EXAM OBJECTIVES

Professional ▶

Exam 70-210

- Upgrade from a previous version of Windows to Windows 2000 Professional.
  - Apply update packs to installed software applications.
  - Prepare a computer to meet upgrade requirements.

Server ▶

Exam 70-215

- Upgrade a server from Microsoft Windows NT 4.0.

CHAPTER

4 Upgrading to Windows 2000

This chapter focuses on upgrading a computer to Windows 2000. You'll learn how to prepare a computer for upgrade and how to perform the upgrade. Specifically, I'll show you how to upgrade a Windows 95, Windows 98, or Windows NT Workstation computer to Windows 2000 Professional. I'll also show you how to upgrade a Windows NT Server computer to Windows 2000 Server. Finally, I'll spend some time explaining how to upgrade an entire network to Windows 2000.

Chapter Pre-Test

1. Can you upgrade a Windows for Workgroups computer to Windows 2000 Professional?
2. Can you upgrade a Windows NT Workstation 4.0 computer to Windows 2000 Server?
3. How can you tell if your computer's current hardware is adequate for upgrading to Windows 2000?
4. What should you do if some of your existing software applications aren't compatible with Windows 2000?
5. When upgrading your existing Windows NT Server 4.0 network to Windows 2000, which computer should you upgrade first?

Preparing to Upgrade

Before you upgrade a computer to Windows 2000, there are several steps you should take to prepare for the upgrade. First of all, you should ask yourself numerous questions to make sure that upgrading to Windows 2000 makes the best sense for your situation. If you don't decide to upgrade, you may decide to install the Directory Service Client on the computer. If you decide to go ahead with the upgrade, you'll need to prepare the computer by making sure it has sufficient, compatible hardware to run Windows 2000. You may also need to obtain upgrade packs for some of your installed software programs. Finally, there are a few special considerations you should note if you're planning to upgrade computers on an existing Windows NT 4.0 network. All these questions are discussed in the following sections.

Questions to Ask Yourself

Before you rush right out to upgrade a computer to Windows 2000 (or to any new version of an operating system), there are several questions you should consider:

Do I Need to Upgrade This Computer?

Sometimes we automatically assume that just because we *can* do something, like upgrade a computer to a newer version, we *should* do that thing. But, if the computer is currently doing everything you want it to do, maybe there's no need to upgrade it. On the other hand, if the new version will provide features and functionality that you want or need to use, upgrading may make a lot of sense. Also, if upgrading this computer is part of an overall plan to upgrade several or all computers on your network to Windows 2000, the answer to this question is probably "yes."

If you're not sure you need to upgrade this particular computer (and the computer runs Windows 95 or Windows 98), but you have other computers on your network that run Windows 2000 and have Active Directory installed, you may decide that you only need to install the Directory Service Client on this computer to take advantage of the added Active Directory functionality this client provides.

For details on how to install the Directory Service Client, see the "Installing the Directory Service Client" section later in this chapter.

Is the Computer's Current Operating System Upgradeable to Windows 2000?

You can upgrade the following operating systems to Windows 2000 Professional: Windows 95, Windows 98, Windows NT Workstation 3.51, and Windows NT Workstation 4.0. The only operating systems you can upgrade to Windows 2000 Server are Windows NT Server 3.51 and Windows NT Server 4.0.

You probably noticed that I didn't mention Windows for Workgroups (and Windows 3.*x*) in the last paragraph. You can't upgrade directly from these operating systems to Windows 2000. If you need to upgrade a computer running either of these operating systems, you'll need to perform a clean install of Windows 2000 on the computer, or perform the upgrade in steps — first upgrading to Windows 95, Windows 98, or Windows NT Workstation, and then upgrading to Windows 2000. Personally, I recommend that you bypass this last option and replace the computer in question because the hardware typically found on a Windows 3.*x* computer isn't adequate to run Windows 2000.

If This Computer's Operating System Is Upgradeable, Would It Be Better to Perform an Upgrade or Better to Do a Clean Install of Windows 2000?

There's no one right answer to this question, but there are some general guidelines to go on. One key consideration is that Windows NT Workstation and Windows NT Server are vastly easier to upgrade to Windows 2000 than Windows 95 or Windows 98. This is because Windows NT Workstation and Windows NT Server have a registry structure that is nearly identical to the Windows 2000 registry structure, while Windows 95 and Windows 98 have a different registry structure. Windows NT Workstation and Windows NT Server tend to have fewer hardware and software compatibility problems during an upgrade because Windows 2000 is the next generation/version of Windows NT.

Another key factor to weigh is the amount of time it takes to perform an upgrade versus the amount of time it takes to perform a clean install, and then reinstall and configure all of the applications used on the computer. If there are numerous applications on the computer that you want to continue using, it might be faster to upgrade.

Is the Computer's Hardware Sufficient for (and Compatible with) Windows 2000?

Windows 2000 requires more hardware resources than previous versions of Windows. A lot more. To determine if the hardware in a computer is satisfactory for an upgrade to Windows 2000, you can use a Windows 2000 utility to produce a hardware and software upgrade report. If the computer's existing hardware is not sufficient for (or not compatible with) Windows 2000, consider whether you will upgrade hardware, buy a new computer that is better and faster, or retain the old computer as it is and not upgrade it to Windows 2000.

IN THE REAL WORLD

Just because your computer meets the minimum hardware requirements to install Windows 2000 doesn't mean that it will run Windows 2000 acceptably. It's been my experience that a computer's processor and RAM should significantly exceed the minimum hardware requirements to produce performance that is satisfactory to users.

See Table 4-1 for the minimum processor, RAM, and hard disk space required to install Windows 2000 Professional and Windows 2000 Server. See the "Preparing a Hardware and Software Upgrade Report" step-by-step section later in this chapter for detailed instructions on how to determine whether a computer's hardware is adequate for and compatible with Windows 2000.

Are All of the Existing Applications on This Computer Compatible with Windows 2000?

Windows 2000 includes a utility that you can use to produce a hardware and software upgrade report. This report indicates whether the applications installed on your computer will run correctly with Windows 2000. If some of your existing applications are not compatible with Windows 2000, check with the application's manufacturer to see if an upgrade pack can be obtained. Apply the upgrade pack during the upgrade process when prompted by the Windows 2000 Setup program.

See the "Preparing a Hardware and Software Upgrade Report" step-by-step section later in this chapter for detailed instructions on how to determine whether a computer's software is compatible with Windows 2000.

Installing the Directory Service Client

If, for whatever reason, you decide not to upgrade an individual Windows 95 or Windows 98 computer to Windows 2000, but you run Windows 2000 (and Active Directory) on servers and other computers on your network, you may decide to install the Directory Service Client on this computer. When the Directory Service Client is installed on a Windows 95 or Windows 98 client computer, the client computer is able to:

- Access fault-tolerant Dfs shares
- Search Active Directory
- Change passwords on any domain controller

You can install the Directory Service Client on any Windows 95 or Windows 98 computer. The Directory Service Client is also called the DS Client for Windows 98. I'll go through the steps to install the Directory Service Client in the next section.

TIP

Before you install the Directory Service Client on a Windows 95 computer, you should ensure that Internet Explorer 4.01 or later is installed and that Active Desktop is enabled—otherwise the wizard used to install the Directory Service Client won't run.

STEP BY STEP

INSTALLING THE DIRECTORY SERVICE CLIENT

1. Boot your computer to its existing operating system (Windows 95 or Windows 98). Log on as Administrator.
2. Place the Windows 2000 Server compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently running. Click No.
4. Close the Microsoft Windows 2000 CD dialog box.
5. Select Start ➪ Programs ➪ MS-DOS Prompt.
6. At the MS-DOS prompt, type the drive letter of your CD-ROM drive, followed by a colon—for example, **D:**—and press Enter. Then type **cd \clients\win9x** and press Enter. Type **dsclient** and press Enter.
7. Windows 2000 extracts files and then displays the Directory Service Client Setup Wizard as shown in Figure 4-1. Click Next.

STEP BY STEP *Continued*

FIGURE 4-1 The Directory Service Client Setup Wizard

8. The "Ready to install" screen appears. Click Next.
9. The Installation screen appears. The wizard detects your system configuration and copies files to your hard disk. Click Next.
10. The installation is completed. Click Finish.
11. Windows prompts you to restart your computer. Click Yes to reboot.

Preparing a Computer to Meet Upgrade Requirements

When you prepare a computer to meet Windows 2000 upgrade requirements, you're basically focusing on two things: hardware and software. The following sections explain how to determine if your computer meets the minimum Windows 2000 upgrade requirements, and what to do if it doesn't.

Determining If Hardware Is Adequate

Windows 2000 is somewhat of a hardware hog. It requires better, faster hardware than previous versions of Windows just to run, and more than that if you want it to perform satisfactorily.

Table 4-1 reviews the minimum processor, memory (RAM), and available hard disk space required to install Windows 2000 Professional and Windows 2000 Server. Keep in mind that these are the bare-bones minimum requirements, and that you'll probably want to use better components for your upgrade if at all possible.

TABLE 4-1 Minimum Processor, Memory, and Disk Space Required to Install Windows 2000

Hardware Component	Windows 2000 Professional	Windows 2000 Server/ Advanced Server
Processor	Pentium/133MHz	Pentium/133MHz
Memory	64MB of RAM	256MB of RAM
Available hard disk space (minimum recommended hard disk size—2GB)	650MB	1GB

So how do you tell if your current hardware is sufficient for (and compatible with) Windows 2000? Microsoft has conveniently provided a command-line switch for the `Winnt32.exe` utility to help you out. It's called `/checkupgradeonly`, and when run from an MS-DOS or command prompt on a computer you want to upgrade, it analyzes the computer's hardware and software, and then prepares an upgrade report summarizing all detected compatibility issues you may encounter when running Windows 2000.

The `Winnt32.exe` utility ships with Windows 2000 Professional and Windows 2000 Server, and is located in the `\I386` folder on the compact disc.

When the upgrade report is created on a Windows 95 or Windows 98 computer, it is named `Upgrade.txt`, and is automatically saved to your Windows installation folder — normally `C:\Windows`. When the upgrade report is created on a Windows NT Workstation or Windows NT Server computer it is *not* automatically saved. However, you can manually save the report as a text file.

Following are detailed steps on how to use this utility to prepare your own upgrade report.

STEP BY STEP

PREPARING AN UPGRADE REPORT

1. Boot your computer to its existing operating system (Windows 95, Windows 98, Windows NT Workstation, or Windows NT Server). Log on as Administrator.
2. Place the product compact disc of the operating system you want to upgrade to (either Windows 2000 Professional or Windows 2000 Server) in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently running. Click No.
4. Close the Microsoft Windows 2000 CD dialog box.
5. Select Start ➪ Programs ➪ MS-DOS Prompt (for Windows 95/98 computers). If you're using a Windows NT computer, select Start ➪ Programs ➪ Command Prompt.
6. At the MS-DOS/command prompt, type the drive letter of your CD-ROM drive, followed by a colon—for example, **D:**—and press Enter. Then type **cd \i386** and press Enter. Then type **winnt32 /checkupgradeonly** and press Enter.
7. Windows 2000 prepares an upgrade report. This takes a few minutes.
8. The Windows 2000 Readiness Analyzer displays the upgrade report, as shown in Figure 4-2. The upgrade report shown in this figure was created on a Windows 98 computer.

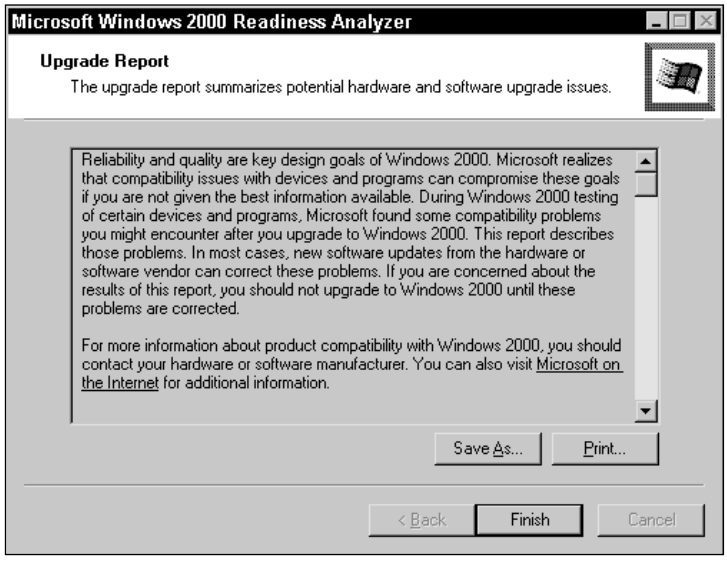

FIGURE 4-2 Upgrade report for a Windows 98 computer

STEP BY STEP *Continued*

When the upgrade report is created on a Windows 95 or Windows 98 computer, it is named `Upgrade.txt`, and is automatically saved to your Windows installation folder – normally `C:\Windows`. If you're running this utility on a Windows 95 or Windows 98 computer, print the report if you want to, and click Finish.

When the upgrade report is created on a Windows NT Workstation or Windows NT Server computer, it is *not* automatically saved. However, you can manually save the report as a text file.

If you're running this utility on a Windows NT Workstation or Windows NT Server computer, click Save As to save the report. (You can open the report later using Notepad and view or print the report.) You can also highlight any item listed on the screen and click Details if you want to view specific information about the item. Click Finish.

9. At the MS-DOS/command prompt, type **exit** and press Enter.

After you've generated your upgrade report, you can review it to determine how your computer's hardware stacks up, and whether or not your computer's software applications will work with Windows 2000.

Obtaining Upgrade Packs for Software

Don't be surprised if the upgrade report indicates that several of your installed software applications are either incompatible with or may not work with Windows 2000. You may need to apply upgrade packs in order to run these applications with Windows 2000.

EXAM TIP

One of the exam objectives for the Professional exam mentions applying "update packs to installed software applications." The Windows 2000 user interface uses the terms *upgrade pack* and *update pack* interchangeably, although *upgrade pack* seems to be the most frequently used term.

It's possible that there may not be an upgrade pack or other way to make an application compatible with Windows 2000. If there isn't a way to upgrade the application, you have three options:

- Remove the application and discontinue using it.
- Replace the application with a similar program that *is* compatible with Windows 2000.

- If you must continue using the old application, you shouldn't upgrade this computer.

I recommend that you contact the manufacturer of all software applications that the upgrade report indicates will not or may not work with Windows 2000 to request upgrade packs *before* you upgrade to Windows 2000. Then, when you perform the actual upgrade, supply the location of the upgrade packs (on your computer or network) when prompted by Windows 2000 Setup.

Testing Software Applications before the Upgrade

If you plan to upgrade a whole network of computers, it's a good idea to test all of your applications on a Windows 2000 test computer before upgrading all of your computers. Some applications, even though they are reported as being compatible with Windows 2000 or have upgrade packs, may lose functionality after a computer is upgraded to Windows 2000. For example, an application may no longer support a specific hot key combination or may not support importing a specific file type that you were previously able to import. I recommend that you test all applications (including all of the application's individual features that are critical to your users) in a Windows 2000 test environment *before* you upgrade.

Special Considerations for Existing Windows NT 4.0 Networks

Upgrading an entire network to Windows 2000 is a whole different ballgame than upgrading one or two computers. A fair amount of planning and testing should be done before the upgrade is performed, and several issues need to be considered as part of your overall network upgrade plan.

Planning Your Domain Structure

Planning a domain structure is fairly straightforward. Basically, you need to plan an interim domain structure (that you will use during the upgrade process) and a final Windows 2000 domain structure.

Because of the Windows NT Server 4.0 limitation of 40,000 objects per domain, your interim domain structure should mirror your existing domain structure. For example, if you currently use a Windows NT 4.0 single master domain model that consists of three domains, your interim domain structure should consist of a root domain and two child domains. The root

domain is typically formed by upgrading your existing master domain, and then the child domains are formed by upgrading your existing resource domains. There are several third-party migration tools to help you migrate a multiple-domain structure into a single domain structure. For example, both Mission Critical Software (`http://www.missioncritical.com`) and Fastlane (`http://www.fastlane.com`) have tools specifically designed for this purpose.

As far as your final Windows 2000 domain structure is concerned, in most cases, a single domain design is the best way to go. If you need additional guidance in determining a domain structure, I recommend you review the "Planning a Domain Design" section in Chapter 2.

Evaluating Infrastructure and Hardware

When you plan your network upgrade to Windows 2000, it's a good idea to evaluate your network infrastructure and hardware. Is your current network infrastructure fast enough to support Windows 2000 and your future network needs? For example, you might want to consider upgrading from 10 Mbps Ethernet to 100 Mbps Ethernet, or installing higher speed WAN links, and so on.

In addition to making sure your client hardware is adequate for Windows 2000, it's also important to evaluate your server hardware. You should consider replacing your current PDC with a bigger, faster box before you upgrade it to Windows 2000, because Windows 2000 requires more hardware than Windows NT 4.0 and the PDC will form the backbone of your new Windows 2000 network.

Testing Server-Based Applications

Prior to upgrading any servers on your network to Windows 2000, it's imperative that you test all of your server-based applications (such as Microsoft Systems Management Server, Microsoft Exchange Server, Microsoft SQL Server, and so on) on a Windows 2000 test network to ensure that these applications function flawlessly in the new environment you plan to use.

IN THE REAL WORLD

I can't urge you strongly enough to test all of your server-based applications thoroughly before upgrading. Woe to the network administrator who upgrades his network only to discover afterwards that data in a server's database can no longer be accessed, or that users can no longer send and receive e-mail.

Planning for Your DNS Server

Windows 2000 Active Directory requires a DNS server that supports the DNS dynamic update protocol (RFC 2136) and SRV (service) resource records (RFC 2052). If you have an existing DNS server on your network that meets these requirements, you can use this DNS server for your Windows 2000 network. If you don't have an existing DNS server on your network (or have a DNS server but it doesn't meet these requirements), you can either install a Windows 2000 stand-alone server with the Domain Name System (DNS) service installed on it to function as your network's DNS server; or you can choose to install the Domain Name System (DNS) service on your primary domain controller (PDC) during the upgrade process, and thereby make the PDC into your Windows 2000 network's DNS server. Alternatively, you can use QIP by Lucent Technology to provide fault-tolerant DHCP and DNS on large networks — especially if your IT department refuses to use any operating system other than UNIX for these services. Lucent is making the current version of QIP (6.0) compatable with Windows 2000 for DNS and DHCP.

CROSS-REFERENCE

For more information on installing and configuring a DNS server, see Chapter 7.

Upgrading to Windows 2000

Now that you've prepared your computer for the upgrade, you're ready to perform the actual upgrade process. This section explains the steps involved in upgrading to Windows 2000 Professional and to Windows 2000 Server. If you are interested in upgrading an entire network, I'll also cover the order in which you should upgrade existing computers, and how to upgrade your domain structure.

Upgrading to Windows 2000 Professional

You can upgrade to Windows 2000 Professional from Windows 95, Windows 98, Windows NT Workstation 3.51, or Windows NT Workstation 4.0. The next two sections explain, in detail, first how to upgrade from Windows 98 to Windows 2000 Professional, and then how to upgrade from Windows NT Workstation 4.0 to Windows 2000 Professional.

STEP BY STEP

UPGRADING FROM WINDOWS 98 TO WINDOWS 2000 PROFESSIONAL

TIP

This section lists the steps I used to upgrade Windows 98 to Windows 2000 Professional. The steps to upgrade Windows 95 are nearly identical.

1. Boot your computer to Windows 98. Log on as Administrator.
2. Place the Windows 2000 Professional compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently running. Click Yes to upgrade to Windows 2000.
4. The Windows 2000 Setup Wizard starts. Accept the default option to upgrade to Windows 2000, and click Next.
5. The License Agreement screen appears. Select the "I accept this agreement" option, and click Next.
6. The Your Product Key screen appears. Type in the 25-character product key from the back of your Windows 2000 compact disc case. Click Next.
7. The Preparing to Upgrade to Windows 2000 screen appears. Click Next.
8. The Provide Upgrade Packs screen appears, as shown in Figure 4-3.

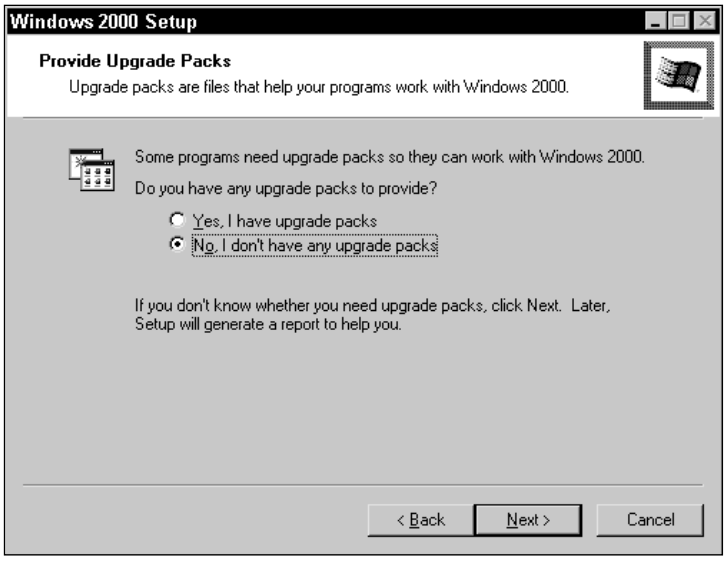

FIGURE 4-3 Providing upgrade packs

STEP BY STEP *Continued*

If you have upgrade packs for installed applications, select the "Yes, I have upgrade packs" option, and click Add. Windows 2000 prompts you to browse your computer or network for the location of the upgrade pack(s). In the browse list, highlight the location the upgrade packs are located in and click OK. Go on to Step 9.

If you don't have upgrade packs, select the "No, I don't have any upgrade packs" option, and click Next.

9. The Upgrading to the Windows 2000 NTFS File System screen appears.

   If you don't need to dual boot this computer between Windows 2000 and Windows 95, Windows 98, or MS-DOS, select the "Yes, upgrade my drive" option, and click Next. Go on to Step 10.

   If you want this computer to be able to dual boot, select the default option of "No, do not upgrade my drive," and click Next.

10. Windows 2000 prepares an upgrade report. (This is the same upgrade report I discussed earlier in the "Determining If hardware Is Adequate" section.) This process takes a few minutes.

11. Windows 2000 may prompt you to supply updated files for Plug and Play hardware in your computer. If it does, either click Provide Files and follow the instructions presented on-screen, or click Next if you want to complete the upgrade now and go back and provide the updated files later.

TIP

I recommend that you don't complete the upgrade until you have the necessary files and upgrade packs for the hardware and software installed in your computer. If you continue the upgrade without providing these files/upgrade packs, you may find that some of your hardware and/or software won't work after Windows 2000 is installed.

12. Windows 2000 displays the Upgrade Report. You can read, save, and print this report. Click Next.

13. If Windows 2000 determined that some of your hardware or software is not compatible with Windows 2000 (and you did not supply updated files or upgrade packs), Windows 2000 Setup prompts you to either review the upgrade report again, continue with the upgrade, or quit setup. If you choose to continue the upgrade in spite of these potential incompatibilities, click Continue.

14. The Ready to Install Windows 2000 screen is displayed. Click Next. Windows 2000 will automatically install itself and perform all necessary upgrades and file system conversions. The process takes a long time—up to an hour or more. Your computer will restart several times during the upgrade process.

STEP BY STEP *Continued*

15. After your computer finishes the upgrade and performs its final reboot, the Password Creation dialog box is displayed. Type a password for the Administrator in the New Password text box. Confirm this password by retyping it in the Confirm New Password text box. Click OK.
16. Log on to Windows 2000 Professional by typing in your user name and password and clicking OK. The upgrade is complete.

Upgrading from Windows NT Workstation to Windows 2000 Professional is similar to upgrading from Windows 98, but the steps are different enough to warrant listing them separately.

STEP BY STEP

UPGRADING FROM WINDOWS NT WORKSTATION TO WINDOWS 2000 PROFESSIONAL

1. Boot your computer to Windows NT Workstation. Log on as Administrator.

TIP

These are the steps I used to upgrade a Windows NT Workstation 4.0 computer to Windows 2000 Professional. The steps to upgrade Windows NT Workstation 3.51 are nearly identical.

2. Place the Windows 2000 Professional compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently using. Click Yes to upgrade to Windows 2000.
4. The Windows 2000 Setup Wizard starts. Accept the default option to upgrade to Windows 2000, and click Next.
5. The License Agreement screen appears. Select the "I accept this agreement" option, and click Next.
6. The Your Product Key screen appears. Type in the 25-character product key from the back of your Windows 2000 compact disc case. Click Next.
7. The Upgrading to the Windows 2000 NTFS File System screen appears. (This screen won't appear if your computer is already configured to use NTFS.)

   If you want to use NTFS, accept the default option of "Yes, upgrade my drive," and click Next. (I recommend using NTFS for most upgrade situations.)

STEP BY STEP *Continued*

If for some reason you don't want to use NTFS, select the "No, do not upgrade my drive" option, and click Next.

8. Windows 2000 Setup checks your computer for compatibility with Windows 2000, and displays the Report System Compatibility screen if it detects any incompatible hardware or software, as shown in Figure 4-4. If you want more information about any item displayed in this screen, highlight the item and click Details. To save this report, click Save As and provide a file name.

FIGURE 4-4 Upgrade report for a Windows NT 4.0 computer

Click Next.

9. Windows 2000 Setup copies installation files to your computer's hard disk. Then Windows 2000 restarts your computer.
10. After your computer reboots, Windows 2000 Setup inspects your computer's hardware configuration. If you have third-party SCSI or RAID drivers that need to be installed, press F6 during this process. (If you don't have these drivers, just ignore this screen.)
11. Windows 2000 Setup examines your hard disk(s) and copies files to the Windows 2000 installation folders. Then Setup initializes your Windows 2000 configuration, and restarts your computer.
12. Windows 2000 Professional starts. If you chose to convert your file system to NTFS, Windows 2000 converts the drive to NTFS. Windows 2000 restarts your computer again.

STEP BY STEP *Continued*

13. Windows 2000 Setup detects and installs devices on your computer. This takes several minutes, and your display may flicker during this time. If your computer stops during this process for a long period of time (more than an hour) or displays an error, reboot your computer and Setup will resume automatically.
14. Windows 2000 Setup installs networking components. Then Windows 2000 Setup installs additional Windows 2000 components. Finally, Setup performs a final set of tasks. During this process, it installs Start menu items, registers components, saves settings, and removes any temporary files used. This process takes quite a bit of time. Then Windows 2000 automatically restarts your computer.
15. Log on to Windows 2000 Professional by typing in your user name and password and clicking OK. The upgrade is complete.

Upgrading to Windows 2000 Server

In the following section, I explain how to upgrade from Windows NT Server to Windows 2000 Server.

CAUTION

As you might expect, during the upgrade process your server will be restarted several times. Because of this fact, I recommend that you perform the upgrade at a time when you are able to reboot the server without disrupting service to users of client computers.

STEP BY STEP

UPGRADING FROM WINDOWS NT SERVER TO WINDOWS 2000 SERVER

1. Boot your computer to Windows NT Server. Log on as Administrator.

TIP

These are the steps I used to upgrade a Windows NT Server 4.0 computer to Windows 2000 Server. The steps to upgrade from Windows NT Server 3.51 are similar.

2. Place the Windows 2000 Server compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently using. Click Yes to upgrade to Windows 2000.

STEP BY STEP *Continued*

4. The Windows 2000 Setup Wizard starts. Accept the default option to upgrade to Windows 2000, and click Next.
5. The License Agreement screen appears. Select the "I accept this agreement" option, and click Next.
6. The Your Product Key screen appears. Type in the 25-character product key from the back of your Windows 2000 compact disc case. Click Next.
7. The Upgrading to the Windows 2000 NTFS File System screen appears. (This screen doesn't appear if your computer is already configured to use NTFS.)

   If you want to use NTFS, accept the default option of "Yes, upgrade my drive," and click Next. (I recommend using NTFS for most upgrade situations.)

   If for some reason you don't want to use NTFS, select the "No, do not upgrade my drive" option, and click Next.
8. Windows 2000 Setup checks your computer for compatibility with Windows 2000, and displays the Report System Compatibility screen if incompatible hardware or software is detected. If you want more information about any item displayed in this screen, highlight the item and click Details. To save the report, click Save As and provide a filename. Click Next.
9. Windows 2000 Setup copies installation files to your computer's hard disk. Then Windows 2000 restarts your computer.
10. After your computer reboots, Windows 2000 Setup inspects your computer's hardware configuration. If you have third-party SCSI or RAID drivers that need to be installed, press F6 during this process. (If you don't have these drivers, just ignore this screen.)
11. Windows 2000 Setup examines your hard disk(s) and copies files to the Windows 2000 installation folders. Then Setup initializes your Windows 2000 configuration, and restarts your computer.
12. Windows 2000 Server starts. If you chose to convert your file system to NTFS, Windows 2000 converts the drive to NTFS. Windows 2000 restarts your computer again.
13. Windows 2000 Setup detects and installs devices on your computer. This takes several minutes, and your display may flicker during this time. If your computer stops during this process for a long period of time (more than an hour) or displays an error, reboot your computer and Setup will resume automatically.
14. Windows 2000 Setup installs networking components. Then Windows 2000 Setup installs additional Windows 2000 components. Finally, Setup performs a final set of tasks. During this process, it installs Start menu items, registers components, saves settings, and removes any temporary files used. This process takes quite a bit of time. Then Windows 2000 automatically restarts your computer.

STEP BY STEP *Continued*

15. If you are upgrading a stand-alone server or a member server, log on to Windows 2000 Server by typing in your password and clicking OK. The upgrade is complete.

    If you are upgrading a domain controller (either a PDC or a BDC), Windows 2000 Setup automatically logs you on as Administrator and starts the Active Directory Installation Wizard. Configure each of the screens in this wizard as appropriate to complete the upgrade. You must restart your computer at the end of this process.

CROSS-REFERENCE

For detailed information on using the Active Directory Installation Wizard, see the "Installing Active Directory" section in Chapter 7.

Recommended Order to Upgrade Computers

When upgrading an existing Windows NT Server 4.0 network to Windows 2000, you should upgrade computers in a specific order.

When upgrading from a single domain model:

1. Upgrade the primary domain controller (PDC) to Windows 2000 before upgrading any other computers. The PDC *must* be the first computer upgraded.
2. Upgrade all backup domain controllers (BDCs) and members servers to Windows 2000. Upgrade client computers as appropriate, or install the Directory Service Client on these computers.

When upgrading from any multiple domain model (single master, multiple master, or complete trust):

1. Upgrade the PDC of the Windows NT 4.0 domain that will become the root domain of your Windows 2000 network. This *must* be the first computer upgraded. Once the PDC from this domain has been upgraded, you can upgrade BDCs, member servers, and client computers from this domain to Windows 2000 whenever you want to, and in any order you choose.
2. Upgrade the PDC from each remaining Windows NT 4.0 domain. The PDC must be the first computer in the domain that is upgraded. Once the PDC from a domain has been upgraded, you can upgrade BDCs, member servers, and client computers *in that domain* to Windows 2000 whenever you want to, and in any order you choose.

Upgrading a Windows NT 4.0 Domain Structure

If your existing Windows NT 4.0 network has a single domain structure and you're upgrading the entire network to Windows 2000, upgrading your domain structure is as simple as upgrading your domain controllers.

If your existing Windows NT 4.0 network has a multiple domain structure (single master, multiple master, or complete trust), upgrading your domain structure is more complex. As discussed ealier in this chapter, you'll need to plan an interim domain structure as well as your ultimate Windows 2000 domain design.

Due to the Windows NT 4.0 limitation of 40,000 objects per domain, you can't upgrade directly from a Windows NT 4.0 multiple domain structure to a Windows 2000 single domain structure. You have to upgrade in steps:

1. Determine which of your existing Windows NT 4.0 domains will form the root domain of your new Windows 2000 domain structure. Normally, this is the master domain that contains the user accounts (or the majority of the user accounts) for your company.
2. Upgrade the primary domain controller (PDC) of the Windows NT 4.0 domain that will form the root domain.
3. Upgrade the other servers on your existing network to Windows 2000. See the "Recommended Order to Upgrade Computers" section in this chapter for details. During the server upgrade process, you should use an interim domain structure, which should mirror your Windows NT 4.0 domain structure.
4. Switch each Windows 2000 domain from mixed mode to native mode. This can be done only after all domain controllers are upgraded to Windows 2000.
5. Use the various Windows 2000 domain consolidation tools to restructure your domains to match your Windows 2000 domain design. You can merge domains only after all domain controllers on the network are upgraded to Windows 2000 and after each Windows 2000 domain is switched to native mode.

I intended this section to be a high-level overview of how domains are upgraded to Windows 2000. For details on switching domains from mixed mode to native mode, or on using Windows 2000 domain consolidation tools, see Chapter 9.

KEY POINT SUMMARY

This chapter explored numerous Windows 2000 upgrade topics. Some of the key points are:

- You can upgrade the following operating systems to Windows 2000 Professional: Windows 95, Windows 98, Windows NT Workstation 3.51, and Windows NT Workstation 4.0.
- You can upgrade the following operating systems to Windows 2000 Server: Windows NT Server 3.51 and Windows NT Server 4.0.
- If you decide *not* to upgrade a Windows 95 or Windows 98 computer to Windows 2000, but you run Windows 2000 (and Active Directory) on servers and other computers on your network, you may decide to install the Directory Service Client on this computer.
- When you prepare a computer to meet upgrade requirements, you need to determine if hardware is adequate, obtain necessary upgrade packs for software, and test software applications before the upgrade.
  - Windows 2000 is somewhat of a hardware hog. Table 4-1 shows the minimum hardware required to install Windows 2000.
  - To determine if hardware is adequate and if software is compatible with Windows 2000, you can use the `/checkupgradeonly` switch for the `Winnt32.exe` command-line utility to create an upgrade report.
- There are some special considerations for upgrading an existing Windows NT 4.0 network to Windows 2000, including planning your domain structure, evaluating infrastructure and hardware, testing server-based applications, and planning for your DNS server.
- When upgrading an existing Windows NT Server 4.0 network to Windows 2000, you should upgrade computers in a specific order.
  - When upgrading from a single domain model, the primary domain controller (PDC) must be upgraded first.
  - When upgrading from a multiple domain model, you should upgrade the PDC of the Windows NT 4.0 domain that will become the Windows 2000 root domain first.
- If you upgrade an existing multiple domain Windows NT 4.0 network to a single Windows 2000 domain, the domain structure can't be upgraded directly, but is upgraded by performing a series of sequential steps.

STUDY GUIDE

This section contains several exercises that are designed to cement your knowledge and help you prepare for the exams:

- **Assessment questions:** These questions test your knowledge of the upgrade topics covered in this chapter. *You can find the answers to these questions at the end of this chapter.*
- **Lab Exercises:** These two labs give you the opportunity to practice upgrading a Windows 98 computer to Windows 2000 Professional, and upgrading a Windows NT Server 4.0 computer to Windows 2000 Server.

Assessment Questions

1. Which operating system(s) can you upgrade to Windows 2000 Professional? (Choose all that apply.)
   A. Windows 95
   B. Windows 98
   C. Windows for Workgroups
   D. Windows NT Workstation 4.0
   E. Windows NT Server 4.0
2. Which operating system(s) can you upgrade to Windows 2000 Server? (Choose all that apply.)
   A. Windows 95
   B. Windows 98
   C. Windows for Workgroups
   D. Windows NT Workstation 4.0
   E. Windows NT Server 4.0
3. You are considering upgrading a Windows NT Workstation 4.0 computer on your network to Windows 2000 Professional. The computer has 12 applications installed in addition to the operating system. All the applications are compatible with Windows 2000. The end user would benefit from the additional features Windows 2000 provides. What action should you take?

A. Upgrade the Windows NT Workstation 4.0 computer to Windows 2000 Server.

B. Upgrade the Windows NT Workstation 4.0 computer to Windows 2000 Professional.

C. Perform a clean install of Windows 2000 Professional on the Windows NT Workstation 4.0 computer.

D. Don't upgrade the Windows NT Workstation 4.0 computer, but install the Directory Service Client on it instead.

4. You want to upgrade a Windows 98 computer to Windows 2000 Professional. What is the *minimum* processor, amount of memory (RAM), and amount of available disk space that the Windows 98 computer must have for you to perform the upgrade?

   A. Pentium/75MHz processor, 16MB of RAM, 400MB of free hard disk space

   B. Pentium/100MHz processor, 32MB of RAM, 500MB of free hard disk space

   C. Pentium/133MHz processor, 64MB of RAM, 1GB of free hard disk space

   D. Pentium/166MHz processor, 128MB of RAM, 1GB of free hard disk space

5. You want to upgrade a Windows NT Server 4.0 computer to Windows 2000 Server. What is the *minimum* processor, amount of memory (RAM), and amount of available disk space that the Windows NT Server 4.0 computer must have for you to perform the upgrade?

   A. Pentium/75MHz processor, 16MB of RAM, 400MB of free hard disk space

   B. Pentium/100MHz processor, 32MB of RAM, 500MB of free hard disk space

   C. Pentium/133MHz processor, 256MB of RAM, 1GB of free hard disk space

   D. Pentium/166MHz processor, 128MB of RAM, 2GB of free hard disk space

6. You are preparing a Windows 95 computer to be upgraded to Windows 2000 Professional. What action(s) should you take before you perform the upgrade? (Choose all that apply.)
   A. Determine if the computer's hardware is adequate.
   B. Use the `Winnt32.exe /checkupgradeonly` utility to prepare an upgrade report.
   C. Contact Microsoft for upgrade packs for your non-Microsoft software applications.
   D. Test all applications on a Windows 2000 test computer.
7. You are preparing to upgrade a Windows NT Server 4.0 computer to Windows 2000 Server. You recently obtained upgrade packs for several software applications installed on this computer. When should you apply the upgrade packs?
   A. Before the upgrade
   B. During the upgrade
   C. After the upgrade
   D. You can install the upgrade pack at any time.
8. You are upgrading your single master Windows NT Server 4.0 network to Windows 2000. Which computer should you upgrade first?
   A. The stand-alone server in the Windows NT 4.0 domain that will become the root domain in your Windows 2000 network
   B. The primary domain controller (PDC) in the Windows NT 4.0 domain that will become a child domain in your Windows 2000 network
   C. The backup domain controller (BDC) in the Windows NT 4.0 domain that will become a child domain in your Windows 2000 network
   D. The primary domain controller (PDC) in the Windows NT 4.0 domain that will become the root domain in your Windows 2000 network

Lab Exercises

The following labs provide you with hands-on experience upgrading to Windows 2000 Professional and Windows 2000 Server.

Lab 4-1 Upgrading from Windows 98 to Windows 2000 Professional

▶ Professional

This lab is optional because it requires a Windows 98 computer. If you have a Windows 98 computer that you've been wanting to upgrade to Windows 2000, here's your opportunity.

The purpose of this lab is to give you hands-on experience in upgrading a computer from Windows 98 to Windows 2000 Professional.

This lab has two parts:

- Part 1: Preparing your computer to meet upgrade requirements
- Part 2: Upgrading from Windows 98 to Windows 2000 Professional (including applying update packs to installed software applications)

Follow the steps in this lab exercise carefully.

Part 1: Preparing Your Computer to Meet Upgrade Requirements

1. Boot your computer to Windows 98. Log on as Administrator.
2. Place the Windows 2000 Professional compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently running. Click No.
4. Close the Microsoft Windows 2000 CD dialog box.
5. Select Start ➪ Programs ➪ MS-DOS Prompt.

6. At the MS-DOS prompt, type the drive letter of your CD-ROM drive, followed by a colon — for example, **D:** — and press Enter. Then type **cd \i386** and press Enter. Then type **winnt32 /checkupgradeonly** and press Enter.
7. Windows 2000 prepares an upgrade report. This takes a few minutes.
8. The Windows 2000 Readiness Analyzer displays the upgrade report. Print the upgrade report. Click Finish.
9. At the MS-DOS prompt, type **exit** and press Enter.
10. Read the upgrade report you printed in Step 8. If the report indicates your hardware is inadequate to run Windows 2000, perform any necessary hardware upgrades. If the report indicates that some of your computer's hardware or software may be incompatible with Windows 2000, obtain the appropriate updated files or upgrade packs from the hardware or software manufacturer.

    If you have hardware or software installed in your computer for which you are unable to obtain updated files or upgrade packs for Windows 2000, and you no longer require the use of this hardware or software, remove the hardware or software from your computer before upgrading to Windows 2000.

Part 2: Upgrading from Windows 98 to Windows 2000 Professional (Including Applying Update Packs to Installed Software Applications)

1. Boot your computer to Windows 98. Log on as Administrator.
2. Place the Windows 2000 Professional compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently running. Click Yes.
4. The Windows 2000 Setup Wizard starts. Accept the default option to upgrade to Windows 2000, and click Next.
5. The License Agreement screen appears. Select the "I accept this agreement" option, and click Next.
6. The Your Product Key screen appears. Type in the 25-character product key from the back of your Windows 2000 compact disc case. Click Next.

7. The Preparing to Upgrade to Windows 2000 screen appears. Click Next.
8. The Provide Update Packs screen appears.

   If you have upgrade packs for installed applications, select the "Yes, I have upgrade packs" option, and click Add. Windows 2000 prompts you to browse your computer or network for the location of the upgrade pack(s). In the browse list, highlight the location of the upgrade packs and click OK. Go on to Step 9.

   If you don't have upgrade packs, select the "No, I don't have any upgrade packs" option, and click Next.
9. The Upgrading to the Windows 2000 NTFS File System screen appears.

   If you don't need to dual boot this computer between Windows 2000 and Windows 95, Windows 98, or MS-DOS, select the "Yes, upgrade my drive" option, and click Next. Go on to Step 10.

   If you want this computer to be able to dual boot, select the default option of "No, do not upgrade my drive," and click Next.
10. Windows 2000 prepares an upgrade report. This process takes a few minutes.
11. If Windows 2000 prompts you to supply updated files for Plug and Play hardware in your computer, either click Provide Files and follow the instructions presented on-screen, or click Next if you want to complete the upgrade now and go back and provide the updated files later.
12. Windows 2000 displays the Upgrade Report. Click Next.
13. If Windows 2000 determined that some of your hardware or software is not compatible with Windows 2000 (and you did not supply updated files or upgrade packs), Windows 2000 Setup prompts you to either review the upgrade report again, continue with the upgrade, or quit setup. If you choose to continue the upgrade in spite of these potential incompatibilities, click Continue.
14. The Ready to Install Windows 2000 screen is displayed. Click Next. Windows 2000 will automatically install itself and perform all necessary upgrades and file system conversions. The process takes a long time — up to an hour or more. Your computer will restart several times during the upgrade process.

15. After your computer finishes the upgrade and performs its final reboot, the Password Creation dialog box is displayed. Type a password for the Administrator in the New Password text box. Confirm this password by retyping it in the Confirm New Password text box. Click OK.
16. Log on to Windows 2000 Professional by typing in your password and clicking OK. The upgrade is complete.

Lab 4-2 Upgrading a Windows NT Server 4.0 Computer to Windows 2000 Server

► Server

This lab is optional because it requires a Windows NT Server 4.0 computer that is configured as a stand-alone server. If you have a Windows NT Server 4.0 computer that you've been wanting to upgrade to Windows 2000, here's your opportunity.

The purpose of this lab is to give you hands-on experience in upgrading a Windows NT Server 4.0 stand-alone server to Windows 2000 Server. Follow the steps in this lab exercise carefully.

1. Boot your computer to Windows NT Server 4.0. Log on as Administrator.
2. Place the Windows 2000 Server compact disc in your computer's CD-ROM drive.
3. Windows 2000 displays a message indicating that the compact disc contains a newer version of Windows than you are currently using. Click Yes.
4. The Windows 2000 Setup Wizard starts. Accept the default option to upgrade to Windows 2000, and click Next.
5. The License Agreement screen appears. Select the "I accept this agreement" option, and click Next.
6. The Your Product Key screen appears. Type in the 25-character product key from the back of your Windows 2000 compact disc case. Click Next.

7. The Upgrading to the Windows 2000 NTFS File System screen appears. (This screen won't appear if your computer is already configured to use NTFS.)

   If you want to use NTFS, accept the default option of "Yes, upgrade my drive," and click Next. (I recommend using NTFS for most upgrade situations.)

   If for some reason you don't want to use NTFS, select the "No, do not upgrade my drive" option, and click Next.

8. Windows 2000 Setup checks your computer for compatibility with Windows 2000, and displays the Report System Compatibility screen if it detects any incompatible hardware or software. To obtain more information about any item displayed in this screen, highlight the item and click Details. Click Next.

9. Windows 2000 Setup copies installation files to your computer's hard disk. Then Windows 2000 restarts your computer.

   After your computer reboots, Windows 2000 Setup inspects your computer's hardware configuration. If you have third-party SCSI or RAID drivers that need to be installed, press F6 during this process. (If you don't have these drivers, just ignore this screen.)

10. Windows 2000 Setup examines your hard disk(s) and copies files to the Windows 2000 installation folders. Then Setup initializes your Windows 2000 configuration, and restarts your computer.

    Windows 2000 Server starts. If you chose to convert your file system to NTFS, Windows 2000 converts the drive to NTFS. Windows 2000 restarts your computer again.

    Windows 2000 Setup detects and installs devices on your computer. This takes several minutes, and your display may flicker during this time. If your computer stops during this process for a long period of time (more than an hour) or displays an error, reboot your computer and Setup will resume automatically.

11. Windows 2000 Setup installs networking components. Then Windows 2000 Setup installs additional Windows 2000 components. Finally, Setup performs a final set of tasks. During this process, it installs Start menu items, registers components, saves settings, and removes any temporary files used. This process takes quite a bit of time. Then Windows 2000 automatically restarts your computer.

12. Log on to Windows 2000 Server by typing in your user name and password and clicking OK. The upgrade is complete.

Answers to Chapter Questions

Chapter Pre-Test

1. No, you can't upgrade directly from Windows for Workgroups to Windows 2000 Professional.
2. No, the only operating systems you can upgrade to Windows 2000 Server are Windows NT Server 3.51 and Windows NT Server 4.0.
3. Use the `/checkupgradeonly` command-line switch for the `Winnt32.exe` utility to prepare an upgrade report.
4. Contact the manufacturer of all software applications that aren't compatible with Windows 2000 to request upgrade packs *before* you upgrade to Windows 2000.
5. When upgrading from a single domain model, upgrade the primary domain controller (PDC) to Windows 2000 before upgrading any other computers. When upgrading from a multiple domain model, the first computer you should upgrade is the PDC of the Windows NT 4.0 domain that will become the root domain of your Windows 2000 network.

Assessment Questions

1. **A, B, D.** The only operating systems that can be upgraded to Windows 2000 Professional are Windows 95, Windows 98, and Windows NT Workstation. Neither Windows for Workgroups nor Windows NT Server can be upgraded to Windows 2000 Professional.
2. **E.** The only operating systems that can be upgraded to Windows 2000 Server are Windows NT Server 3.51 and Windows NT Server 4.0. E is the only correct answer.
3. **B.** Upgrading the computer to Windows 2000 Professional is probably the best choice given that the current operating system is Windows NT Workstation 4.0 (which upgrades easily to Windows 2000 Professional) and the fact that the computer has 12 additional applications installed on it that would need to be reinstalled and reconfigured if a clean install was performed.
4. **C.** See Table 4-1.
5. **C.** See Table 4-1.

6. **A, B, D.** C is incorrect because you should contact the manufacturer(s) of the application(s) that may not work with Windows 2000 (not Microsoft) and ask them for an upgrade pack
7. **B.** During the upgrade process, the Windows 2000 Setup program will prompt you to provide any upgrade packs you have for installed software applications.
8. **D.** When upgrading from a Windows NT 4.0 single master domain model to Windows 2000, the first computer you should upgrade is the PDC of the Windows NT 4.0 domain that will become the root domain of your Windows 2000 network.

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