ROM drive.

### PRE-COPY PHASE

1. Close the Welcome to Windows NT dialog box.
2. Select Start ➪ Programs ➪ Command Prompt.
3. At the command prompt, change the default drive to your CD-ROM drive by typing in the CD-ROM drive letter followed by a colon (for example, **D:**). Then press Enter.
4. Type **cd I386**, and then press Enter.
5. Type **winnt32 /b**, then press Enter. (This command performs the installation without creating the Setup Boot Disk set.)
6. The Windows NT 4.0 Upgrade/Installation dialog box appears. Click Continue to accept the default path for the location of your Windows NT files.
7. The Installation program copies files to your hard disk. (This process takes a few minutes.)
8. When Setup displays the Windows NT 4.0 Server Installation/Upgrade dialog box, click Restart Computer and continue the installation.

### PHASE 0

1. After a minute or two, when the Windows NT Server Setup screen appears, press Enter to set up Windows NT now.
2. Setup displays a screen showing any mass storage devices, such as SCSI adapters, CD-ROM drives, and so on. Some older IDE controllers are not displayed here, but will still function and be recognized by NT. Specify additional devices by making changes on this screen if you need to. When you have completed all necessary changes, press Enter to continue.
3. The Windows NT Licensing Agreement screen appears. Read the licensing agreement, pressing PgDn to view additional screens. When you reach the bottom of the agreement, press F8 to continue setup.
4. Windows NT Server Setup displays a screen indicating it has found Windows NT Workstation. Press N to cancel upgrade and install a fresh copy of Windows NT.
5. Windows NT Server Setup displays a screen listing your computer's hardware and software components. Make any changes necessary. When you are finished, highlight "The above list matches my computer," and press Enter.

6. If you have a previous version of Microsoft Windows installed on your computer, Setup displays a screen stating that it detected a previous version. If this screen appears, press N to install Windows NT Server in a different directory.
7. Windows NT Server Setup displays a screen showing your computer's hard disk partitions. Highlight the partition on which you want to install Windows NT Server, then press Enter. (Make sure the partition you choose has at least 124MB free.)
8. Windows NT Server Setup asks you to select the type of file system you want on this partition. Highlight "Leave the current file system intact <no changes>," and press Enter.
9. Windows NT Server Setup displays the location where it will install the NT Server files. In the highlighted area, edit the text so that it reads: **\WINNTSRV**. (Don't type the period at the end.) Then press Enter.
10. Windows NT Server Setup offers to examine your hard disk for corruption. Press Enter to allow this. (This takes a few minutes.)
11. Windows NT Server Setup displays a screen that indicates this portion of Setup is complete. If you have a floppy disk inserted in drive A:, remove it now. Then press Enter to restart your computer and to continue with setup.

PHASE 1

1. After your computer reboots and the Windows NT Server Setup dialog box finally appears, click Next to continue.
2. Type in your name, press Tab, and then type the name of your organization. Click Next to continue.
3. Type in the ten-digit CD key number from the back of your Windows NT Server compact disc case (press Tab after you enter the first three digits). Click Next to continue.
4. Select a Licensing mode for the server. Select "Per Server for:" and enter the number of client licenses you purchased. Click Next to continue.
5. When prompted to type in a name for your computer, type **PDCLAB**. Click Next to continue.
6. Select Primary Domain Controller in the Server Type window. Click Next to continue.
7. Type **password** when prompted to enter an administrator password. Press Tab. Confirm the password by retyping it. Click Next to continue.
8. Windows NT Server Setup asks if you want to create an Emergency Repair Disk. Accept the Yes default. Click Next to continue.

9. Windows NT Server Setup displays a screen prompting you to Select Components. Add any components that you want to install, but do *not* deselect any components that are selected by default. Click Next to continue.

PHASE 2

1. Windows NT Server Setup displays a window indicating that Phase 2, Installing Windows NT Networking, is about to begin. Click Next to continue.
2. Accept the default check in the box next to "Wired to the network." (It's OK to select this option even if you don't have a network adapter in your computer.) Click Next to continue.
3. Accept the default check in the box next to "Install Microsoft Internet Information Server." Click Next to continue.
4. Windows NT Server Setup displays the Network Adapters box. If you have a network adapter, click Start Search. Your network adapter should then appear in the Network Adapters box. If your network adapter did not appear, or if you do not have one in your computer, click Select From List. If your network adapter is shown in the list, highlight it and click OK. If your network adapter is not on the list, and you have a driver disk from its manufacturer, highlight any network adapter and click Have Disk. Setup then prompts you to insert this disk. Insert the disk and click OK. Highlight your network adapter from the list and click OK. If you do not have a network adapter, highlight MS Loopback Adapter and click OK. You should now have either the MS Loopback Adapter or your network adapter displayed in the Network Adapters box. Click Next to continue.
5. Windows NT Server Setup displays the Network Protocols list box. Deselect NWLink IPX/SPX Compatible Transport. Ensure that the TCP/IP Protocol is the only protocol selected (it will have a gray check in the check box). Click Next to continue.
6. Windows NT Server Setup displays the Network Services list box. Accept all of the defaults selected in this window. Click Next to continue.
7. Click Next to have Setup install the selected components.
8. Setup prompts you to enter your network adapter card settings. (This screen may not appear for some network adapters.) Verify that the settings shown match the ones you used when you installed and configured your network adapter. Make changes only as needed. Click Continue.
9. A TCP/IP Setup warning screen appears. If you are on a network that has a DHCP server, click Yes. Otherwise, click No.

10. The Microsoft TCP/IP Properties dialog box appears if you clicked No in the previous step. *If you are on a network that uses TCP/IP, or if you are connected to the Internet, obtain an IP address, subnet mask, and default gateway from your network administrator*. Otherwise, type an IP address of: **192.168.59.5** and a subnet mask of: **255.255.255.0**.


Do *not* use this IP address if you are on a network that uses TCP/IP, or if you are connected to the Internet.

11. Leave the Default Gateway blank. Click OK to continue.
12. Windows NT Server Setup displays a screen showing network binding information. Click Next to continue.
13. Click Next to start the network.
14. Windows NT Server Setup prompts you enter a domain name. Type **LAB** as your domain name. Click Next to continue.

PHASE 3

1. Click Finish to continue the setup process.
2. Accept the defaults selected in the Microsoft Internet Information Server 2.0 Setup dialog box. Click OK to continue.
3. Click Yes to create the directory.
4. Accept the default directories in the Publishing Directories dialog box by clicking OK.
5. Click Yes to create the directories.
6. Click OK in the Microsoft Internet Information Server 2.0 Setup dialog box. (You won't be configuring the Gopher functionality in this course.)
7. Click SQL Server in the Install Drivers dialog box to highlight it. Click OK to continue.
8. In the drop-down list box under the Time Zone tab, click your time zone to highlight it. Optionally, click the Date & Time tab and set the correct date and time. When you are finished, click Close to continue.
9. Setup displays a screen indicating that it has found your video display adapter. Click OK in the Detected Display dialog box to continue.
10. Adjust the display settings to suit your preferences. Click Test. The Testing Mode dialog box appears. Click OK to test. When the Testing Mode dialog box reappears, click Yes if you saw the test bitmap. When the Display Settings dialog box appears, click OK to continue. Click OK in the Display Properties dialog box to complete the installation. (This takes a few minutes.)

11. When prompted, label and insert a blank 3.5-inch floppy disk into drive A:. Setup formats and makes this disk into your Emergency Repair Disk. Click OK to continue. (This takes a couple of minutes.)
12. Windows NT Setup displays a window indicating that Windows NT 4.0 is successfully installed. Remove your newly created Emergency Repair Disk from drive A: (and save it for future use). Also remove the compact disc from your CD-ROM drive. Then click Restart Computer to reboot and start Windows NT Server. The setup is complete.

At the completion of Labs 2.1 and 2.2, both Windows NT Workstation and Windows NT Server are installed on your computer, and your computer is configured to dual boot between the two operating systems.