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Installing, Configuring, and Administering Microsoft Windows 2000 Server

E am Code: 070-215

Certifications:

Microsoft Certified (MCP)	
Microsoft Certified Systems Administrator (MCSA)	**Core**
Microsoft Certified Systems Engineer (MCSE)	**Core**
Microsoft Certified Database Administrator (MCSA)	**Core**

PrereZuisites:
Microsoft Windows 2000 Network and Operating System Essentials

About This Study Guide
This Study Guide is based on the current pool of e am Zuestions for the 070-215 - Installing, Configuring, and Administering Microsoft Windows 2000 Server e am. As such it provides all the information reZuired to pass the Microsoft 070-215 e am and is organized around the specific skills that are tested in that e am. Thus, the information contained in this Study Guide is specific to the 070-215 e am and does not represent a complete reference work on the subject of Installing, Configuring, and Administering Microsoft Windows 2000 Server. This StudyGuide also includes the information reZuired to answer Zuestions related to the installation of Windows 2000 Professional, DNS, Active Directory, and DCHP that may be asked during the e am. Topics covered in this Study Guide includes Installing Windows 2000 Server; Upgrading from Windows NT 4.0 Server; Deploying Service Packs; Installing, Configuring, and Troubleshooting Access to Resources; Monitoring, Configuring, Troubleshooting, and Controlling Access to Printers, Files, Folders, and Shared Folders; Configuring, Managing, and Troubleshooting Distributed file system (Dfs); Monitoring, Configure, Troubleshoot, and Controlling Access to Files and Folders via Web Services; Monitoring, Configuring, Troubleshooting, and Controlling Access to Web sites; Configuring and Troubleshooting Hardware Devices and Drivers; Monitoring, and Optimizing System Performance, Reliability, and Availability; Monitoring, Configuring, and Troubleshoot Disks and Volumes; Configuring and Troubleshooting Windows 2000 Network Connections; Installing, Configuring, and Troubleshooting a Virtual Private Network (VPN); Installing, Configuring, Monitor, and Troubleshoot Terminal Services; Implementing, Monitoring, and Troubleshooting Security; Encrypting Data by using Encrypting File System (EFS).

Intended Audience
This Study Guide is targeted specifically at people who wish to take the Microsoft MCSE e am 070-215 … Installing, Configuring, and Administering Microsoft Windows 2000 Server. This information in this Study Guide is specific to the e am. It is not a complete reference work. Although our Study Guides are aimed at new comers to the world of IT, the concepts dealt with in this Study Guide are comple and reZuire an

understanding of material provided for the MCSA / MCSE e am: 070-210 ..Installing, Configuring, and Administering Microsoft Windows 2000. Knowledge of CompTIA.s.A+ course would also be advantageous.

> **Note:** There is a fair amount of overlap between this StudyGuide and the 070-210 StudyGuide. We would not advise skimming over the information that seems familiar. Instead, read over it again to refresh your memory.

How To Use This Study Guide

To benefit from this Study Guide we recommend that you:

- Although there is a fair amount of overlap between this StudyGuide and the 070-210 StudyGuide, the relevant information from the 070-210 StudyGuide is included in this StudyGuide. This is thus the only StudyGuide you will reZuire to pass the 070-215 e am.
- Study each chapter carefully until you fully understand the information. This will reZuire regular and disciplined work. Where possible, attempt to implement the information in a lab setup.
- Perform all labs that are included in this Study Guide to gain practical e perience, referring back to the te t so that you understand the information better. Remember, it is easier to understand how tasks are performed by practicing those tasks rather than trying to memorize each step.
- Be sure that you have studied and understand the entire Study Guide before you take the e am.

> **Note:** Remember to pay special attention to these note bo es as they contain important additional information that is specific to the e am.

Good luck!

1. Installing and Deploying Windows 2000

You can install Windows 2000 Professional or Windows 2000 Sever directly from the CD-Rom or from a network share. The Windows 2000 installation process consists of four stages:

Stage 1: Hard Drive Preparation. In te t mode Setup checks the hard drive for consistency and errors. It allows you to format and create the Windows 2000 partition if you need to and copies setup files to the hard drive. Setup then reboots the computer.

Stage 2: Setup Wizard. The graphical user interface Setup Wizard gathers information from you; such as regional settings, your name and organization, the Windows 2000 CD-key, and computer name. Creates the local Administrator user account and reZuests a password for it.

Stage 3: Installing Network Components. After the Setup Wizard has gathered the necessary information from you in Stage 2, it begins the network components installation. It detects your network adapter card; allows you to choose which network components, such as the network client, file and printer sharing and protocols, to install; allows you to join a workgroup or domain; and installs the components you have chosen.

Stage 4: Completing the installation. The Setup Wizard completes the installation by installing the start-menu items and applying and saving the configuration settings you chose in the previous stages. It then deletes the temporary setup files and reboots the computer.

1.1 System ReZuirements

Before installing Windows 2000, you must ensure that the computer meets the minimum system reZuirements for the various versions of Windows 2000 as indicated in the table below.

TABLE 1.1: *Windows 2000 Server System ReZuirements*

Hardware	Minimum reZuirement
Processor	Pentium 133 MHz
Memory	256 MB Ram
Hard disk space	2 GB with 1 GB free space (2 GB free space recommended)
Networking	Network adapter card
Display	Video display adapter card and VGA monitor
I/O devices	Keyboard and mouse or other pointing device

Note: Windows 2000 Server supports up to 4 processors and a ma imum of 4 GB Ram while Windows 2000 Advanced Server supports up to 8 processors and a ma imum of 8 GB Ram and Windows 2000 Data Centre supports up to 16 processors and a ma imum of 8 GB Ram.

1.2 Installing Windows 2000 from the CD-Rom

When installing Windows 2000 from the CD-Rom you can either boot directly from the CD-Rom or, if your computer system does not support booting from the CD-Rom, you can create boot disks.

1.2.1 Booting from the CD-Rom.

To install Windows 2000 form the CD-Rom you must enter your system BIOS and set the CD-Rom drive as the ***First Bootable Device***. This is usually set in the ***BIOS Feature Setup***. While you are in the BIOS Setup you should also check that ***Boot Sector Virus Protection*** is disabled. The Boot Sector Virus protection prevents any attempt is made to write to the hard drive.s.boot sector or partition table. When BIOS detects an attempt to write to the boot sector it stops the computer and display an error message. The Windows 2000 Setup program must write to the boot sector, therefore the ***Boot Sector Virus Protection*** must be disabled.

Once you have configured the BIOS, place the Windows 2000 installation disk in the CD-Rom and reboot the computer. During the boot process you will be prompted to ***press any key to boot from CD-Rom***. Once you have pressed a key the installation of Windows 2000 will begin.

1.2.2. Using Setup Boot Disks

You can use Setup Boot Disks if you install Windows 2000 on an 86-based computer that does not have MS-DOS or a Windows operating system installed and does not support booting from the CD-Rom. You can also use these Setup Boot Disks to start Windows 2000 when it might not be able to start on its own because of a computer error, or to initiate an emergency repair. You must run *makeboot.e e* or *makebt32.e e* from the `\bootdisk` directory on the Windows 2000 Server installation CD to create the Setup Boot Disks. This must be done on a computer that has an operating system installed on it already and will reZuire four density floppy disks. *Makeboot.e e* is a 16-bit DOS application that runs on 16-bit operating systems like MS-DOS, Windows 3.11 and Windows 9 while *makebt32.e e* is a 32-bit application that runs on Windows NT, Windows 2000 and Windows XP. To install Windows 2000 by using the Setup Boot disks, you must first boot the computer, enter the computer.s. system BIOS and set the `A:\` drive as the ***First Bootable Device***. This is usually set in the ***BIOS Feature Setup***. Then insert the Windows 2000 Setup Boot Disk 1 into the `A:\` drive, the Windows 2000 Server installation CD in the CD-Rom, and save and e it the BIOS setup. The Setup Boot Disks will then boot the computer, load the necessary drivers reZuired to access the CD-Rom drive and will start the Windows 2000 Server setup automatically.

> **Note:** Boot disks operate in a **16-bit DOS mode** environment. You therefore cannot use *winnt32.e e* to install Windows 2000 Professional as *winnt32.e e* is **32-bit** application. You must use *winnt.e e*, which is the 16-bit eZuivalent of *winnt32.e e*, instead.

1.3 Installing Windows 2000 over the network.

To install Windows 2000 over the network you must copy the **i386** folder from the Windows 2000 installation CD to a shared folder on the network. You must also ensure that the computer has a can connect to the network share when it has booted. To be able to boot to the network share the computer must have a **PXE compliant** network adapter. If the computer cannot be booted over the network you will have to create a network boot disk for the computer. A boot disk can be created by using the *rbfg.e e* utility. If you must use a boot disk to boot the computer, you will have to run *winnt.e e* to install Windows 2000.

> **Note:** Boot disks operate in a **16-bit DOS mode** environment. You therefore cannot use *winnt32.e e* to install Windows 2000 Professional as *winnt32.e e* is **32-bit** application. You must use *winnt.e e*, which is the 16-bit eZuivalent of *winnt32.e e*, instead.

1.4 Performing an Unattended Installation.

Microsoft allows for the automated installation of Windows 2000 through unattended installations. There are three mechanisms through which an unattended installation can be performed. These are through:

- unattended answer files;
- disk imaging using the System Preparation Tool; and
- Remote Installation Services

1.4.1 Using an Unattended Answer file.

The first mechanism you can use to perform an unattended installation of Windows 2000 is to use an **answer file** (See FIG 1.1). An answer file is an automated script that supply.s. the Windows 2000 Setup program with all the information it would reZuire during the installation.

You can use **Setup Manager** to create and modify an answer file or you can manually create the Answer file. Setup Manager is located in the *deploy.cab* file in the */support/tools* folder on the Windows 2000 installation CD and can be e tracted to your computer by double-clicking on the *deploy.cab* file. This will display the files contained in the *deploy.cab* file. Right-click on the files and select **E tract** on the menu that pops up.

You can use Setup Manager to create an answer file for an unattended installation, a sysprep install, and for a Remote Installation Services. You can also choose the level of automation. This can be:

- **Provide Defaults:** The answer file provides defaults that the user can see and allows the user to accept or change these settings during the installation.
- **Fully Automated:** No input is reZuired from the user and the user cannot alter any of the settings.
- **Hide Pages:** All pages that the answer file provides answers for are hidden from the user.
- **Read Only:** The user can view any of the answers on the pages that are not hidden but cannot change them.
- **GUI Attended:** The first stage of the installation is automated but the user must supply the information reZuired by the Setup Wizard during the graphical user interface stage (stages 2 and 3) of the installation.

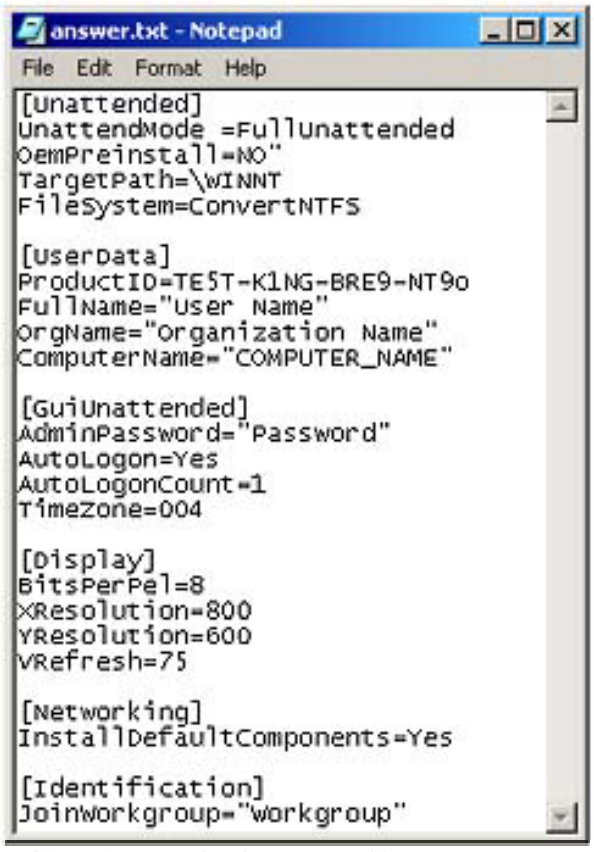

FIG1.1: *An e ample of an answer file.*

Note: When creating a **Fully Automated** answer file, you must include all the information the Setup Wizard reZuires during the Installation this includes Product key, which must be specified in the **ProductID** variable in the **UserData** portion of the answer file. (See FIG1) If the ProductID is missing the installation is stopped during the graphical user interface stage and the following error message is displayed:

```
Unattended Setup is unable to continue because a Setup
parameter specified by your system administrator or
computer manufacturer is missing or invalid.
```

If you want to start an unattended Windows 2000 installation from the Windows 2000 installation CD:

- the computer must support the El Torito Bootable CD-Rom mode format;
- the answer file must be named Winnt.sif and must be placed on a floppy disk that is inserted into the floppy drive as soon as the computer boots from the CD-Rom; and
- the answer file must contain a [Data] section with the reZuired keys specified.

1.4.2 Using the System Preparation tool (disk imaging).

With disk imaging it is possible to install and configure Windows 2000 and all the applications and application update packs on a test computer and then create an e act image of the hard drive that can then be used to install Windows 2000 and the applications on other client computers. These computers that will become recipients of the disk image installation are also referred to as target computers.

During an installation that uses disk imaging, the source files on Windows 2000 installation CD are not used, e cept for the initial installation on the test computer. In other words, you would not be using *winnt.e e* or *winnt32.e e* to install the disk image on the target computers and thus will not run the Windows 2000 Setup program. Therefore, you will not be detecting the hardware devices and installing the appropriate drivers on the target computers. As a result, all the target computers must have the same hardware configuration as the test computer. You will also have to change the computer name of all the target computers as each computer on the network must have a uniZue name.

Microsoft has created a **System Preparation tool** (*Sysprep.e e*) which solves some of the problems associated with disk imaging. You would use the Sysprep, after installing and configuring Windows 2000, the applications and application update packages on a test computer, to prepare the computer of disk imaging. You would then run the disk imaging program after Sysprep has completed. Sysprep adds a mini-Setup Wizard to the disk image that will reZuest the user-specific information such as productID, user name, network configuration, etc, on the first reboot of the target computer. This information can either be supplied by the user or by an answer file.

When using answer file with the sysprep tool, a Sysprep folder must be created on the *%systemdrive%* of the test computer or a ***Sysprep.inf*** file must be created and saved to a floppy disk that must be inserted at the beginning of the mini-Setup Wizard. The Sysprep folder that is created on the target computer when the disk image is copied is automatically deleted when the mini-Setup Wizard is completed.

Sysprep can also be used to force the target computer to perform a Plug and Play detection and to install the correct device drivers on the first reboot of the target computer; however, the target computer and the test

computer must have identical hard disk controllers and compatible **Hardware Abstraction Layers**. The .pnp switch is used to force the target computer to detect its hardware configuration on its first reboot. A full list of Sysprep switches are listed in Table 1.2.

TABLE 1.2: *System Preparation Tool Switches*

Switch	Description
-reboot	Restarts the test computer rather than allowing it to shut down after sysprep.e e is completed.
-Zuiet	Mini-Setup runs without user input. ReZuires an answer file.
-pnp	Forces a Plug and Play detection on the target computer.
-nosidgen	Does not regenerate the SIDs on the target computers.

1.4.3 Using Remote Installation Services (RIS)

Remote Installation is the process of connecting to **Remote Installation Services** (RIS) server from a target computer and then performing an automated installation of Windows 2000 on the target computer. This is the most effective method of deploying Windows 2000. Remote Installation allows administrators to use a centrally located computer to install Windows 2000 on a target computer, i.e. the computer on which the Windows 2000 operating system is to be installed, anywhere on a network. It however reZuires that your network already has a Windows 2000 server infrastructure in place and that the target computers support remote booting. A list of network services that the RIS server reZuires is listed in Tabe1.3.

TABLE 1.3: *Network services reZuired by RIS*

Network Service	Reasons for RIS ReZuirement
DNS Service	ReZuired for locating the Active Directory directory service and client computer accounts
DHCP Service	ReZuired for supplying IP addresses to client computers
Active Directory directory services	ReZuired for locating e isting client computers and e isting RIS servers

1.4.3.1 Setting up the RIS Server

To set up a RIS server, you must install RIS on a NTFS partition that is at least 2GB size and that does not contain the operating system, i.e. the boot partition, and is not the system partition, i.e. the startup partition, by running the RIS Setup Wizard. And you must specify a Remote Installation Folder that cannot be on a Distributed File System (Dfs) shared folder or on an Encrypting File System (EFS) volume.

The RIS creates and uses CD-based images and disk images. The process of creating the disk image is similar to the process reZuired when using the sysprep tool; first install and configure Windows 2000 on a test computer, install and configure your applications, apply application update packs and then use the **Riprep utility** to create a **Riprep image**. Unlike the Sysprep tool, however, RIS creates its own disk images and does not reZuire third party software. The Riprep utility automatically removes the test computer.s.SID from the image and creates an answer file based on the configuration of the operating system on the test computer.

1.4.3.2 Client reZuirements for Remote Installation

To deploy the image on the client computers, the client computers must be able to connect to the RIS server by booting from the network adapter card. To do this the client computer reZuires a **PXE-compliant network adapter**, which has a special chip that supports network booting. If the computer does not have a PXE-compliant network adapter card, you must use the *Rbfg.e e* file to make network a boot disk for the computer. The network boot disk can then be used to simulate the PXE boot process.

In addition, the user account that will be used to perform the installation must be assigned the right to .Logon as a batch job..and must be assigned permissions to create computer accounts in the domain that they will be joining.

1.4.4 Deploying Software applications

1.4.4.1 Overview

In Windows 2000 you can use a **Group Policy Object** (GPO) in conjunction with **Windows Installer** to automate and manage software installations, updates and removal from a centralized location. Group Policy can be used to assign the software application to a group of users that are organized into a unit (an Organizational Unit) and allow you to manage the various phases of software deployment.

There are four phases of software deployment:

- **Preparation:** preparing the files that allows you to use Group Policy to deploy the application software. This involves copying the Windows Installer package files to a software distribution point. The Windows Installer application files can be obtained from the application.s.vendor or can be created through the use of third-party utilities.
- **Deployment:** the administrator creates a Group Policy Object (GPO) that installs the software on the target computers and links the GPO to the appropriate Organizational Unit. During this phase the software is installed.
- **Maintenance:** the software is upgraded with a new version or redeployed with a patch or a service pack.
- **Removal:** to remove software that is no longer reZuired, you must remove the Windows installer package from the GPO that was used to deploy the software. The software is then automatically removed when a user log on or when the computer restarts.

1.4.4.2 Windows Installer

Windows Installer consists of Windows Installer **service**, which is a client-side service, and Windows Installer **package**. Windows Installer package uses the ***.msi*** file e tension and contains all the information that Windows Installer services reZuires to install the software. The software developer provides the Windows Installer package with the application. If a Windows Installer package does not come with an application, you can create a Windows Installer package or repackage the application, using a third-party utility. Alternatively you could create an application file (.zap) that uses the application.s.e isting setup program. A .zap file is not a native Windows Installer package.

Advantages of using Native Windows Installer packages:

- **Automatic File Repair** when a critical application file becomes corrupt. The application automatically returns to the installation source to retrieve a new copy of the file.
- **Clean Removal** without leaving orphaned files and without deleting shared files used by another application.

- **Transformable.** You can customize a Windows Installer package to meet the reZuirements set by your company by using authoring and repackaging tools. Transformed Windows Installer packages are identified by the *.mst* file e tension.
- **Patches.** Patches and upgrades can be applied to the installed applications. These patches use the *.msp* file e tension.

> **Note:** A *.zap* file is not a native Windows Installer package and does not offer the same benefits as Windows Installer packages. It therefore does not support **automatic repairing** and cannot be transformed.

1.5 Upgrading to Windows 2000

1.5.1 Upgrading to Windows 2000 Professional

You can upgrade all earlier Windows operating systems, with the e ception of Windows 3.1, Windows for Workgroups 3.1 and Windows NT Workstation 3.5, directly to Windows 2000 Professional. **Windows 3.1** must first be upgraded to Windows 95 or Windows 98 and can then be upgraded to Windows 2000 Professional. **Windows for Workgroups 3.1** and **Windows NT Workstation 3.5** must first be upgrade to Windows NT Workstation 3.5.1 or Windows NT Workstation 4.0 and can then be upgraded to Windows 2000 Professional.

TABLE 1.4: *Windows 2000 Professional Upgrade Paths*

Operating System	Upgrade Path
Windows 3.1	First upgrade to Windows 95 or Windows 98 and then Windows 2000 Professional
Windows for Workgroups 3.1	First upgrade to Windows NT Workstation 3.5.1 or Windows NT Workstation 4.0 and then Windows 2000 Professional
Windows 95	Windows 2000 Professional
Windows 98	Windows 2000 Professional
Windows NT Workstation 3.5	First upgrade to Windows NT Workstation 3.5.1 or Windows NT Workstation 4.0 and then Windows 2000 Professional
Windows NT Workstation 3.5.1	Windows 2000 Professional
Windows NT Workstation 4.0	Windows 2000 Professional

You can use Windows 2000 to generate an **upgrade compatibility report** that can be used to check whether the devices and drivers on the e isting operating system are compatible with Windows 2000. You can generate this compatibility report by running the ***winnt32 /checkupgradeonly*** command or the ***Chkupgrade.*****e e** utility, which runs the Windows 2000 Readiness Analyzer but must be downloaded from Microsoft website. The */checkupgradeonly* switch of the for *winnt32* command runs the first part of the Windows 2000 Setup program and checks only for compatible hardware and software. For a full list of *winnt32* see Table 1.5 and for a full list of *winnt* switches see Table 1.6.

TABLE 1.5: *WINNT32 switches*

Switch	Description
/checkupgradeonly	Checks the computer for upgrade compatibility with Windows 2000
/copydir:*folder_name*	Creates a folder in the *systemroot* folder (which contains the Windows 2000 system files).
/copysource:*folder_name*	Creates a folder in the *systemroot* folder. Files created with /copysource are automatically deleted after the installation is completed.
/cmd: *command_line*	Specifies a command to be run before the final phase of Setup.
/cmdcons	Adds a Recovery Console option to the operating system selection screen.
/debug[*level*] [:*file_name*]	Creates a debug log at the specified level.
/m:*folder_name*	Specifies that Setup must copy replacement files from another location and to look for files in that location first.
/makelocalsource	Specifies that Setup must copy all installation files to the hard drive.
/noreboot	Prevents Setup from rebooting the computer following the file copy phase. This enables a command to be entered by the user prior to completing setup.
/s:*source_path*	Specifies the source location of Windows 2000 installation files.
/syspart:*drive_letter*	Copies Setup startup files to a hard disk and marks the drive as active. You can then install the drive on another computer. When you start that computer, Setup starts at the ne t phase. This reZuires use of the /tempdrive switch.
/tempdrive:*drive_letter*	Specifies a drive to contain temporary setup files and installs Windows 2000 on that drive.
/unattend [number][:*answer_file*]	Performs an unattended installation using an answer file that provides your custom specifications to the Setup program.
/udf:id[,*udf_file*]	Indicates an identifier (ID) that Setup uses to specify how a UniZueness Database File (UDF) modifies an answer file.

Note: *winnt32.e e* is **32-bit** application. It cannot be used in a DOS-based environment such as DOS mode. Boot disks operate in a **16-bit DOS mode** environment. You therefore cannot use *winnt32.e e* to install Windows 2000 Professional from a boot disk. You must use *winnt.e e*, which is the 16-bit eZuivalent of *winnt32.e e*, instead.

TABLE 1.6: *WINNT switches*

Switch	Description
/a	Enables accessibility options
/e[:*command*]	Specifies a command to be e ecuted at the end of Setup's GUI mode.
/r[:*folder*]	Specifies an optional folder to be installed on the hade drive. Setup retains the folder.
/r [:*folder*]	Specifies an optional folder to be installed on the hade drive. Setup deletes the folder after installation
/s[:*sourcepath*]	Specifies the source location of Windows 2000 files.
/t[:*tempdrive*]	Specifies a drive to contain temporary setup files.
/u[:*answer file*]	Performs an unattended installation using an answer file that provides your custom specifications to the Setup program. This reZuires the /s switch.
/udf:*id*[,*UDF_file*]	Indicates an identifier (ID) that Setup uses to specify how a UniZueness Database File (UDF) modifies an answer file.

1.5.2 Upgrading to Windows 2000 Server

1.5.2.1 Upgrading the Operating System

Windows 2000 Server allows you to upgrade directly from Windows NT 3.51 Server and Windows NT Server 4.0 to Windows 2000 Server. A computer running a version of Windows NT sever older than Windows NT 3.51 must first be upgraded to Windows NT Server 4.0 before it can be upgraded to Windows 2000 Server. You can upgrade the operating system by running *winnt32.e e* from the Windows 2000 Server installation CD or over the network from within the e isting operating system. You however cannot upgrade the operating system from the setup boot disks or by booting from the CD-Rom.

TABLE 1.7: *Windows 2000 Server Upgrade Paths*

Operating System	Upgrade Path
Windows NT Server 3.1	First upgrade to Windows NT Server 3.51 or Windows NT Server 4.0 and then to Windows 2000 Server
Windows NT Server 3.5	First upgrade to Windows NT Server 3.51 or Windows NT Server 4.0 and then to Windows 2000 Server
Windows NT 3.51 Member Server	Windows 2000 Member Server and can then optionally be upgraded to a Windows 2000 Sever Domain Controller
Windows NT 4.0 Member Server	Windows 2000 Member Server and can then

	optionally be upgraded to a Windows 2000 Sever Domain Controller
Windows NT 3.51 PDC or BDC	Windows 2000 Sever Domain Controller
Windows NT 4.0 PDC or BDC	Windows 2000 Sever Domain Controller

1.5.2.2 Upgrading the Network Domain

A critical task in upgrading your network to Windows 2000 Server is upgrading the Windows NT Server domain. Domains are an important feature of both Windows NT Server and Windows 2000 Server. It is necessary to have one or more domains if you want to use domain-based user accounts and other domain security features in Windows 2000 Server.

In a Windows 2000 Domain, a server can have one of three roles. They can be:

- a **domain controller**, which contain copies of the user accounts and Active Directory services database for a given domain;
- a **member server**, which belong to a domain but does not contain a copy of Active Directory services database; or
- a **stand-alone server**, which do not belong to a domain but to a workgroup.

When upgrading the domain controllers in a Windows NT domain to Windows 2000, you must upgrade the Windows NT Primary Domain Controller (PDC) first.

The Windows 2000 server roles domain are named different as compared to Windows NT Server. In Windows NT Server, the possible server roles were PDC (limited to one per domain), Backup Domain Controller (BDC), member server, or stand-alone server. Windows 2000, however, has only one kind of domain controller, i.e. not a "primary" or "backup" domain controller, and also includes the roles of member server and stand-alone server. The following table illustrates how Windows 2000 Setup assigns server roles when you upgrade from Windows NT Server:

TABLE 1.8: *Upgrading Windows NT Server Roles*

Windows NT Server	Windows 2000 Server
Primary Domain Controller	Automatically upgraded to Domain Controller
Backup Domain Controller	Allows you to choose to upgrade to a Domain Controller or a Member Server
Member Server	Allows your to choose to upgrade to a Member Server or to a Stand-alone Server
Stand-alone Server	Allows you to choose to upgrade to a Member Server if a Windows 2000 domain e ists, or to a Stand-alone Server

Note: Before upgrading the Windows NT Domain Controller you should first disable WINS and DHCP by using the Services option in Control Panel in Windows NT Server 4.0 so that the WINS database and the DHCP database can be converted during the upgrade process.