

## CompTIA A+ Operating System Technologies.

### What is an Operating System?

The traditional role of Operating System Software was to manage and allocate hardware resources. Operating Systems also provide these key features and functions.

- Responsible for Hardware management
- System Hardware.
- Peripherals.
- Provides an isolation layer between the end user, and the system hardware

### Operating System Categories

Network Operating Systems.

End User Operating Systems.

### Operating System Components

System Kernel: Core of the Operating System. All Low Level Operating System Functions are implemented at the Operating System level.

Device Drivers: Specialized Programs that allow the operating system to communicate with and control hardware devices such as printers, video adapters, and network adapters.

User Interface: The UI gives the user some way to communicate with the operating system. This could be through a terminal environment, or through a Graphic User Interface.

Application Environment: This is an environment provided for Applications to run in by the Operating System.

### Common Operating Systems

MS-DOS

Windows 3.x

Windows 9x

Windows NT

Windows 2000

OS/2

UNIX

Linux

Netware

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

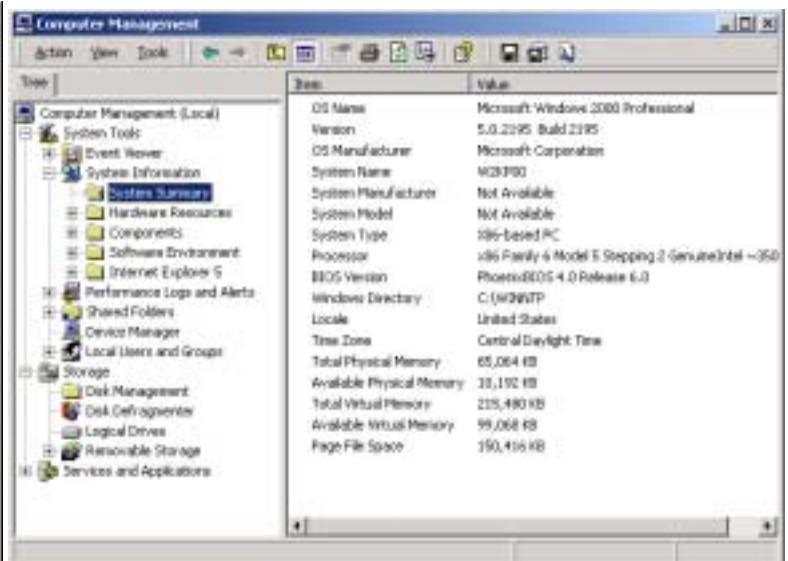
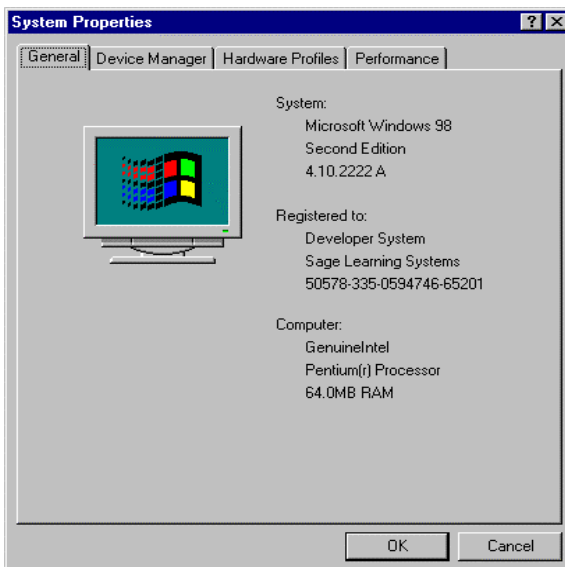
Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Operating System Features

Have a good understanding of Operating System Features

Windows 95	Windows 98	Windows 2000
Preemptive Multitasking	New Device Driver Model	Legacy Application Support
MS-DOS and Win 3.x application support	Additional Hardware Support	Active Directory
Integrated Networking	Improved Management Tools	Enhanced Security
Long File Names	Desktop and UI changes	Integrated Network Support
Context Sensitive Menus	Enhanced Multimedia	Integrated Internet Support
Windows Explorer		Scalability and performance enhancements
MS Exchange Client		Hardware support enhancements
Multi Media Support		File Service Support
Improved Print Performance		Management Tools
Plug and Play		

## Identify the Operating System Version



Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

Windows 95 icons	Windows 98 icons
My Computer	My Computer
My Documents	My Documents
Internet Explorer	Internet Explorer
Network Neighborhood	My Network Places
Recycle Bin	Recycle Bin
Online Services	Connect to Internet
Outlook Express	
Connect to Internet	

### Windows 2000 versions

Windows 2000 Professional: Support for up to 2 processors, and 4GB of memory.

Windows 2000 Server: Support for up to 4 processors, and 4GB of Memory.

Windows 2000 Advanced Server: Support for up to 8 processors, and 8GB of Memory.

Windows 2000 Data Center: Support for up to 32 processors, and 64GB of memory.

### Windows Navigation

- Understand Mouse Navigational Terms: Left Click, Right Click, etc.
- Understand the Windows Desktop Metaphor.
- Understand the Standard Desktop Icons: My Documents, My Computer etc.
- Understand Start Menu, and Windows nested menus, and Context menus. Windows Update, Programs, Favorites\*Documents, Settings, Help, Run, Logoff\*,
- Shutdown.
- Understand How to get help. Start > Help.

### Windows File Management

Know how to:

- Create, move, rename, and delete Folders
- Create, move, rename, and delete Files
- Change the appearance of a folder (icons, list, details, reorder by name, date...)
- Drag and drop folders, single files, and multiple files
- Create shortcuts
- Folder names cannot contain the characters: \ / : \* ? " < > |
- Filenames cannot contain the characters: \ / : \* ? " < > | and [ ]

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## **Windows Keyboard Shortcuts to know**

- CTRL C - copy
- CTRL V - paste
- CTRL X - cut
- CTRL A – select all
- CTRL Z – undo
- ALT TAB – toggle between open applications
- ALT PRINTSCREEN – capture top window open (including error messages)
- Windows Key – start menu
- SHIFT click – selects all between two clicks
- CTRL click – selects just those clicked
- RIGHT CLICK – reveal menu selections for any file, folder, shortcut.
- CTRL ALT DEL – launches Task Manager (\*\* not in NT or 2000 though)

## **Operating System General Installation Procedures**

- Select an OS that is appropriate for the system and the user needs.
- Make sure that both minimum and operational requirements are met.
- Back up the system before and after installation.
- Test the system before and after installation.
- Verify configuration settings after installation.

## **Minimum Installation and Operational Requirements**

Minimum Installation Requirements refers specifically to the requirements needed in order to install and support a specific Operation System. Different Operating Systems have different requirements. Operational Requirements follow the same guidelines except you need to assess what kinds of applications, or tasks the system will be performing, and adjust your minimum requirements accordingly.

- Microprocessor
- Memory
- Hard Disk Space
- Other Mass Storage such as CD-Rom, or a Floppy Drive
- Optional Hardware such as a mouse

## **Installation Source Options**

- Floppy Diskette
- CD-ROM
- Network Install

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Disk Preparation

- Partition the Hard Disk
- Create Logical Drives
- Format the Logical Drives
- Understand Primary, Extended, and Logical Partitions.

## Command Prompt (DOS)

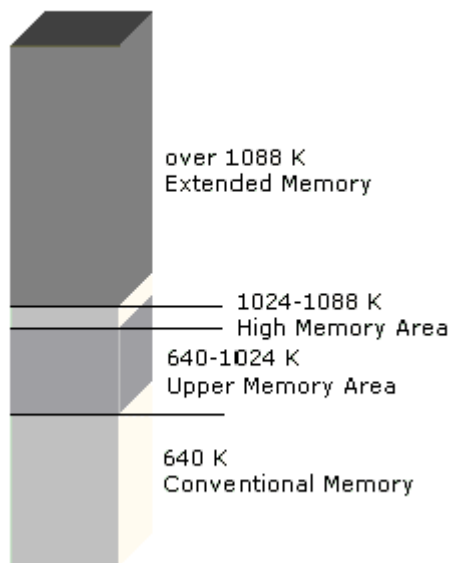
### DOS System Files

History: DOS is a 16-bit (FAT16), text-based interface OS for file and disk management, now it is integrated as the MS-DOS Command Prompt application in Windows.

### Memory Management

DOS is also quite particular about the amount of memory your system has. For more information, read up on the DOS memory model.

DOS Memory Model



Visit [Examnotes.net](https://www.examnotes.net) for all your certification needs.

Visit [Cert21.com](https://www.cert21.com) for the best online practice exams.

Visit [CertPortal.com](https://www.certportal.com) – most powerful IT certifications search engine.

## Architecture

To boot, DOS needs three core files and two configuration files, found in the root directory, loaded by the boot sector. If any of the three core files are missing, you will get the error "Missing operating system."

IO.SYS is a core, hidden file that contains basic I/O device drivers and controls the boot process, including loading the files that follow it

MSDOS.SYS is a core, hidden file that contains the DOS kernel (the main part of the OS) code. This file is the interface between applications and hardware drivers held in IO.SYS. (\*\*NOTE\*\* in Windows, this file is a text file, NOT the kernel of the Windows OS)

CONFIG.SYS is a configuration text file that contains commands to load device drivers, memory managers, and system hardware configuration settings. These include DEVICE= and DEVICEHIGH=, for example.

COMMAND.COM is a core file that provides the user interface, sometimes called the shell or Dosshell. It interprets and executes what is entered at the command prompt.

AUTOEXEC.BAT is a configuration text file that holds a list of boot DOS commands, like PROMPT \$P\$G, some TSRs, and the MSCDEX drive label to read the CD-ROM.

DOS needs only:

IO.SYS

MSDOS.SYS

COMMAND.COM

Additional Driver Files in DOS directory:

HIGHMEM.SYS – Makes extended memory available

EMM386.SYS – Simulates expanded memory, access to UMA for device drivers and TSRs

MOUSE.SYS

SMARTDRV.EXE – Disk caching

ANSI.SYS – Display, cursor, and keyboard assignments

POWER.EXE – Power saving support

## Command Prompt Utilities

You should have practical or theoretical experience with the following utilities.

- FDISK.EXE
- FORMAT.EXE
- SYS.EXE
- EDIT.EXE
- HIMEM.SYS
- EMM386.EXE
- SMARTDRV.EXE (for disk caching)
- MSD.EXE
- MSCDEX.EXE (for CD ROM support)
- MEM.EXE

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

- ATTRIB.EXE
- DEFRAG.EXE (also, from within Windows)
- DELTREE.EXE
- EXPAND.EXE
- LABEL.EXE
- SCANDISK.EXE
- SHARE.EXE
- EXTRACT.EXE (for those CAB files)

## Command Prompt Commands and Syntax

/? – Shows all the switches for any given command

Wildcards – asterisk and question mark

? - Replaces any single character (eg, ?? .sys)

\* - Replaces any number of characters (eg, \*.\* finds all files)

DIR – Shows the contents of a directory

/P – Pause after each screen

/W – Wide list format

CD – Changes directories

\ - Goes to root

MD – Make (create) a directory

RD – Remove directory/subdirectory

REN – Rename file [old name] [new name]

DEL – Delete files

DELTREE – Delete entire tree (including subdirectories, files, and directory)

TREE – display the directory structure with all subdirectories

| more – displays one screen at a time

MOVE – Move files

SYS – Copies the 3 DOS system files to a partition/drive, making it bootable

COPY – Copy files and directories [from] [to]

XCOPY – Directory-level copy (with extra switches)

/S – Copies system files

/E – Copies empty subdirectories as well

/H – Copies hidden files as well

/V – Verifies each file as it is written

DISKCOPY – Copies entire disk

ATTRIB – sets Attributes of a file

+/-R – Read Only

+/-A - Archive

+/-S - System

+/-H - Hidden

VER - Displays the MS-DOS version number

SETVER – Displays or updates the current version table

MEM - Displays the amount of used and free memory

/C – will show programs loaded into the first 1MB of memory (conventional, upper, reserved, extended)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Checking Drives

CHKDSK - Checks the disk status and displays a status report (Can fix disk errors)

/F – Fixes/Repairs lost clusters/chains

SCANDISK - Starts Microsoft Scandisk, a disk analysis and repair tool that checks a drive for errors and corrects any problems it finds

Note: Key in troubleshooting

DEFRAG – defragmentation of a hard drive

EDIT – enables editing

UNFORMAT – unformats a disk

/TEST - Lists all the files/directories that would be recovered by UNFORMAT

UNDELETE – for recovering deleted files,

Only works if they haven't been overwritten since their deletion

MSCDEX – CD ROM driver support

SCANREG – Scans registry

FORMAT – For (re) creating file systems

[Drive letter] /S – makes the drive bootable (system)

FDISK – For (re) creating partitions (see below)

## Windows 3.x

Historical Information only: Windows 3.x, while not a true operating system, is a 16-bit (FAT16) GUI (Graphical User Interface) for DOS. Windows 3.11 (Windows for Workgroups) also provides peer-to-peer networking functionality (sharing resources).

Windows 3.x required a 386 with at least 2 MB RAM, DOS 3.1, a floppy drive, and 6 MB of free disk space. Its main components are the File Manager and the Program Manager (interface file is PROGMAN.INI).

To start Windows 3.x, DOS has to boot and the DEVICE=HIMEM.SYS must be loaded. From there, WIN.COM is loaded (typing WIN at the command prompt or adding WIN to the last line of AUTOEXEC.BAT) which executes the GUI and the kernel of Windows 3.x:

KRNL386.EXE

USER.EXE

GDI.EXE

SYSTEM.INI

WIN.INI

PROGMAN.EXE (Program Manager – shell program)

**NOTE:** The main INI files were SYSTEM.INI, WIN.INI and PROTOCOL.INI. The Registry replaces these in Windows 9x.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Windows 9x

In contrast to Windows 3.x, Windows 95 was a true OS. It is a 32-bit (FAT32) OS with backward compatibility for FAT16 files and programs. Windows 95 had two releases – OSR1 and OSR2. 95 OSR2 and 98 allow hard drive partitions greater than 2 GB, and fully integrate Internet Explorer. It provides a GUI, a common user interface, and a customizable interface. Using a swap file, it can use virtual memory. It also allows data sharing, greater networking abilities, and multitasking. And, most importantly, Windows 95 and 98 provide plug and play (PnP) support (Plug n Play is another way of saying built-in driver support.) Windows 9x still needs DOS.

Windows 9x supports extended file names up to 255 characters in length.

Windows 9x can run 16-bit or 32-bit applications (with the DLL files for both to maintain backward capability)

CONFIG.SYS in Windows 9x replaces SYSTEM.INI (resources) in Windows 3.x and WIN.INI replaces AUTOEXEC.BAT (settings), though both files are still there (even in Windows 2000) for backward capability. Believe it or not SYSTEM.INI is still a required file to run Windows 9x.

## Windows 95 Installation Requirements

Component	Installation Requirement
Processor	80386DX or above
RAM	4 MB or Above
Available Disk Space	10-15 MB Depending on the options selected.
Monitor	VGA or Better
Software	MS-DOS 3.2, Windows 3.x suggested
Other Required Hardware	High Density Floppy Drive
Recommended Hardware	CD-ROM, Modem, and a mouse or other pointing device

## Windows 98 Installation Requirements

Component	Installation Requirement
Processor	66MHz 80486 DX2 or better
RAM	16 MB or Better
Available Disk Space	110 MB or more
Monitor	VGA or Better
Software	Win 95, MS-DOS 3.2, Windows 3.x suggested
Other Required Hardware	High Density Floppy Drive
Recommended Hardware	CD-ROM, Modem, and a mouse or other pointing device. A network interface card is suggested if you wish to connect to a network.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Windows 9x Setup Options

Option	Description
/C	Specifies that setup will not load smart drive
/t:dir	Specifies a temporary directory to which setup will copy files. The directory will be created if it does not already exist.
/iL	Loads the Logitech series C mouse driver instead of the MS mouse driver.
/id	The disk space check is skipped.
/ie	Setup will not create an emergency repair disk. (98 only)
/ih	The registry consistency check is skipped. (98 only)
/im	The memory check is skipped.
/in	Setup is run without the network setup module.
/iq	The check for cross-linked files is skipped.
/is	Scan Disk will not be run.
/iv	Billboards are not displayed during setup. (98 only)

## Installation Process

1. Prepare a DOS Boot Disk, that includes:
  - o FORMAT
  - o FDISK
  - o EDIT
  - o SYS
  - o ATTRIB
  - o CONFIG.SYS
  - o AUTOEXEC.BAT
2. From a Command Prompt, type SETUP
3. SCANDISK runs first, then you get the setup window
4. Checks the system for the minimum requirements
5. End User License Agreement (EULA) – and the pleasure of agreeing to it
6. Select directory (default is C:\WINDOWS)
7. Choose Setup Type
  - o Typical (default option, for most desktops)
  - o Portable (for laptops, installs briefcase, for example)
  - o Compact (if limited disk space)
  - o Custom (for experienced users)
8. Fill in the Windows Product Key (I recommend writing it right on the CD itself!)
9. Fill in user information: name, company
10. You will be prompted whether to analyze your computer before the install or not (devices, hardware detection)

(You will be prompted through a series of pop up windows for particular components, depending on which setup type you are installing. If Custom was chosen, you can select the components individually here.)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

11. Prompt for Networking information and options (whether or not you have a NIC)
12. Prompt to make an Emergency Boot (Startup) Disk
13. Finishing Setup – Restarts computer
14. You will be prompted for your password to Microsoft Networking
15. PnP Hardware will be set up
16. Control Panel settings, including Time Zone and Printers can be selected and/or installed next.
17. Installation is complete.

### **Failed Install**

If the installation of the Operating System fails you will need to locate these three files to recover from the failed install.

- SETUPLOG.TXT
- DETLOG.TXT
- DETCRASH.LOG
- BOOTLOG.TXT
- NETLOG.TXT

### **Emergency Startup Disk**

To create a Startup disk:

- Make one when installing the OS, or
- Access Control Panel > Add/Remove Programs > Startup Disk > Create Disk.

Then put a HD (high density 1.44 MB) floppy disk in the A: drive and click OK. The files on the Startup disk include:

- ATTRIB.EXE
- CHKDSK.EXE
- COMMAND.COM
- DRVSPACE.BIN (disk compression)
- EBD.SYS (Emergency Boot Disk identifier)
- EDIT.COM
- FDISK.EXE
- FORMAT.EXE
- IO.SYS
- MSDOS.SYS
- REGEDIT.EXE (Registry editor)
- SCANDISK.EXE
- SYS.COM
- UNINSTAL.EXE (Removes Windows 95)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Boot Sequence of Windows 9x

To boot Windows 95, there are 4 stages: Hardware/BIOS, to Real Mode, to Protected Mode, to the OS and desktop initialization, in this order:  
BIOS

- POST – Power On Self Test
- PnP BIOS – assigning system resources (without conflicts)
- IPL or Bootstrap – initiates the program to load the OS into memory

Real Mode (16 bit)

- IO.SYS – takes over from BIOS, “Starting Windows 95...”
- MSDOS.SYS – IO.SYS processes MSDOS.SYS and parameters in AUTOEXEC.BAT
- CONFIG.SYS (not needed, 95 defaults override it)
- COMMAND.COM – Command Line interface (processes requests before they are sent directly to the processor \_ a translator)
- AUTOEXEC.BAT – COMMAND.COM processes AUTOEXEC.BAT, to load TSRs and DOS applications (not needed, 95 defaults override it)

Protected Mode (32 bit)

- WIN.COM (automatically loads now by default)
- VMM32.VxD – virtual machine manager
- SYSTEM.INI – loads DEVICE= parameters

OS and Desktop (16-bit and 32-bit for backward compatibility)

- KERNEL32.DLL, KRNL386.EXE (kernel)
- GDI32.EXE, GDI.EXE
- USER32.EXE, USER.EXE
- EXPLORER.EXE (interface)

## Startup Menu

In the case that Windows fails to load, at startup you may press F8 to access the windows START-UP menu.

1. Normal – no troubleshooting help
2. Logged – bootlog.txt to find where the failure occurred
3. Safe Mode (F5) – default after problems – does not process the Registry, CONFIG.SYS, AUTOEXEC.BAT, SYSTEM.INI, drivers, or extended peripherals
4. Safe Mode with network support (F6) – Safe mode but loads NIC drivers, protocols, and clients

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

5. Step-by-step Confirmation (SHIFT F8) – choose which commands are executed during the boot sequence
6. Command Prompt only – when Safe Mode fails
7. Safe Mode Command Prompt (SHIFT F5) – to reinstall from scratch
8. DOS (F4)

If you are having trouble during the boot sequence, try Step-by-Step Confirmation, which goes through these steps, in this order:

- Create BOOTLOG.TXT? - Y/N
- Load CONFIG.SYS? - Y/N
- Load HIGHMEM.SYS? - Y/N
- Start EMM386.EXE? – Y/N
- Start SETVER.EXE? - Y/N
- Load DISPLAY.SYS? - Y/N
- Load COUNTRY.SYS? - Y/N
- Load DBLBUFF.SYS? - Y/N
- Load IFSHLP.SYS? - Y/N
- Load AUTOEXEC.BAT? - Y/N (start up command files) ...
- Load WIN? - Y/N
- Load WIN Drivers? - Y/N
- Enable Network Support - Y/N
- Start Display - Y/N ... (Windows Start up screen)
- (More device drivers) - Y/N
- MSMOUSE.VXD- Y/N

## Registry

The Registry's function is to store system PnP and hardware configuration information and user-specific details. The Registry replaces the .INI files of Windows 3.x, and stores the system hardware and configuration information in the /WINDOWS/ folder. The Registry is divided into two files, both read-only and hidden:

- SYSTEM.DAT – system settings
- USER.DAT – users settings

The Registry, though resembling a directory tree structure, is a database of keys: each key has a value or set of sub keys. You can edit and access the Registry using REGEDIT.EXE.

Top-level Keys:

- HKEY\_LOCAL\_MACHINE – common hardware settings
- HKEY\_CURRENT\_CONFIG – current configuration of hardware
- HKEY\_CLASSES\_ROOT – file associations
- HKEY\_DYN\_DATA – hardware devices (info held in RAM)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

- HKEY\_USERS – configuration information of all users ever logged into the system
- HKEY\_CURRENT\_USER – configuration information for current user

## **Backups**

Copy: Copies selected folders and files to the backup device without turning off archive bit

Full: backs up every folder and file, turns off archive bit

Incremental: backs up only folders and files with the archive bit on, and turns off the archive bit

Differential: backs up only folders and files with the archive bit on, but doesn't turn the archive bit off.

## **Configuring Windows 9x**

### **Drivers**

Plug n Play (Configuration Manager, PC BIOS, Registry, Bus and port emulators, Resource allocation, setup and device installer)

Control Panel > Add New Hardware Wizard

Device Manager > Resources (IRQ, I/O)

Right-click Properties

Advanced properties

### **Printers**

To install a printer in Windows 9x/NT/2000, Access Setting > Printers > Add Printer, or My Computer > Printers, or Control Panel > Printers, and walk through the Print Wizard.

View Print Queue

Add Local/Network Printer

Port LPT1

Install Printer Drivers

Changing default printer and other printer settings Printers > Properties

To Troubleshoot print jobs check Spool Settings:

Enhanced Metafile (EMF – independent of printer type) and RAW (printer-specific) are file formats for print jobs sent to the spool. Printer Properties > Spool Settings > Details

## **Memory Management**

Real Mode: single task environment (DOS)

Protected Mode: virtual machine created to access extended memory; memory and hardware are “protected” from direct access from applications by the OS (allocating processor time and memory)

Conventional Memory: 0-640KB (runs DOS)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

Upper Memory Area (UMA): 640–1024KB (video RAM, BIOS) – made up of Upper Memory Blocks (UMB)

Extended memory (XMS): everything above 1MB (1024KB): Pentiums can support up to 4 GB of memory.

High Memory Area (HMA): 1024-1088KB – first 64KB of extended memory

From the Command Prompt, type “MEM /C” to see your memory information.

HIMEM.SYS enables Windows 9x to use extended memory. It must be loaded in the CONFIG.SYS file, like this:

```
DEVICE=C:\<DOS OR WINDOWS directory>\HIGHMEM.SYS
```

EMM386.EXE enables DOS to access XMS.

### Windows 2000 Installation Requirements

Windows 2000 can be installed as a clean installation, an upgrade or as an additional operating choice in a dual boot configuration.

When installing Windows 2000 from a system that does not have an Operating System, support start-up from a CD-ROM, or are installing from a network location, you must use a floppy drive to initiate the installation.

Component	Windows 2000 Professional	Windows 2000 Server
Processor	133-mhZ Pentium	133-MHz Pentium
RAM	64 MB	128 MB
Free Disk Space	620 MB	671 MB
Monitor	VGA	VGA
Other Required Hardware	CD-Rom or high-density floppy drive	CD-Rom or high-density floppy drive
Suggested Hardware	CD-ROM, Modem, Network Adapter and mouse or pointing device.	CD-ROM, Modem, Network Adapter and mouse or pointing device.

**Note:** You can install Windows 2000 server on a system with only 64 MB of RAM. However you will not be able to use this as an operational configuration. System performance will be severely degraded because of the excessive reliance on the virtual memory paging file.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Windows 2000 Setup

Know the following ways to set up Windows 2000

- Boot from the Windows 2000 installation CD-ROM.
- Boot from Windows 2000 installation startup diskettes.
- Place Windows 2000 installation CD-ROM in the CD-ROM drive, and select to install Windows 2000.
- Run Setup, Winnt, or Winnt32.

## Winnt, and Winnt32 option switches

WINNT	WINNT32
/s:source	/s:source
/t:temp	/t:temp
/u:answerfile	/u:answerfile
/udf:id,file	/udf:id,file
/r:folder	/copydir:folder
/rx:folder	/copyfolder:folder
/e:command	/cmd:command
/a	
	/unattend
	/debug
	/syspart:drive
	/checkupgradeonly
	/cmdcons
	/m:folder
	/makelocalsource
	/noreboot.

## Windows 2000 Installation Phases

- System Preparation
- Information Gathering
  - Welcome Screen
    - Press ENTER to start the installation.
    - Press R to Repair an existing Installation.
    - Press F3 to exit without attempting to install Windows 2000.
  - Destination Partition Screen Defaulted to C:
    - Select a partition and press ENTER to install.
    - Press C to create a new partition.
    - Select a partition and press D to Delete the partition.
  - File System Conversions
    - Convert the partition to NTFS.
    - Format the partition as NTFS.
    - Format the partition as FAT.
    - Do not make any changes to the partition.
- File Copy

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

- Graphic Mode
  - Upgrade or install Clean
  - Prompt for license
  - Prompt for Product Key
  - Special Options required for installation
    - Language
    - Advanced Options
    - Accessibility
  - Network
    - Use Client for Microsoft Networks for network logon and connections.
    - Enable File and Print Sharing.
    - Install TCP/IP protocol suite, using automatic addressing.

For a system upgrade run Installation from the CD-ROM

- Accept the License agreement.
- Enter the 25-character product key.
- Convert the Drive (optional).

For Both Installations at this point Setup Will

- Attempt to detect and Install All system hardware devices.
- Install network components.
- Configure Network Components to match existing configuration.
- Install Windows 2000 components.
- Install Start Menu Items.
- Register Operating System Components.
- Remove Temp Files.

### **Windows 2000 Installation Troubleshooting**

- Check all hardware against the Hardware Compatibility List (HCL).
- Check to see if Minimum Rees list is met.
- Bad or Corrupted Installation source.
- Hardware Detection Failure.
- Cannot Find Domain Controller.

Windows Setup creates three files that may provide assistance with installation problems

- Setup.txt
- Setup.log
- Setuperr.log

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.  
 Visit [Cert21.com](http://Cert21.com) for the best online practice exams.  
 Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

### **Windows 2000 System Files**

- Ntldr
- Ntdetect.com
- Ntbootdd.sys
- Boot.ini
- Bootsect.dos
- Ntoskrnl.exe

### **Windows 2000 Startup**

- POST
- Retrieve MBR from First Hard Disk
- Load the appropriate File System
- Load Boot.ini
- Display Operating System Selection.

### **Windows 2000 Shutdown Options**

- Log off User
- Shut Down
- Restart

### **Windows 2000 Safe Mode startup**

Press F8 at startup to access this menu.

- Safe Mode
- Safe Mode with Networking
- Safe Mode with Command Prompt
- Enable Boot Logging
- Enable VGA Mode
- Last Known Configuration
- Directory Services Restore Mode
- Debugging Mode
- Boot Normally
- Return to OS Choices menu

### **Windows 2000 System Registry**

The Windows 2000 registry is stored as the SAM, SECURITY, SYSTEM, DEFAULT, and SOFTWARE files.

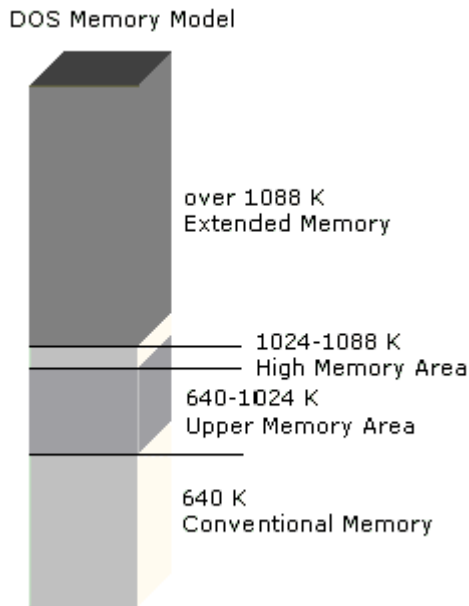
The registry may be edited through the REGEDIT.EXE, and REGEDIT32.EXE utilities.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Windows 2000 Memory Concepts



Conventional Memory: The area between 0 and 640KB

Upper Memory Area: The area between 640KB and 1024KB.

Extended Memory: Memory between 1MB and 4GB.

High Memory Area: The first 64KB of the XMS area between 1024-1088KB

Virtual Memory: Hard Disk Space used to provide additional Memory

- Know Page File Size.

- Know Page File Location.

- Understand the effects of Hard Disk Optimization on the Page File.

- Understand the concept of multiple page files.

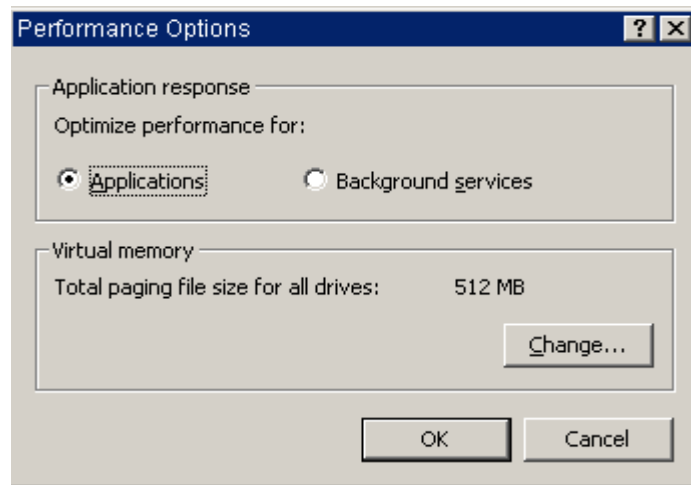
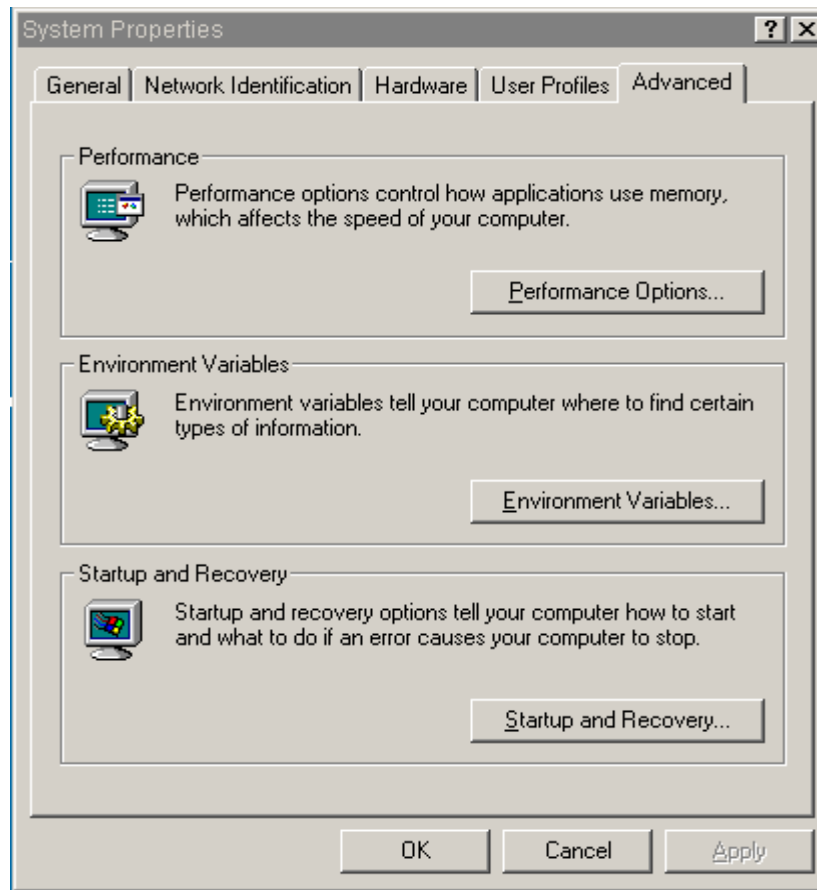
To manage the Windows 2000 Virtual Memory

Start > Settings > Control Panel Double Click the System Utility and Click the Advanced Tab.

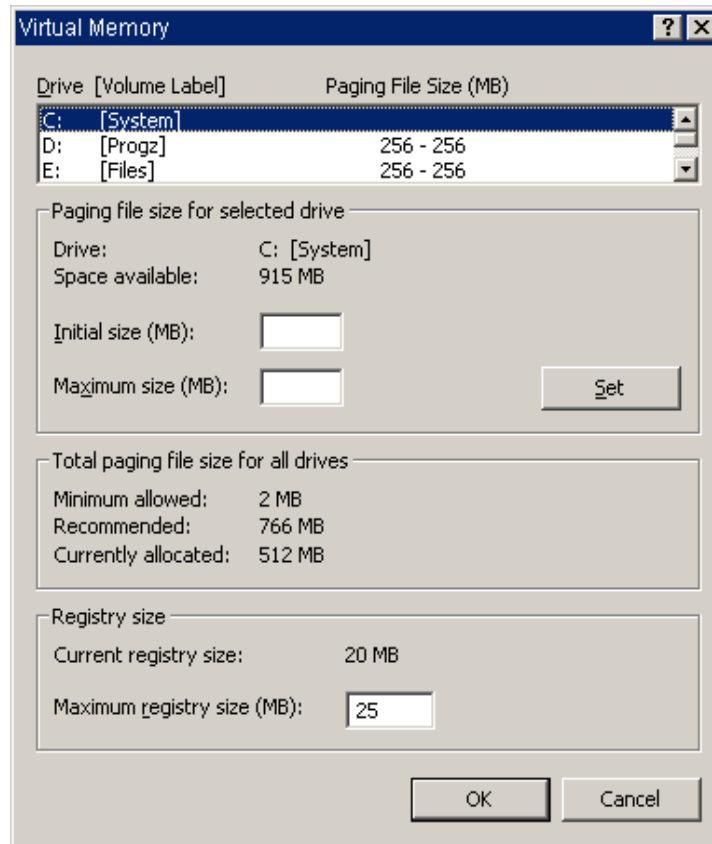
Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.



Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.  
Visit [Cert21.com](http://Cert21.com) for the best online practice exams.  
Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.



## Windows 2000 Device Configuration

To install a new Device START > SETTINGS > CONTROL PANEL > ADD/REMOVE HARDWARE

- Add New Hardware Screen >Next
- Add/Troubleshoot a Device
- Uninstall/Unplug a device
- When you select ADD, the Utility automatically searches for the device.
  - A list of devices will be presented to you.
  - Choose your device from the list.
  - You will be prompted to exit after you install the devices.
- You may also search for your own Legacy Devices.
  - You will be presented with a list of device categories
    - Choose your category (NIC, DISPLAY)
    - Allow the System to search for the Driver
    - Search for the Driver your self
      - If you search for the driver a list of manufacturers, and models will be presented to you.
      - Choose Manufacturer and model
      - Or Browse to a location on a CD-ROM, Floppy, or on the Hard Drive for the Driver.
    - The Driver is Loaded
  - You are Prompted to Exit

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Windows 2000 Device Management

Windows 2000 Devices may be controlled through the Computer Management tool.

To access the management tool, Start > Programs > Administrative Tools > Computer Management.

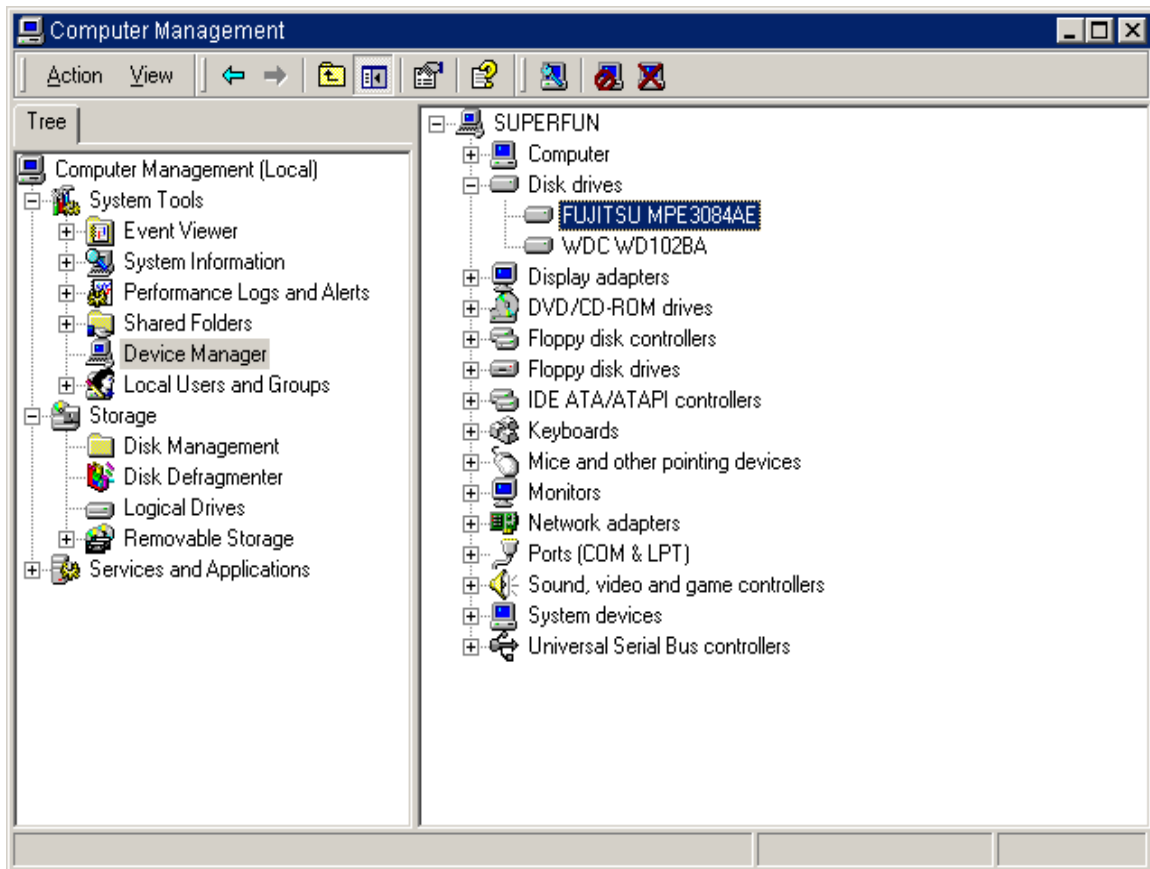
You may Access the Device Manager.

From the Device Manager you may select hardware categories and the hardware inside.

At this point you may manage your hardware

Hardware settings include

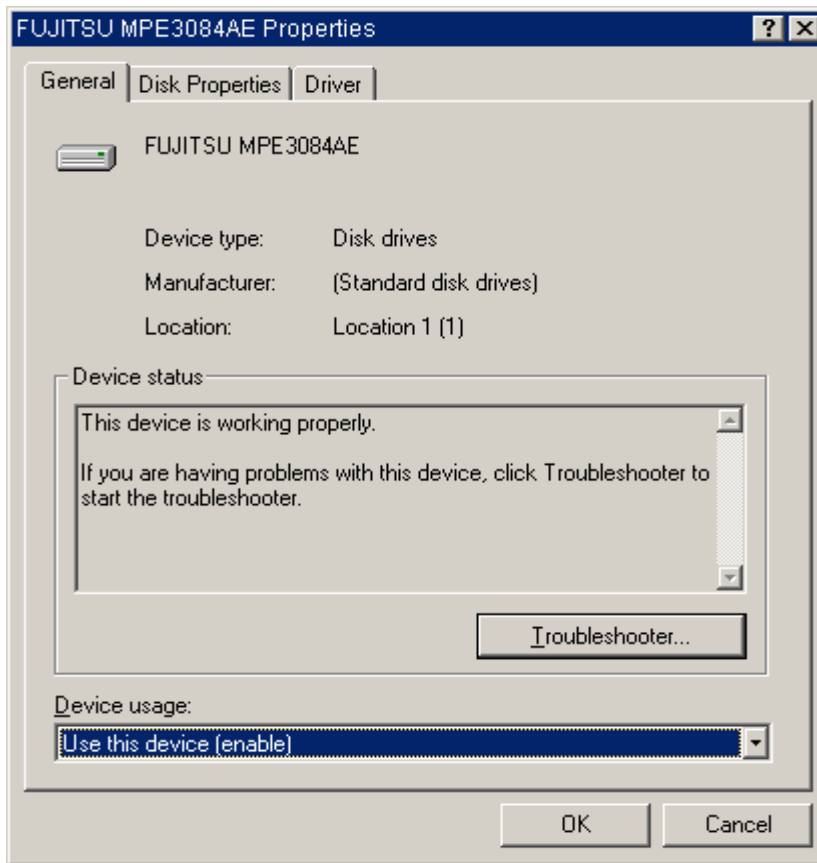
- Disable Device
- Enable Device
- Scan For Hardware Changes
- Properties



Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

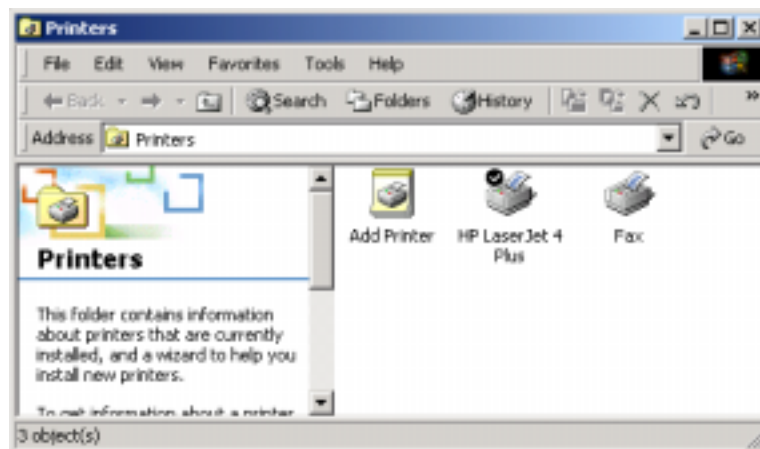
Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

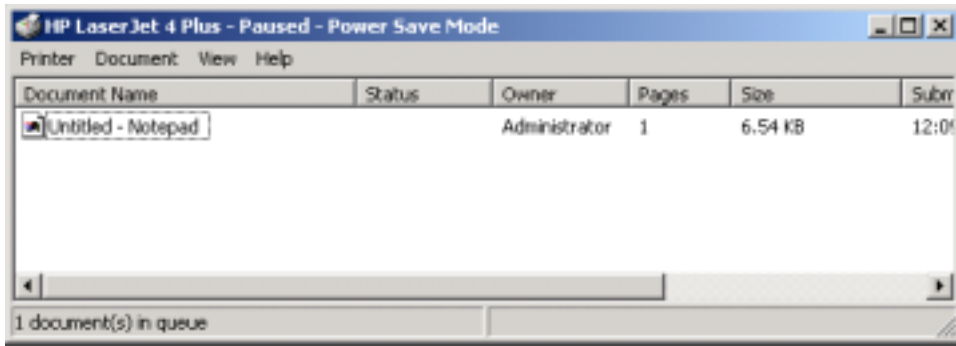


### Windows 2000 Local Printer Installation

- Launch Add Printer wizard
- Select Local printer
- Search or select printer
  - Printer port
  - Manufacturer and model
- Enter printer name
- Print test page



Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.  
Visit [Cert21.com](http://Cert21.com) for the best online practice exams.  
Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.



## Back Up Methods

Back up Method	Reset Archive	Windows 9x	Windows 2000
Full	Yes	Yes	Yes
Differential	No	Yes	Yes
Incremental	Yes	Yes	Yes
Copy	No	No	Yes
Daily	Yes	No	No

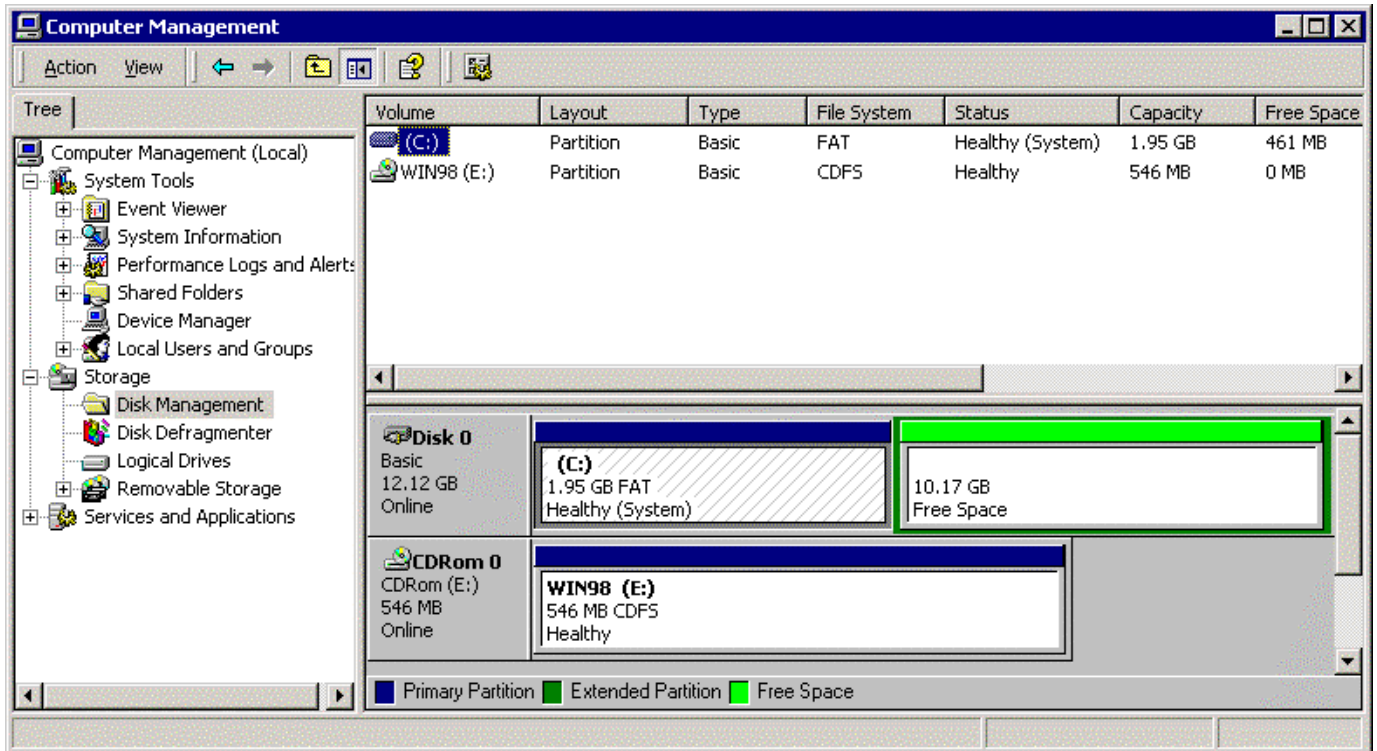
## FDISK Options

- Create DOS partition or logical DOS drive
  - Create Primary DOS Partition
  - Create Extended DOS partition
  - Create Logical DOS Drive(s) in the Extended DOS partition
- Set active partition
- Delete partition or logical DOS drive
  - Delete Primary DOS partition
  - Delete Extended DOS partition
  - Delete Logical DOS Drive(s) in the Extended DOS partition
  - Delete Non-DOS partition
- Display partition information

## Windows 2000 Disk Management

Windows 2000 Disk Management is maintained through the Microsoft Management Console. To access Disk Management you will need to access Computer Management through the Administrative tools. Once there you can select disk management and manage

- Disk Volumes
- Disk Layout
- Disk Type
- Disk File System
- Disk Status



## Volume Sets

A volume is a unit of storage, logical or physical (whole or part of a drive) used by Windows 2000 dynamic storage for fault tolerance and backup:

- Simple Volume: No fault tolerance. Disk space from one disk only.
- Spanned Volume: No fault tolerance. Disk space from more than one disk, information is written on one disk until full, then the next, then the next
- Striped volume (RAID 0): to improve disk access. Data is written simultaneously to all disks (stripe set). Selecting 2 to 32 areas of free space on 2 to 32 physical Hard Disk Drives may create stripe Sets. This enables writing and reading across two or more Hard Disk Drives simultaneously and can speed up read/write access. There is no fault tolerance on a simple stripe set.

Mirror Sets (RAID 1) and Stripe Sets with Parity (Duplex) (RAID 5) are available only on NT/2000 Server. These use multiple Hard Disk Drives for faster access and/or recoverability of data in case one drive fails.

## User and Group Management

Just like Windows NT, Win2K has two types of accounts:

- Local (this computer login)
- Domain (accounts reside on the domain controllers)

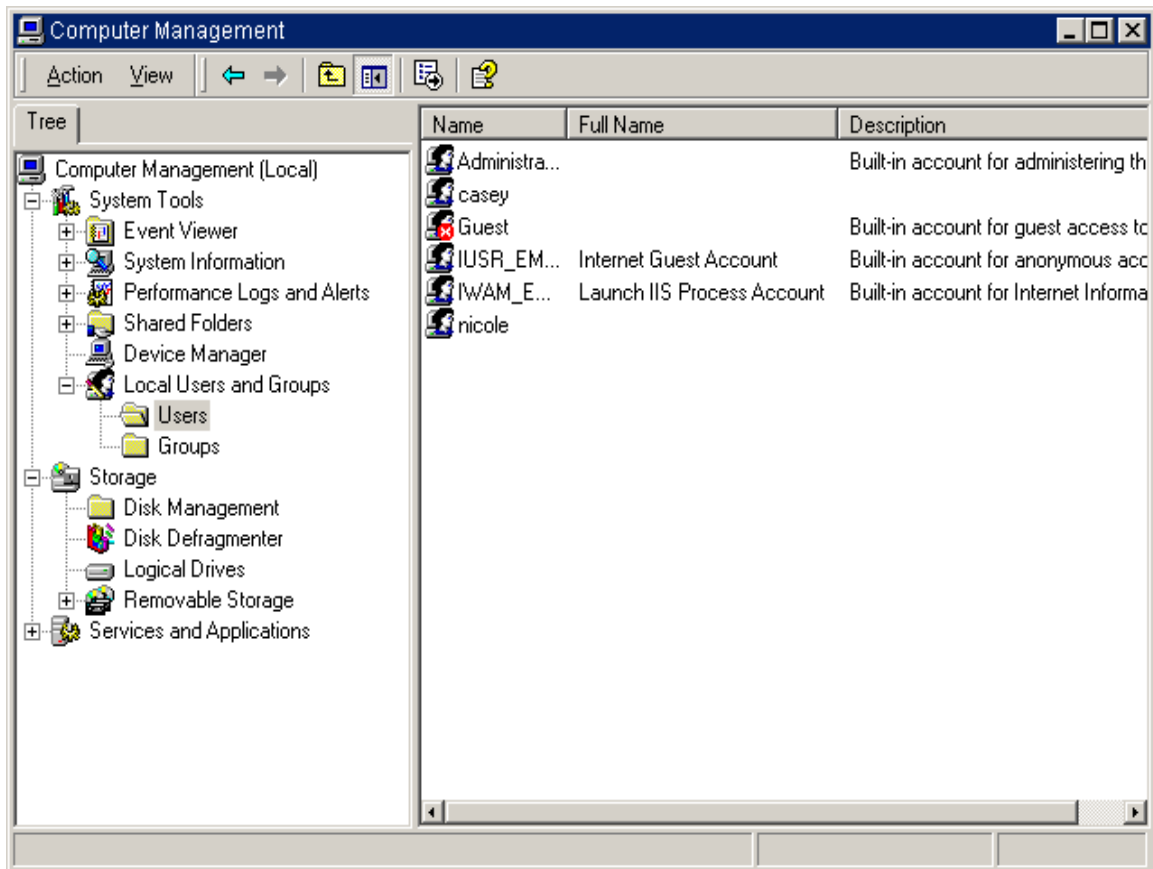
Like Windows NT, There are two built-in User Accounts that can be changed, but not deleted:

- Administrator (Super User Access)
- Guest (default disabled)

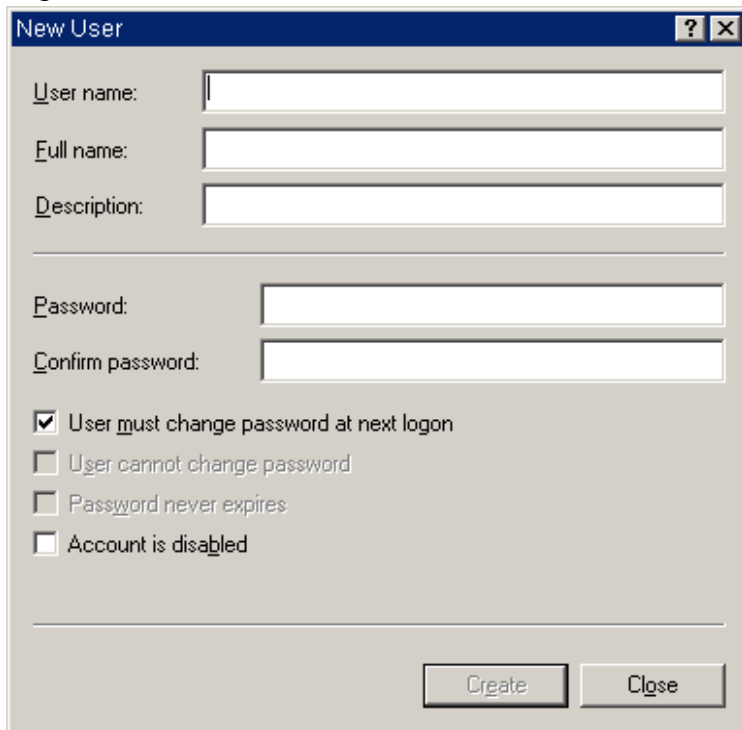
## User Accounts

To create User Accounts access the Local Users and Groups snap-in:

Admin Tools > Computer Management > Users folder >



Right click and select New User:



Fill out the form fields:

- Username (required)
- Full name (helpful in larger environments)
- Description
- Password (recommended)
- User must change password at next login
- User cannot change password
- Password never expires
- Account is disabled

## Groups

A group is simply a collection of user accounts that make it easier to assign permissions and rights to a number of users.

Win2K Professional (like NT Workstation) can only create Local groups. You need a unique name (less than 256 character with no back slashes: \), and can add and remove members as needed.

Note: Shift + Click to add multiple user accounts at once, or use Ctrl + Click to add a consecutive list of users.

Built-in Groups:

- Administrators (god power)
- Power Users (some admin privileges)
- Backup Operators (can backup and restore folders/files)
- Replicator (with directory replication is used)
- Users (all new users are automatically added to this group)
- Guests (limited rights)

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

Win2K also have Built-in System Groups:

- Everyone (all users who access the system)
- Authenticated Users (all users with a valid account)
- Creator Owner (Group owners)
- Interactive (user currently working locally)
- Network (groups of user accounts/users currently connected to the network)

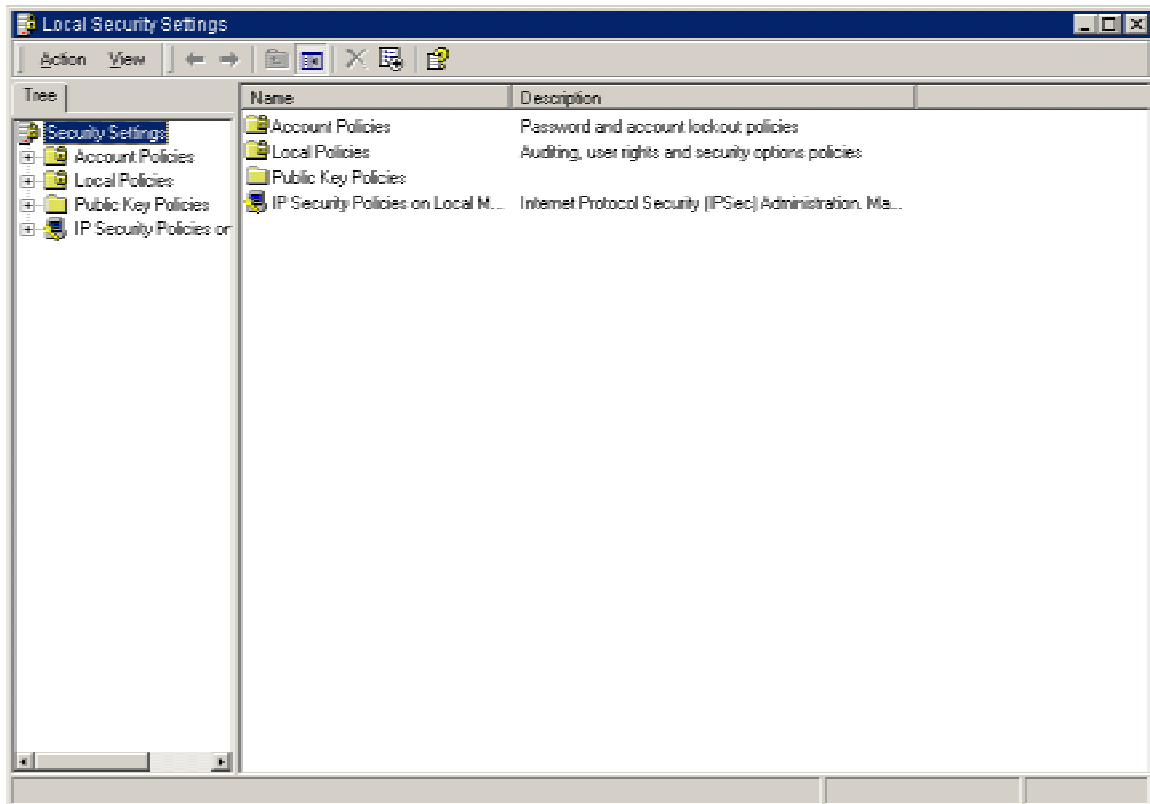
## Managing Security

### Auditing

Auditing enables the Administrator to track user accounts and system events, using the security log in Event Viewer. This log includes the action taken, the user who did it, whether successful or unsuccessful. Also includes:

- Account management
- Logon events
- Object access
- Policy changes
- Privilege use
- System Events

Access Start > Programs > Admin Tools > Local Security to set up Auditing:



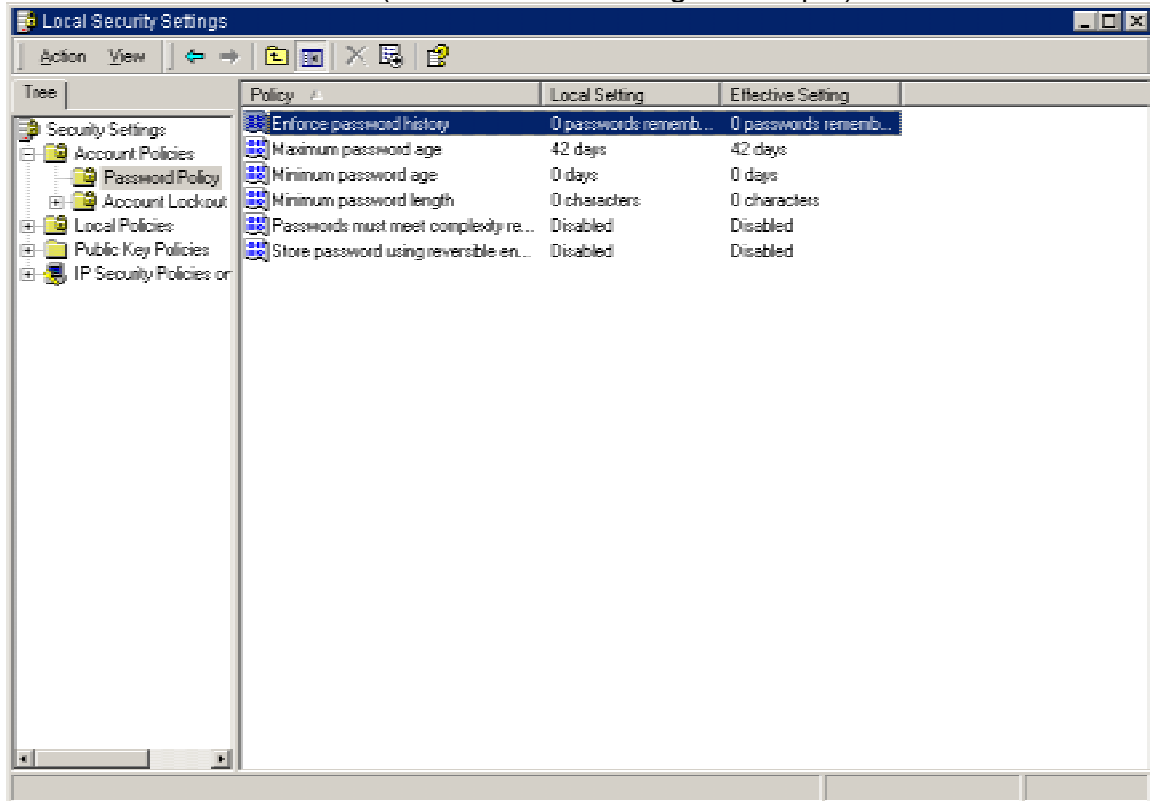
Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

### To Set Password Auditing Properties

- Enforce password history (can keep up to 24 passwords, to prevent reusing)
- Max password age (42 days, below)
- Min password age (when a password can be changed again)
- Min password length (...to a max of 14 characters)
- Meet complexity requirements
- Account Lockout duration (time of lockout after exceeding logon attempt threshold)
- Account Lockout threshold (number of login attempts allowed)
- Reset account lockout (after a number of login attempts)



### Logon Security Options include:

- Allow system to be shut down without having to logon
- Disable CTRL + ALT +DEL requirement for logon
- Do not display last user name on logon screen
- Automatically logoff user when login time expires
- Rename Admin account
- Rename guest account

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## File Systems

After you create partitions and Logical Drives, you must format the primary partitions and Logical Drives so the operating system can use them.

File System	Operating System Support	Description
FAT	MS-DOS Windows 3.x Windows 95 Windows 98 Windows NT Windows 2000	The FAT file system is the most widely supported operating system. However it is an old file system and does not support many of the features offered by other file systems.
FAT32	Windows 95 OSR2 Windows 98 Windows 2000	Fat32 offers performance improvements over FAT. It also provides support for logical drives and primary partitions over 2GB.
NTFS4	Windows NT Windows 2000	NTFS 4 offers support for large hard disks. In addition, it offers a variety of important features, including the ability to assign access permissions to files.
NTFS 5	Windows NT 4 with Service Pack 4 Windows 2000	NTFS 5 is an enhancement of NTFS 4, offering several new features such as the ability to encrypt files.
HPFS	OS/2 Windows NT 3.x	HPFS is a legacy file system supported by Windows 3.51 but not later versions. HPFS was introduced with IBM's OS/2 operating system.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

### FAT Cluster Sizes

Volume Size	Cluster Size
0 MB - 32 MB	512 bytes
33 MB - 64 MB	1 KB
65 MB - 128 MB	2KB
129 MB - 255 MB	4KB
256 MB - 511 MB	8KB
512 MB - 1023 MB	16KB
1024 MB -2047 MB	32 KB
2048 MB- 4095 MB	64 KB

### FAT32 Cluster Sizes

Volume Size	Cluster Size
< 8 GB	4 KB
8 GB < 16 GB	8 KB
16 GB < 32 GB	16 KB
>=32 GB	32 KB

### NT File System

Feature	Description	NTFS4, NTFS 5, or both
Security Descriptors	By associating security descriptors with a file, NTFS allows you to limit access to specified files, even for users who are logged in locally.	Both
Transaction Logging	NTFS keeps a log of all the changes to the file system and uses that log after a system failure to help prevent damaged files.	Both
Compression	Files on NTFS volumes can be compressed to conserve disk space.	Both
Encryption	Encrypting file system uses key-based encryption to allow a user to prevent anyone else from looking at confidential files.	NTFS 5
Disk Quotas	Disk Quotas allow an administrator to control the amount of storage space a user can consume.	NTFS 5
Sparse Files	When support for sparse files is enabled, a file can use the leftover space in a cluster	NTFS 5

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.  
Visit [Cert21.com](http://Cert21.com) for the best online practice exams.  
Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## **NTFS Folder and File Permissions**

NTFS permissions secure resources and determine user/group access.

Folder Permissions include:

- Read – ability to read
- Write – ability to view attributes, permissions
- List – ability to view names of files and subfolders
- Read/Execute – read, plus run applications
- Modify – Read/Execute and Write permissions, plus modify and delete
- Full Control – All of the above, plus changing permissions
- Deny – overrides any other permission

File Permissions include:

- Read – ability to read
- Write – ability to view attributes, permissions
- Read/Execute – read, plus run applications
- Modify – Read/Execute and Write permissions, plus modify and delete
- Full Control – All of the above, plus changing permissions
- Deny – overrides any other permission

Permissions are assigned with the Access Control List (ACL). User permission entries in that list are called Access Control Entry (ACE) to allow or deny access to files and folders.

## **Network Components**

Operating System

Network Adapter Driver

Communication Protocols

Client Software

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Network Terminology

Term	Description
Client	A system configured to access network resources
Server	A system configured to provide resources on a network
Peer Server	A user system configured to both access network resources and provide services to the network
Node	Any device (computer, printer, etc) connected to a network.
Symbolic Name	A text name by which a computer is known on the network. Also referred to as a computer's host name
MAC address	A unique address that is hard-coded into a network adapter
Host Address	A protocol-based address by which a computer is recognized.
Name Resolution	The process by which a computer's host address is determined from its symbolic host name.
Network Address	An address used to identify a portion of the network and to divide a network into subnets.
Routable Protocol.	A protocol that supports network addresses and sub networking, which is a way of dividing a network to control communications and traffic levels.
Logon	The process by which a user logically connects to the network and is given access to network resources. Network logon requires a user name and password.
Shared Resource	A resource made available for access over the network. The primary shared resources are shared folders and printers.

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

### **Network Security Models**

- Workgroup
  - All current Windows family
- Client/server
  - Novell NetWare 3.x and earlier
- Domain-based
  - Windows NT Server
- Directory-based
  - Novell NetWare 4.0 and later
  - Windows 2000 Server

### **Common Protocols**

- NetBEUI
  - Non-routable
  - Legacy network support
- NWLink (IPX/SPX)
  - Routable
  - Novell NetWare support
- TCP/IP
  - Routable
  - Current standard and Internet support

## TCP/IP Suite

Component	Description
Internet Protocol	Connectionless protocol that operates as the underlying protocol for both connectionless and connection oriented delivery servers between computer systems.
Transmission Control Protocol	Provides Connection oriented delivery services between computer systems.
Address Resolution Protocol	Determines a systems MAC address when the host systems address is known.
Reverse Address Resolution Protocol	Determines a systems MAC address when its host address is unknown.
Telnet	TCP/IP connection utility that supports remote terminal emulation.
File Transfer Protocol	File Transport Protocol used for transferring files between computers with dissimilar file systems
Ping	Command Line utility that can test communication with another system
Tracert/Traceroute	Command line utility that traces the communication path between two computer systems. Tracert is the windows family operating system version of the command.
Ipconfig/Winipcfg	Command line utility that can view and in some configurations, manage TCP/IP configuration information. Ipconfig is supporting on Windows 2000 and NT, Winipcfg is supported on Win 9x.

### TCP/IP Services

- Internet protocol (IP)
- Domain name system (DNS) service
  - DNS name resolution
- Windows Internet name service (WINS)
  - NetBIOS name resolution
- Dynamic host configuration protocol (DHCP) service
  - Automated TCP/IP host configuration

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.

## Domain Names

### IP Addresses

Every computer on the Internet has a 32-bit unique IP address, which looks like this:

206.112.74.27

But all those numbers are hard to remember, much less type properly. So, an alternative addressing method called FQDN (Fully Qualified Domain Names) is used.

Domain names are user-friendly versions of the IP address:

[www.cert21.com](http://www.cert21.com) = 130.94.22.181

Domains

Top-level domain - .com, .org, .net, edu, .ca, .biz

Sub-domains – identify the company (cert21, examnotes, microsoft, etc)

Local domains – specify a division within the company (eg, cramsession.brainbuzz.com)

Host – www, www2

### URLs

URLs are made up of a:

- Protocol – http, ftp, mailto, https: etc
- Host name (domain + sub-domain + local domain [if any] + host) – cramsession.brainbuzz.com
- File path – to the exact web page - /cert21/CompTIA/aplus

E.g. <http://www.cert21.com/>

Email addresses are made up of a:

- Protocol – mailto:
- Identifier – e.g. whomever@wherever.com

Visit [Examnotes.net](http://Examnotes.net) for all your certification needs.

Visit [Cert21.com](http://Cert21.com) for the best online practice exams.

Visit [CertPortal.com](http://CertPortal.com) – most powerful IT certifications search engine.