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# Windows NT Installation

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# Overview

- Salient Features of Windows NT 4.0
  - » Base Operating System
  - » Important Features
- Case Example : Server Based Windows NT 4.0 Installation (Lab)

# Windows NT 4.0

## Salient features of Windows NT :

- Micro kernel based architecture
- Multitasking and multithreading
- Multi-platform support (80486, Pentium, MIPS R4x00-, Dec Alpha AXP, PReP-based Power PC)
- Object Oriented operating system
- All user, machine and application specific data is stored in a central database called Registry
- Windows NT has C2 security classification



# Windows NT VS Windows

## 95

### Windows NT

- Supports Multiprocessing
- Supports preemptive multitasking
- File level security
- Applications run in their own address space
- True 32 bit OS
- No Plug & Play support

### Windows 95

- No Multiprocessing Support
- Interrupt driven multitasking
- No file level security
- Shared address space
- Contains some 16 bit code
- Plug & Play support
- More Hardware support

### Common Features

- Same user interface
- Some Common applications

# NT File Systems

Windows NT supports two types of file systems

- FAT
  - » Accessible from DOS, Windows 95 and OS/2
  - » No file level security
- NTFS
  - » Not accessible from other operating systems
  - » Supports file level security (UNIX like permissions)
  - » Support for Macintosh file sharing
  - » Support for file compression

Windows 95 FAT32 is not supported

# Client Workstation

Computers running the following operating systems can be clients to Windows NT :

- DOS
- Windows for Workgroups
- Windows 95
- Windows NT
- OS /2
- Macintosh

# Built in Protocol support

Windows NT has built-in support for the following protocols:

- TCP/IP -- used for Internet services and communication with UNIX hosts
- NWlink IPX/SPX -- used for communication with Netware servers
- NetBEUI -- used for communication with Windows NT and Windows NT computers.

Note : Windows NT can communicate to any other computer using **any** protocol, the only requirement is that the same protocol must be used by both computers



# Workgroups and Domains

- Workgroup

Is a logical grouping in which each computer :

- » Is managed separately and has separate accounts
- » Has per computer sharing and security policies
- » User and Share level security

- Domain

- » Is a logical grouping in which there is a centralized accounts and security database, managed by a domain controller
- » Management is centralized
- » Users and machines both have accounts in the domain i.e you can control by granting or denying permissions in a centralized manner

# Important services and utilities

Some important information exchange utilities of Windows NT

- Windows Internet Naming Service (WINS)
- Domain Name System (DNS)
- Dynamic Host Configuration Protocol (DHCP)

MODEM dial in / dial out services of Windows NT

- Remote Access Service (RAS)

# Upgrading to Windows NT 4.0

- Upgrade from Windows 95 is not possible
- Upgrade from Windows NT 3.x is possible

# Windows NT Installation Overview

- Types Of Installations
- NT Hardware Requirements
- Disk Partitions
- NT 4.0 Installation Steps
  - » Installation from network server

# NT 4.0 Installation

- CD ROM Based Installation
  - » The hard disk must be DOS bootable
  - » Run WINNT command with appropriate parameters from DOS (WINNT is 16 bit version for DOS while WINNT32 is 32 bit version for Windows NT)
  - » Prepare installation diskettes
  - » Boot computer using installation diskettes, follow through installation steps, guided by Setup Wizard
- Unattended Server Based Installation
  - » Prepare client diskette (e.g. DOS client diskette)
  - » Logon to server with distribution files and run WINNT command, with appropriate parameters, from distribution directory
  - » Optionally an installation script can be passed for automated installation

# Types Of NT Installations

- Primary Domain Controller (PDC)
  - » If Domain Security Model is selected then a PDC is the first system to be installed
  - » Maintains Directory Data Base : Validates Users
- Backup Domain Controller (BDC)
  - » Periodically updated backup of PDC
  - » Needs manual promotion from BDC to PDC
- Standalone or Member Server
  - » Acts as file, print and application server
- NT Workstation
  - » User desktop

# Hardware Requirements

## (Values are representative not exact)

- Hardware Compatibility List
  - » Latest version: <http://www.microsoft.com/ntserver/hcl>
- CPU
  - » Intel 80486 /33 or better
  - » MIPS R4x00
  - » Digital Alpha
  - » PReP -compliant Power PC
- Memory : 16 MB RAM
- Hard disk : 125 MB
- Display : VGA or Better

# NT Disk Partitions

- System Partition
  - » Active partition
  - » Contains bootstrap and hardware specific files
- Boot Partition
  - » Contains operating system files
- For dual boot systems the System Partition must be FAT

You can run convert.exe for a one time, non reversible, conversion from FAT to NTFS



# Primary Domain Controller --- LAB

This process is for installing from a network server that contains the distribution files

- Site Specific Part of installation:
  - » Connect to \\nt\_server as %administrator+
  - » Map a drive (e.g. h:) to the share nt-un-in
  - » (The complete mapping is h: = %\\nt\_server\nt-un-in+)
  - » Run cmd from %Start+menu
  - » On command prompt change directory to h:\nt-srv2\i386 (I.e. give the commands :
    - h: (enter)
    - cd \nt-srv2\i386 (enter)

This process is for installing from a local CD ROM

Prerequisites: i) Hard disk should be DOS bootable, ii) CD ROM drive must be accessible from DOS

- » Insert installation CD ROM in drive
- » Go to appropriate installation dir for your platform on the CD ROM
- » Type WINNT with appropriate parameters (use WINNT /? for parameter help)

# Installation of Server / Primary Domain Controller (contd.)

- » Type WINNT32 with appropriate parameters e.g. WINNT32 /b

(use WINNT32 /? for help on parameters)

- » Site Specific Part of installation ends

- » Setup requires you to create 3 boot floppies for the installation
- » Use the above created floppies to boot the system
- » Setup continues from here as with network based installation

# Installation of Server / Primary Domain Controller (contd.)

- 1. Setup copies all installation files to your local hard disk, then it restarts computer and starts installing from the local hard disk.  
Question: Why?
- 2. Setup informs that DOS part of the setup is complete and asks for restarting the computer. Press %enter+ to reboot.
- 3. The computer boots up into the Windows NT which is currently being installed. First the Setup program reads the Hardware Abstraction Layer module (hardware-specific module for the hardware platform) and Windows NT configuration data.

Next Setup reads locale-specific data, the keyboard drivers, and the FAT system files. You also see information on the number of processors recognized by Windows NT Server.

# Emergency Domain Controller (contd.)

- 3. A Setup screen comes up asking what you wish to do. Read all. You can press F1 to learn more about the Setup program. To continue with the installation, press %Enter+. To repair a damaged Windows NT installation, press the "R+key; (in general you must have previously created an Emergency Repair Disk during the installation to use this option.) To stop the installation at this point, press the F3 key.

Setup automatically detects floppy-disk controllers and EIDE/IDE hard disks without user intervention. Sometimes, detection of other hardware devices such as SCSI adapters and CD-ROM devices can cause the computer to become unstable. (This happens because the Setup program probes the hardware by polling and writing to port addresses where it expects devices to be. Setup can become confused if the different devices have similar characteristics. If this occurs, you can bypass Setup's mass storage device detection by pressing S and manually selecting the SCSI adapters, CD-ROM devices, and special disk controllers.

# y Domain Controller (contd.)

- 4. If you want Setup to automatically detect mass storage devices, press %Enter+. Setup then loads the different SCSI device drivers, and displays the SCSI hardware interfaces that it discovers. You will see a list of mass storage devices that Setup has recognized.  
If Setup doesn't find the mass storage interface, you can press S to enter additional drivers, manually. Press Enter to continue.
- 5. Setup loads the NT File System (NTFS).  
If one or more hard disks have more than 1,024 cylinders, NT displays a message informing you of this. (MS-DOS is limited to 1,024 cylinders per hard disk. Some disk controllers use sector-translation modes to accommodate larger disks. In the sector translation mode, the number of cylinders does not exceed 1,024, but the number of heads and sectors are assigned %fictitious+or logical values so as to access all the disk space for DOS. -- If the disk size appears too small when Setup later displays this information, you should exit Setup and check your CMOS drive type settings.  
If you receive the above message, press Enter to continue.)

# My Domain Controller (contd.)

- 6. If NT detects that you have a CD-ROM drive, you see a message that it has detected a CD-ROM. (If you are installing from CD-ROM, the CD-ROM file system is now loaded.)
- 7. The %Copy Right Notice+comes up, page down to the end and press F8. Read the notice at least once, but not now.
- 8. Setup searches for previous versions of Windows NT. If a previous version of NT is found, you will be able to press %Enter+to upgrade the existing NT installation or press N to install a fresh copy of NT. Press %N+for new installation. Do not press %Enter+
- 9. Setup now displays a list of hardware and software components. Make sure that the list matches your expectations of the hardware components. Change the settings, if necessary, to match your hardware configuration. Then highlight "The Above List Matches My Computer" and press %Enter+.

# Windows Domain Controller (contd.)

- 10. Setup shows the current partitioning of your hard disk. Select **unpartitioned space for the fresh installation or ask the instructor.**
  - » To delete an existing partition, highlight it and press D. Then confirm your choice by pressing L.
  - » You may need to create a partition for installation. Select %~~o~~+ to create a new partition.
  - » The Setup program displays the minimum and maximum sizes of the partition. You must select the partition size to create. **Select partition size of 500MB. (IF IN DOUBT CONSULT INSTRUCTOR).**
  - » If there are multiple partitions, such as a DOS partition and an NT partition, you see a list of partitions. Highlight the partition in which to install the Windows NT server.
  - » Select the new (unformatted) partition for installation and press %~~o~~nter+



# Local Domain Controller (contd.)

- 11. A choice is given of formatting the selected file system to FAT or NTFS.

Selecting the FAT file system has the advantage of it being used under MS-DOS, Windows NT, and OS/2. However, the disadvantage is that it does not have the security, performance, and fault-tolerant features of NTFS. Also, FAT file system limits file names to eight characters and three-character extensions. Another disadvantage of FAT is that the files on the server can be compromised by booting the NT server with a DOS disk and accessing the files. However, it is still possible to secure the files against network access, but not against local access.

NTFS allows (UNIX like) file level security, it allows owner, group and others permissions (and more e.g. system access, read, add, create etc.). To implement a locally secure file system and to use NTFS's high-performance capabilities, you should select the NTFS file system.

A percentage completion status bar for the partition is displayed.



# Primary Domain Controller (contd.)

- 12. Setup presents a screen informing you about the location where you want the files to be installed. The default location is \WINNT. If you want to install the Windows NT server in a directory other than the default directory, you can edit this value. Press %Enter+ to continue.
- 13. Setup asks for scanning hard disk for errors. Exhaustive testing can be potentially time consuming. Press %Esc+ for non-exhaustive testing. It is recommended that you perform the exhaustive examination of the hard disk, unless you are installing a test server and are short on time.

# Copy Domain Controller (contd.)

- 14. Setup copies files. You see a status indicator showing the percentage of files being copied.

Occasionally, problems with CD-ROM drives, SCSI adapters, hard disks, or system board incompatibilities result in a failure to copy some critical files properly. The Setup program displays a message that the checksums on the files do not match. You must fix the hardware problem before you can install Windows NT Server successfully. Sometimes using different types of RAM chips and incompatibilities between the RAM devices can cause strange errors during installation, when files are being copied from the network server or CD-ROM. If SIMMs are being used, ensure that they are of the same type and from the same manufacturer.

You may try noting down missing files and then refurbishing them later, after setup is complete. But the risk is that after installation is complete your computer may become unbootable, and all effort is lost.

# y Domain Controller (contd.)

- 15. After all the files are copied, the Setup program asks you to remove any Setup disks from the floppy drive and press Enter to restart the computer. The Windows NT Server reboots.
  
- 16. After the computer restarts, you will see the Welcome to the Windows NT Setup Wizard screen. There are three parts in the Setup Wizard. They are:
  - » Gathering information about your computer
  - » Installing Windows NT Networking
  - » Finishing Setup

The Setup Wizard will guide you through the remainder of the setup process. Click Next to continue and gather information about your computer.

# y Domain Controller (contd.)

- 17. A form is presented asking you to enter your name and organization, This is for licensing only. Use Tab to switch between fields or use the mouse to go to the next field. Click Next to continue.
- 18. Enter your 10 digit "CD Key,± Your instructor will provide it to you. Click Next to continue.
- 19. On the Licensing Modes screen you can choose either "Per Server" or "Per Seat" licensing. "Per Server" licensing requires you to specify the number of concurrent connections for which you're licensed. Each concurrent connection requires a separate CLIENT ACCESS LICENSE. If you choose "Per Seat" licensing, the License Manager, which is located in the Administrative Tools folder, can be used to record the number of CLIENT ACCESS LICENSES.  
Choose "Per Server" licensing and 200 concurrent connections. Click on Next to continue.

# Installation of Server / Primary Domain Controller (contd.)

- 20. Enter a unique computer name (limited to 15 characters) for identifying your computer in your domain. Click on the Next button.
  
- 21. Setup asks you to identify the type of Windows NT Server to install. Choices are
  - » Primary domain controller (PDC)
  - » Backup domain controller (BDC)
  - » Stand-alone server

The domain controller is used to manage the domain's security policy and master database. This security role can only be changed by reinstalling the Windows NT Server.

Select the Stand-alone server option.

# y Domain Controller (contd.)

- 22. Next you see the Administrator Account password screen. Enter a password which will be used by the Administrator account. The password can be 14 digits or less, and is case-sensitive. Re-enter the password in the Confirm Password field.  
Choose **ccse** as your administrator password. Click Next to continue.

# y Domain Controller (contd.)

- 23. Setup can create an Emergency Repair disk (ERD) that contains information on repairing your Windows NT Server in case of file system or other damage. You see a prompt asking you whether you want to create this emergency disk. You generally should answer Yes, but in our case ask the instructor. Click Next.

Note 1 : It is strongly recommended to maintain an ERD for each Windows NT computer and update it whenever you make substantial changes to the system. The ERD also contains information of your partition scheme and the way Windows NT addresses it, therefore an ERD prepared for one system cannot be used on another, unless the configuration is identical.

Note 2 : You can create (or update) the emergency disk after the installation by running RDISK.EXE, which is installed in the SYSTEM32 subdirectory.

# y Domain Controller (contd.)

- 24. Windows NT Setup displays a list of the following optional component groups that can be installed. These are :
  - » Accessibility Options : For changing keyboard, mouse, sound, and display for people with disabilities.
  - » Accessories : Includes Windows NT accessories and enhancements.
  - » Communications : Accessories to connect to other computers and online services.
  - » Games : Solitaire, Pinball, Minesweeper, and Freecell.
  - » Multimedia : Programs for video, animation, and for playing sound on CD-ROMs and sound cards.
  - » Windows Messaging : MS Electronic Mail and messaging utilities.

The tasks that are to be performed have a "check" in the check box beside them. You may selectively install individual components or files within a component group. This may be done by highlighting the component group and clicking on the Details button. After making component selections, click Next.



# y Domain Controller (contd.)

- 25. Setup Wizard is now ready to install Networking. Click Next.
- 26. Setup needs to know how your computer will participate on the network. The options are :
  - » Wired to the network : Your computer is connected to the network by an ISDN or Network adapter.
  - » Remote access to the network : The computer uses a MODEM to remotely connect to the network.

Choose Wired to the network .

# y Domain Controller (contd.)

- 27. Network interface card selection : During the installation process, Setup can detect the network adapters installed. You can select the Start Search button to have Windows NT automatically detect your network adapter. If setup does not auto-detect your network adapter, or you would like to use a newer driver (that came on a diskette with the card) then select the network adapter manually. In this case select the 'Select from list' button.

If you select the auto-detection feature, Setup probes the hardware for a network adapter and stops at the first one it identifies. You can accept the identified network adapter and / or select "Find Next+ which causes Setup to look for additional network adapters.

Setup lists the network adapters it has detected. Select Next.

# y Domain Controller (contd.)

- 28. Setup needs to know if you want to install the Internet Information Server (IIS). The IIS includes a Web server, FTP server, and Gopher server. Choose as you like. Click Next to continue.
- 29. After the NIC drivers are selected, you must select the network protocols that will be used by the server. Your choices are :
  - » TCP/IP Transport : If you need to connect to the Internet or communicate with other Unix hosts or a host that uses TCP/IP protocols, or you want to use TCP/IP as your standard protocol then you should select this option. The protocols IP and IPX are both routable but NetBEUI is not. Select this option during installation if you already are familiar with TCP/IP network administration basics and have information such as the IP address, subnet mask, and DNS server address available at the time of installation. You can always install and configure the TCP/IP later. TCP/IP gets installed automatically if you selected IIS for installation. Why?

# y Domain Controller (contd.)

- » NWLink IPX/SPX Compatible Transport : Select this protocol if you plan to access NetWare servers or if you plan to use it as your standard protocol.
- » NetBEUI Transport : NetBEUI (Network BIOS Extended User Interface) is the native protocol for Windows NT, LAN Manager, and IBM's LAN Server. NetBEUI is a small, low overhead and efficient protocol. It is meant for small sized (up to 200 computers) networks. Its disadvantages are that NetBEUI is not routable because it does not have a network layer (layer 3 of the OSI model). Secondly, it tends to use frequent broadcasts, which can add to the network traffic. NetBEUI is installed automatically if you selected the Remote Access Server (RAS). If your Windows NT Server is to communicate with other computers (e.g. Windows 95) that use NetBEUI only then you must select NetBEUI as one of the protocols.

Select all three network protocols, select the Next button.

# y Domain Controller (contd.)

- 30. Next, Setup displays a list of services to be installed. To add additional services, click on the Select from list button, and select the services.

The following is a list of additional services:

- DHCP Relay Agent
- Gateway (and Client) Services for NetWare
- Microsoft DHCP Server
- Microsoft DNS Server
- Microsoft TCP/IP Printing
- Network Monitor Agent
- Network Monitor Tools and Agent
- Remoteboot Service
- RIP for Internet Protocol

# Primary Domain Controller (contd.)

RIP for NwLink IPX/SPX compatible transport  
RPC support for Banyan  
SAP Agent  
Services for Macintosh  
Simple TCP/IP Services  
Windows Internet Name Service

Services can be added or removed later, by using the Network Applet, in the Control Panel. Click Next.

- 31. Setup is now ready to install the previously selected network components. Click Next.

# y Domain Controller (contd.)

- 32. A dialog box appears with the NIC parameters that Setup recognizes. Verify the parameters and click the Continue button.
- 33. A dialog box appears that asks you if there is a DHCP server on the network. If a DHCP server is up and running you can click Yes so that TCP/IP parameters are taken from there. In our case click No.

Network components will be copied to the server, and you will be asked to configure the selected network components, as Setup proceeds.

- 34. NWLink IPX/SPX Configuration : If you selected the NWLink IPX/SPX protocol stack, you see the NWLink IPX/SPX Protocol Configuration dialog box.

# y Domain Controller (contd.)

Frame Types Selection : For Ethernet and Token Ring network adapters, you can select Auto Frame Type Detection to automatically detect the frame type for your network. If every thing works fine that is all you need. But sometimes you may face problems with more complex networks, because it seems that Windows NT associates a particular higher level protocol with the first frame type it receives on the media containing that protocol. Thus, you may find that some of your computers that have NWLink IPX/SPX installed can only see Netware 4.0 servers (Netware 4.0 servers use IEEE802.2), while other computers can see only Netware 3.11 and earliar servers (Netware 3.11 servers use raw IEEE802.3 frames). In this case you can select the Manual Frame Type selection to add additional frame types.



# y Domain Controller (contd.)

Some of the different frame types used by different protocols are :

Netware 3.11 servers : Ethernet 802.3 (or IEEE802.3) frames

NetWare 3.12 (or higher) : Ethernet 802.2 (or IEEE802.2) frames

Macintosh : Ethernet SNAP frame

TCP/IP-based workstations e.g. UNIX : Ethernet II frame

For a Token Ring adapter, select the 802.5 frame type.

You may also specify the I PX eight-digit hexadecimal network number

# Group Policy Domain Controller (contd.)

- 35. TCP/IP Configuration : If you selected the TCP/IP Protocol, you will see the TCP/IP Properties sheets. You must specify an
  - » IP Address
  - » Subnet Mask
  - » Default Gateway (alternately you may install RIP for IP to get the gateway address dynamically)
  - » You can also configure DNS, WINS Address, DHCP Relay, and secondary routers.

Ask your Instructor for relevant information. Click the OK button to continue.

- 36. Setup presents you the option to disable or enable network bindings, or to arrange the order in which your computer will find information on the network. You may change this order to promote usage of your selected protocol . Click on Next to continue.

# Primary Domain Controller (contd.)

- 37. Setup is now ready to start the network, and complete the networking installation. Click on Next.
- 38. If you had requested that Setup create a Primary Domain Controller, you are asked to supply a Computer Name and a Domain Name. This domain will be created.

If you are installing a standalone server you are given the option to join an existing domain.

Ask your Instructor. Click Next to continue.

- 39. The Setup Wizard is ready, to finish the installation process, and configure any remaining network related components. Click on Finish to complete the setup procedure.

# y Domain Controller (contd.)

- 40. If you previously chose to install the Internet Information Server, you are now presented with the IIS installation options. Select the desired components and then select the installation directory. Click on OK to continue.

Select the IIS components and publishing directory locations. Click on OK to continue.

Setup will copy and install the selected IIS components. Optionally, you can install ODBC drivers. Select an ODBC driver from the list and click on the Advanced button to configure advanced ODBC installation options. Click on OK after you finish.

# y Domain Controller (contd.)

- 41. Setup displays the Date/Time Properties screen. Windows NT Server-based networks can be enterprise-wide, with servers located in in different time zones. You can specify the time zone as the number of hours offset from GMT. The time zone setting can be changed after installation by activating the Date/ Time Applet from the Control Panel. You must select the date, time, and time-zone information. You can also check the box for automatically adjusting the daylight savings time. Make appropriate changes for your locale, then click the Close button.

# Local Domain Controller (contd.)

- 42. The Setup program displays the video adapter type that it found on your computer. Select OK and use the controls to configure the size and colors for your display. Use the Test button to examine these settings. The Display settings include information on the following:
  - » Color palette
  - » Font size
  - » Desktop area (in pixels)
  - » Refresh frequency

You can list other resolution modes or change the display type. When you select OK, your graphics adapter is reset and a test bitmap is displayed for five seconds. If everything is fine, Click on Ok to save your configuration and continue,

- 43. Setup will copy any remaining files, set security on the system files, and save the configuration.

# y Domain Controller (contd.)

- 44. Setup is ready to create an "Emergency Repair Disk" if you selected it in the beginning. Insert your ERD into the floppy drive and click OK. Setup formats the floppy disk and then copies the necessary files. After the ERD has been created, remove all disks from floppy drives and remove compact discs from all CD-ROM drives. Click on Restart Computer button to finish the installation process and restart the computer.

The NTDETECT program probes the hardware, and the OS Loader loads Windows NT Server. During the installation process, the type of file system on the hard disk is FAT. After Windows NT reboots for the first time from the hard disk, it converts the FAT file system to the NTFS file system if you selected NTFS as your choice. After converting to NTFS, Windows NT again reboots itself. This conversion is done only once.

# y Domain Controller (contd.)

- 45. After an automatic reboot, (sometimes a few reboots), you should see the Windows NT Server logo and log-on screen. Press Ctrl.Alt.Del to initiate the server login. For the first time you must log in using the Administrator user name and the password that you set during installation.



# Off a Windows NT Computer

- You can shut down or log out of a Windows NT Server by using any of the following methods:

## Method 1

- . 1. Click on the Start button on the Taskbar.
- . 2. Click on Shut Down. You are then presented with three options, as follows:
  - Shut Down the computer?
  - Restart the computer?
  - Close all programs and log on as a different user?

If you select the Shut down the computer option, all applications are terminated and any unsaved data in memory is flushed to disk. If Restart the computer is selected, Windows NT shuts down and restarts the computer automatically. If Close all programs and log on as a different user is selected, all applications are terminated, unsaved data in memory is flushed to disk, and you see the Begin Logon dialog box.

# g Down and logging Off a Windows NT Computer

- Method 2
  - . Press the Ctri.Alt.Del.
  - . You see a screen that has a Logoff, Shut Down, Lock Workstarion, Change Password, Task Manager, and Cancel buttons
  - . You may select logoff or shutdown, as required. The rest of the process is similar to that described above in method 1.