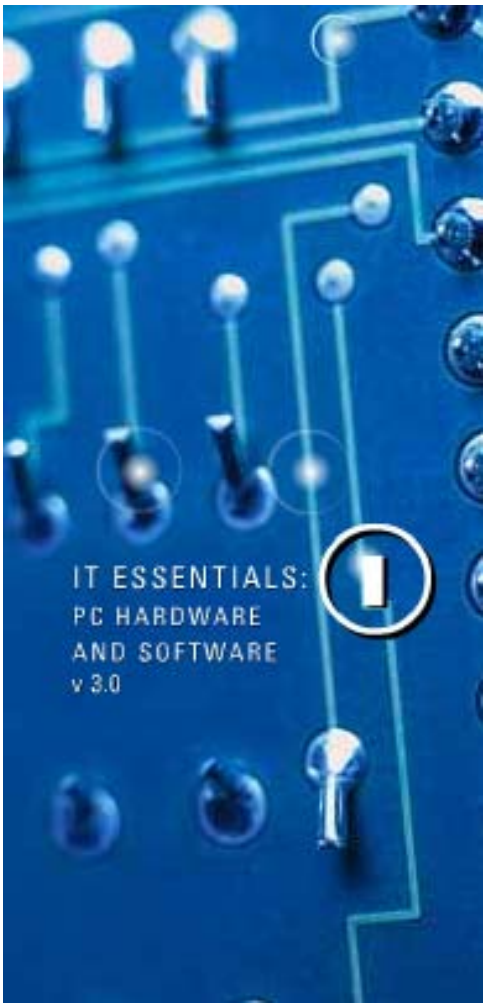
IT Essentials I

Mid-Term Exam

Study Guide

2003-04



Cisco Systems

Empowering the Internet Generation

St. Matthew's RC High School 2004

CISCO IT Essentials - Final Exam Study Guide

Name:_____

Chapter 1 - Information Technology Basics

The Operating System
The Disk Operating System (DOS), Windows 98, Windows 2000, Windows NT, Linux, Mac OS X, DEC VMS, and IBM OS/400 are all examples of operating systems.

The Windows operating system (3.1, 95, 98, 2000, XP, or NT) is designed for use with an IBM-compatible personal computer often referred to as a PC. The Mac OS, on the other hand, will only work with Macintosh computers. PC and Macintosh are called platforms.

Applications
A database is a collection of data that is organized so that its contents can be easily accessed, managed, and updated. It is an electronic filing system. Microsoft Access, Oracle Database, and FileMaker are all examples of database applications. PC databases fall into two distinct categories, flat-file and relational.

Starting Programs in Windows
The Run feature is another method of starting a program, instead of clicking the program's shortcut icon on the desktop or on the list of programs within the Programs directory. Access the Run feature by clicking on Start and choosing Run.

Switching between programs
When more than one window is open, the user can switch between windows by pressing **Alt +Tab**.

The Application Window
Title Bar – Displays the name of the document and application. Also located in the title bar are the Minimize, Maximize, and Exit buttons.

Moving Icons
To move the created icon or another desktop icon to another position on the desktop, click on it and then drag it to the desired location. If the icon does not move, disable the **Auto Arrange** function on the desktop. To do this, right-click on an empty space of the desktop and uncheck the **Auto Arrange**.

Viewing a computer's basic system information
To view information about the system in Windows 2000, go to the **Start** menu and choose **Programs** > **Accessories** > **System Tools** > **System Information.**
It will also show how to view information such as the type of operating system, the processor type, and the type and amount of Random Access Memory (RAM) that is installed.

Using a Wrist Strap
After putting the wrist strap on, allow 15 seconds to pass before touching any sensitive electronic components with bare hands. This pause allows the wrist strap to neutralize the static electricity that already exists on a person's body.

Electronic Signals
It may be necessary when assembling a computer system to test electrical signals on a motherboard or its components. A Multimeter is used to test high-voltage devices.

Connecting Computer Systems
Computers used by students, teachers, and administrators are all connected (networked). This saves the expense of having to buy peripheral equipment like printers for each computer.

Birth of The Internet
When the Advanced Research Projects Agency Network **(ARPANET)** project began, no one anticipated that the network would grow to the extent that it did. Throughout the 1970s, more nodes or access points were added, both domestically and abroad.

The Domain Name System (DNS) was introduced in 1984, providing a way to map friendly host names to IP addresses. It was much more efficient and convenient than previous methods.

Encryption Algorithm
Another common type of algorithm is an encryption algorithm. These algorithms are used to prevent hackers from viewing data as it passes through the Internet. Encryption standards are used to secure connections between networking devices and hosts.

Workspace cleaning supplies
Although a new system will not need to be cleaned during the assembly process, over time, computer systems can gather dust and other residues. Do not confuse isopropyl alcohol with rubbing alcohol. **Rubbing alcohol** is relatively impure and can actually contaminate electrical connections.

Measurements

A bit is the smallest unit of data in a computer. A bit can take the value of either one or zero, and it is the binary format in which data is processed by computers.

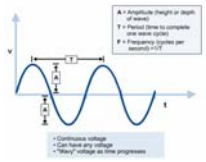
A byte is a unit of measure that is used to describe the size of a data file, the amount of space on a disk or other storage medium, or the amount of data being sent over a network. One byte consists of eight bits of data.

A kilobit (Kb) is 1024 (or approximately 1000) bits.

A kilobyte (KB) is 1024 (or approximately 1000) bytes.

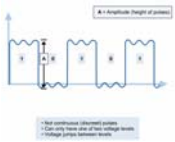
A megabyte (MB) is 1,048,576 bytes (or approximately 1,000,000 bytes).

Hertz is a unit of measurement of frequency. It is the rate of change in the state or cycle in a sound wave, alternating current, or other cyclical waveform. Hertz is synonymous with cycles per second and it is used to describe the speed of a computer microprocessor.



Analogue
The world used to depend entirely on analogue processes, machinery, and communications for its functions. The variables that characterize an analogue system may have an infinite number of values.

Digital
In binary arithmetic, as used on modern computers, only two values are allowed: 0 and 1. Computers and cable modems are examples of digital devices. Digital devices are gradually replacing analogue devices.



Chapter 2 - How Computers Work

SCSI
Most SCSI buses can handle a total of 7 devices and a SCSI controller per channel.
Each SCSI device in the chain, including the SCSI controller card, is given a SCSI ID number from 0 to 7; #0 for the primary boot device (hard drive), and #7 for the SCSI controller card.

SCSI-1
originally just known as SCSI. By today's standards it was rather slow. SCSI-1 generally supported a single channel per SCSI controller. The SCSI-1 internal cable was a ribbon ca ble that was attached to the disk controller by a 50-pin connector.

SCSI-2
Uses the same 50-pin connector on the internal SCSI cable that is used by SCSI-1 devices. SCSI-2 also has a variant called Wide SCSI-2, which can transfer 16 bits at a time as op posed to the 8 bits at a time used by normal SCSI-1 and normal SCSI-2. This extra bus width requires the use of a 68-pin connector. Wide SCSI-2 allows for 16 devices on the SCSI-2 channel, whereas normal SCSI-2 (also called narrow SCSI-2) and SCSI-1 only allow 8 de vices on the SCSI channel.

Wide SCSI 2 supports a total of 15 devices and a SCSI controller.

IRQ Channels
IRQ (Interrupt Request) 8 is for the Real Time Clock.
IRQ 7 Parallel Port 1 (LPT1), or Sound Card (Shared).

Input Output Addresses - I/O Addresses
I/O Address 3F8-3FF is for COM 1 Serial Port

DMA Channels - Direct Memory Access
Direct Memory Access (DMA) channels allow devices to bypass the processor and directly access the computer memory. DMA Channel 2 is for Floppy Disk Controller

Monitors
Monitor screen sizes are measured in inches, just like televisions. The most common sizes are 14", 15", 17", 19", and 21" screens, measured diagonally.

Pixels are picture elements. The screen image is made of pixels (tiny dots), which are arranged in rows across the screen. Each pixel consists of three colours: red, green, and blue (RGB).

Processors
The CPU speed is not controlled by the microprocessor itself, but by an external clock located on the motherboard. The speed of the processor is determined by the frequency of the clock signal.

Slot 1 type of processor uses: Pentium II, 233—450mhz. Pentium III, 450mhz and up.

Expansion Slots
PCI Slot is a 32-bit local bus slot developed by Intel. Since they talk to the motherboard at 33 MHz, the PCI bus slots offer a significant improvement over ISA expansion slots. PCI expansion slots are the most commonly used type in motherboards today.

Developed by Intel, AGP is a dedicated high-speed bus that is used to support the high demands of graphical software. This slot is reserved for video adapters. This is the standard graphics port in all new systems. This slot is usually coloured brown.

Storage Devices
Storage devices: Hard drive, floppy, CDROM etc.

Restarting the PC
Restarting a PC that has already been powered up is referred to as a **warm boot**. This can be achieved by pressing the reset button on the front panel. Alternatively, press **Ctrl + Alt + Delete**, and click **Restart** from the menu that displays.

Modems
A modem plugged to one of the expansion slots inside a PC is known as an internal modem. Such a modem usually has two types of connectors called registered jack type 11, more commonly called RJ-11 jacks. One is for the phone line while the other is used to attach a traditional telephone handset.

Memory
Random access memory (RAM) is the place in a computer where the OS, application programs, and data in current use are kept so that they can be quickly reached by the processor.

The cache (pronounced CASH) is a place to store something temporarily. The type of RAM that is used for cache memory is called SRAM. SRAM is relatively more expensive, but it is fast and holds data when the power is turned off for a brief period of time. This is useful in such circumstances as an unexpected loss of power. SRAM stands for Static RAM.

Identifying SIMMs and DIMMs
A SIMM plugs into the motherboard with a 72-pin or 30-pin connector.
A DIMM plugs into the system memory bank using a 168-pin connector.

PCMCIA Cards
The Personal Computer Memory Card International Association (PCMCIA) card, introduced in 1989, is a special expansion card type designed primarily to accommodate the needs of the portable computer market. Three types of PCMCIA card, type I, II and III.

Type III cards are 10.5mm thick and designed to be used solely for hard drives.

Interfaces
The Universal Serial Bus (USB) is an external port, that allows the user to connect up to 127 external PC peripherals, including USB keyboards, mice, printers, modems, scanners, and external disk drives. USB is considered hot swappable, this means you can attach and remove devices while the system is running.

Serial ports can be used to connect devices that use a serial interface such as a modem, scanner, mouse, etc. The **DB-9** (9-pin) connector is used on most new computers for the serial ports.

POST Checks
To test the computer hardware, the bootstrap program runs a program called power-on self-test or POST. In this test, the computer central processing unit (CPU) checks itself first and then checks the computer system timer. The POST then checks the RAM.

Chapter 3 - Assembling a Computer

When should a wrist strap not be used for grounding?
A wrist strap is never worn when working on a monitor or when working on a computer power supply.

Attaching Power
An AT motherboard requires two power connection to the power supply. ATX requires one. When connecting an AT power supply to a motherboard Plug the P8 and P9 wire lead connectors in the 12-pin power connector.
Caution: Make sure the black wires are in the middle.
On an ATX system, there is one large 20-pin (P1) connector. It is keyed for easy installation.

Whether buying a tower or desktop (to be discussed in the following sections), it is recommended that it conforms to the ATX standard and has at least a 250-watt power supply (300 watts is ideal).

Yellow wire is +12 V

Form factor

newest form factor, and the one most often encountered, is the ATX. Older less used is AT.

Memory
There are two types of memory modules used on most PCs. These are 168-pin dual inline memory module (DIMM) cards and 72-pin single inline memory module (SIMM) cards.
The slots in which RAM is inserted are called Banks.
It is important to remember to put the **DIMM** with the largest memory size in the first bank.
The SIMM module is inserted at an angle of about 45 degrees.
RIMM modules use only the direct Rambus memory chips (RDRAM

Attaching the LEDs
Because LEDs involve very small connectors, sometimes one or two connections could be wrong. If the wrong connector is used, the LED will not light up when the computer is powered up.

Floppy Drive Cable
The floppy drive exchanges data with the motherboard devices, including the microprocessor, via a 34-pin flat ribbon (data) cable.

A red stripe on the edge of the cable identifies pin 1.

Incorrectly oriented cable becomes immediately apparent on power up by the fact that the floppy drive LED light comes on immediately and stays on.

The twist consists of 7 data wires. This feature, called cable select, automatically configures the drive on the middle connector as Drive B and the drive on the end connector as Drive A.

Hard Drive/CDROM Drive IDE
An IDE cable typically has 40 pins and can also have two devices attached to it.

One device must be set as the master and the other as a slave using jumpers.

You should never move a computer when the power is turned on as it will damage the hard-drive

The BIOS
The BIOS places a prompt on the display to tell the user that the CMOS Setup utility can be accessed by pressing a special key, or a given key combination. Typical keys and key combinations include the Esc key, the Del key, the, the F2 function key, and the Ctrl+Alt+Esc key combination.

Inside the BIOS it is usually recommended to set the drive type to Auto. This allows the BIOS to auto-detect and configure the hard drives so that this information does not have to be entered manually.

BIOS Password screens

User Password – This option allows the installation of a password that will keep the system from booting unless the proper password is entered. This option also prevents access to the BIOS, eliminating the possibility of other people changing the BIOS setup on the computer.

Supervisor Password – This feature is normally found only in large institutions, BIOS setups are locked with a master password only known to the network administrator or an administrator designee.

If a password has been set, and the user has/supervisor has forgotten the password, the only way to clear this password, is to use the clear CMOS jumper setting on the motherboard

Startup sequence
During the computers POST check error code 3xx means a keyboard problem.

Bootup Sequence.
One important setup option on the BIOS Features Setup screen allows the system boot order to be specified. For example, on newer systems it is preferable to boot from the hard drive or CD-ROM rather than from the 3.5" floppy drive as older systems did. If a letter A is first then the computer will boot to the floppy drive first.

Processors
AMD Athlon Processors use the Socket A.

Chapter 4 - Operating System Fundamentals

Operating Systems

Kernel - This is the core of the operating system. the kernel is responsible for loading and running programs or processes and managing input and output.

File Management System - The management system is what the operating system uses to organize and manage files.

Multitasking - Capability of a computer to run multiple applications at the same time.

UNIX - UNIX has been around since the 1960's and is one of the oldest operating systems. UNIX has always been popular with computer professionals.

DOS Commands

Format
format A: /s is responsible for copying system files after formatting the disk.
Format /q - does not clear the FAT, making file recovery possible.

Deltree
This command erases a directory including all files and subdirectories that are in it.

Copy
copy /v verifies a file has been copied correctly.
copy C:\test.txt A: - copies a file from hard drive to floppy drive.

CHKDSK
This command displays the status of a disk.

Type
command only displays the contents of a text file.

MD
Makes a new directory

DOS Files

IO.SYS - required for DOS to boot
MSDOS.SYS - required for DOS to boot
CONFIG.SYS
COMMAND.COM - required for DOS to boot
AUTOEXEC.BAT

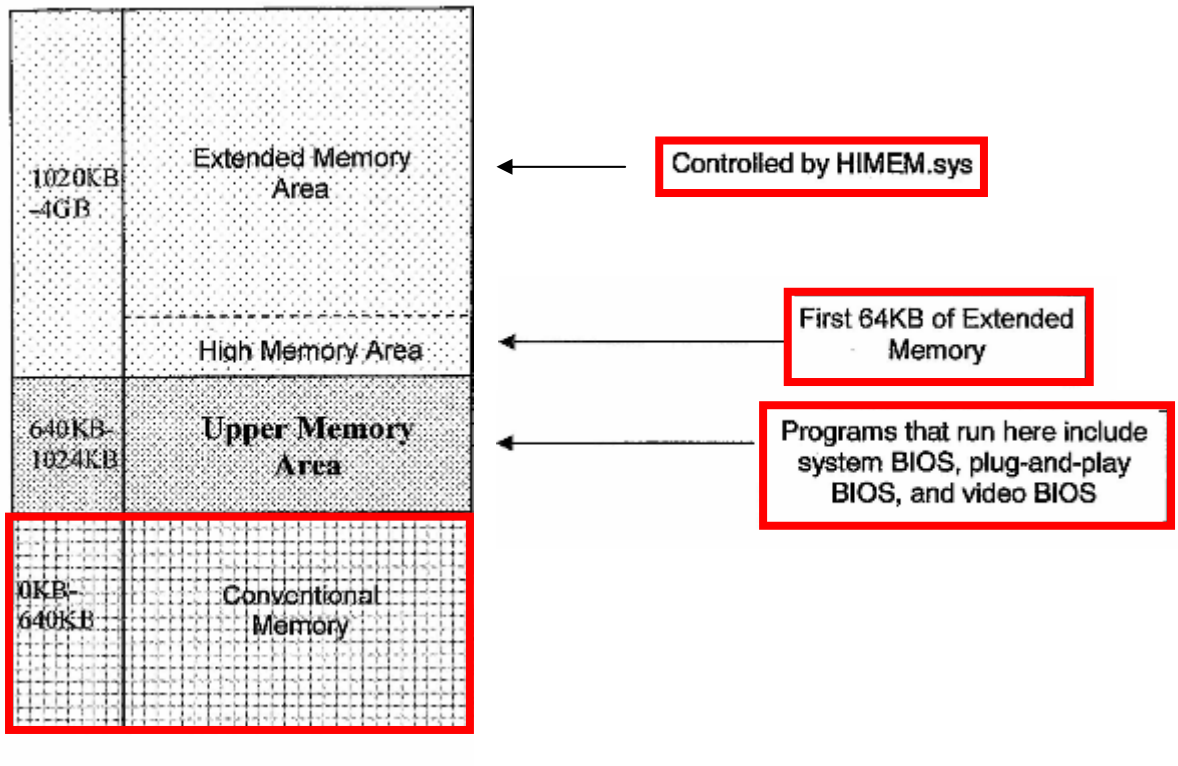
MSDOS.SYS - Loads file management functions

CONFIG.SYS - In Windows 9x, CONFIG.SYS is mostly needed for the installation of real-mode device drivers for those devices that may not be supported by Windows 9x (32-bit) device drivers.

It is also used to run memory managers. DEVICEHIGH=C:\DOS\MOUSE.SYS will load the mouse driver into upper memory blocks.

COMMAND.COM - This file is required for DOS to boot. Command.com is responsible for executing autoexec.bat.

Memory



0 - 1024KB of memory - Real mode can address.

The Windows 2000 swap file (page file) is named **PAGEFILE.SYS**.

General Protection Fault Error
Occurs when one application tries to access the same memory location used by another application.

Chapter 5 - Windows 9x Operating System

The Registry is a hierarchical database used to manage the information needed by the Windows operating system.

The Registry is made up of **SYSTEM.DAT** and **USER.DAT** files.

SCANREG.EXE can be used with any Windows 9x operating system to backup or repair the system registry.

MSCONFIG.EXE
Allows the user to control how the system is started by giving quick access to important Windows configuration/ initialization files.

ASD.EXE
is used to skip a driver when the operating system fails during bootup.

Logical Drives
There can be only one extended partition per disk, but unlike the primary, it can be subdivided into multiple (up to 23) sections called logical drives.

Formatting a hard drive
Formatting a hard drive creates magnetic tracks in concentric circles on the disk surface. These tracks are then broken up into chunks of 512 bytes called sectors.

Low-level formatting routine marks off the disk into sectors and cylinders, and defines their placement on the disk.

File Allocation Table (FAT)
During formatting, a special file, called the File Allocation Table (FAT) is created and located in the disk sector 0. FAT is a reference table that the operating system uses to locate files on the disk.

A built-in program such as CVT1.EXE, or other third party utilities such as Partition Magic can be used to convert FAT16 to FAT32, without destroying the data in the disk partition.

System Properties

General – General information about the system such as version of Windows 98 installed, total RAM, type of CPU.

Device Manager – Displays the hardware that is installed and the status of these

Performance – Shows the detailed performance status that indicates if the system is configured for optimal performance as shown in Figure . Advanced settings can be edited for the file system, graphics, and virtual memory.

Device Manager
The Device Manager is included with Windows 98, and allows the user to manage, view, and change computer resources.

An exclamation Point (!) inside a yellow circle - The device has a resource conflict.

A Red "X" appearing at the device's icon - The device has been disabled, removed, or Windows is unable to locate the device.

"?" appears in place of icon - The drivers are not loaded for this device.

Windows 9x Installation Steps:

Phase1 - Preparing to Run Windows 98 Setup
Creating a **SETUPLOG.TXT** file in the drive root directory.

Phase2 - Collecting Computer Information

Phase3 - Copying Windows 98 Files and Restarting the Computer

Phase4 - Setting Up Hardware and Finalizing Settings

Chapter 6 - Windows 2000

File Systems
FAT16 is only capable of dealing with partitions up to 2 GB.
Both FAT16 and FAT32 file systems maintain two copies of the FAT, which are the default and backup copy.

Cluster Size
Cluster size is the minimum amount of disk space a file must take up on a hard disk. The smallest cluster size using the NTFS file system in 512 bytes.

NTFS5 also includes a feature called **disk quotas**, which provide the system administrator with the ability to assign limits to the amount of hard disk space that users are allowed to occupy on the server

Permissions
File and directory permissions specify which users and groups have access to certain files and folders.

Permissions can be assigned at folder level or at individual file level:

If a folder has **write permissions** for a user then that user can create new files and subfolders within the folder, change folder attributes, and view folder ownership and permissions.

If a file has **full control permissions** then a user can change permissions and take ownership, plus perform the actions permitted by all other NTFS file permissions.

Encryption
administrators to encrypt a file or folder so that only the person who encrypted the file can view it. Other users can be granted access if they are assigned a public key. This allows a user to work with the file. Anyone without the public key cannot access the file.

Preboot sequence
Power on Self test POST. loads and initializes the NTLDR file, which is the operating system loader, and begins to load the operating system.

The Boot sequence

NTLDR
BOOT.INI
NTDETECT.COM
NTOSKRNL.EXE
HAL.DLL

NTLDR reads the BOOT.INI file to enable the on-screen display of the boot menu. The user can select which operating system to load if the computer is set to dual boot.

NTLDR runs NTDETECT.COM, which gathers information about the computer hardware.

Disk Management
You use the **'Disk Management Tool'** to control and manipulate the computers hard drives.

The main difference between basic and dynamic disks is that dynamic disk volumes can be worked on while an operating system is running. This makes dynamic disk management easier than creating partitions.

Simple Volume – This volume acts as a basic disk that contains disk space from a complete single disk. It is not fault-tolerant.

Spanned Volume – This volume includes disk space from multiple disks. There can be up to 32 disks in a spanned volume. In a spanned volume the operating systems write data to the first disk until it runs out of space. Then it continues to write data to the proceeding disks for as many disks as are included in the volume. If one disk in a spanned volume fails, the data in the entire volume is lost — Not fault tolerant.

Mirrored Volume – This volume contains two identical copies of a simple volume that stores the same data on two separate hard drives. Mirrored volumes provide fault tolerance in the event of hard disk failure. If one disk fails, a new one can replace it. All of the data is backed up on the other disk.

Registry

HKEY_USERS – This subtree contains the system default settings used to control individual user profiles and environments, such as the desktop settings, the windows environment, and the custom software settings.

HKEY_CLASSES_ROOT – This subtree contains the configuration data of all the software that is installed on the computer.

Emergency Repair Disk
To make an ERD Go to **Start > Programs > Accessories > System Tools > Backup** to run the Backup program and click the Emergency Repair Disk button on the Welcome tab.

Hardware Abstraction Layer - HAL
The main advantage that Windows 2000 has, when compared with Windows 9x, is the Hardware Abstraction Layer (HAL). The HAL is a library of hardware drivers that function between the operating system and system. The HAL enables Windows 2000 to work with different types of processors from different manufacturers. This feature prevents Windows 2000 from interacting with the hardware as it does in Windows 9x. The HAL controls all direct access for hardware operations, thereby expanding the hardware compatibility of the system.

Hardware Compatibility List - HCL
Hardware Compatibility List (HCL) is a tool that can be used before installation to verify that hardware will actually work with Windows 2000. Microsoft provides drivers for only those devices that are included on this list. The use of hardware that is not listed on the HCL might cause problems during and after installation.

Completing the Setup program
This step of the installation removes temporary files.

To upgrade from Windows 9x
Run the WINNT32.EXE command on Windows 2000 CDROM.

Chapter 7 - Windows XP

Windows XP Home Edition
XP Home Edition is intended for inexperienced users who do not need to connect to corporate networks. Anyone who logs on to a Home Edition machine will have full control of the operating system.

The XP Professional Features:
Remote Desktop feature
Internet Information Services (IIS) Web server software
Roaming profiles
supports dual processors

Windows XP 64 bit Edition
This operating system is designed to accommodate specialized, technical applications. For example, digital content creators including digital artists, 3D animators, gaming developers, and engineers can view more complex models and simulations to improve their product.

64 bit edition requires 1 GB of Memory.

Windows XP Media Center Edition
The media center provides users with the ability to watch live television, record TV programs.

User State Migration Tool - USMT
The USMT is used by IT administrators who are performing large deployments of Windows XP Professional in a corporate environment.

XP Professional Requirements
At least 64 MB of RAM, with 128 MB recommended.
VGA resolution of 800 x 600 or higher.
make sure the version of Windows is eligible for an upgrade.
Use the Compatibility tool or download the Upgrade Advisor to ensure that the system, devices, and software will work with XP.
Review the documentation before starting any new installation.

Dual boot installation
Can be used when the user desires to preserve the currently installed version of Windows. The new version of Windows needs to be installed on a new partition separate from the current version.

XP Installation 1st step - File Copy
This step copies the Windows Setup files to a folder on the partition where they can run when the system is restarted. If the system is booted from a CD, the Setup skips this step and copies files directly from the CD.

Partitioning
Partitioning is not always necessary if a suitable partition already exists, but if a partition needs to be created then it is done during the install. The recommended file system for Windows XP Professional is NTFS (NT File System). Remember FAT32 may also be used.

Upgrading to XP
Windows 3.1 and Windows 95 cannot upgrade.

Insert the Windows XP CD-ROM in the CD-ROM drive to start the upgrade procedure:

- Go to Start > Run.
- In the Run box, type **D:\i386\winnt32**, where D is the drive letter for the CD-ROM

Dual Boot Systems
if the hard drive is formatted with NTFS, the Windows 98 operating system will not be able to read files in the Windows 2000 NTFS partition. Microsoft recommends that both partitions be formatted with the FAT file system if the computer is set up to dual boot with Windows 98 and 2000. Windows 2000 can operate with the FAT file system, and files in the other partition can be read.

Activation
Once installed Windows XP must be activated within 30 days of installation. Either over the internet or using the automated telephone service.

File Sharing and Permissions
In Windows XP, permissions are set for local users and network users at the folder level only.

XP Internet Cookies
Windows XP can block or allow cookies from each website on the Internet.

Remote Desktop
Remote Desktop uses a Terminal Services technology that allows the user to work on a Windows XP Professional computer from any other computer.

Remote Assistant
To enable Remote Assistant, two parties must establish a session. These parties are known as the novice and the expert. Both parties must be using Windows XP for this connection to work.

Automatic Update Tab
Automatic Update allows the user to configure when and how Windows Update checks for critical updates.

System Restore
System Restore is a Windows XP service that runs in the background. This service allows the user to restore the OS to a predefined point in time. Windows XP creates an initial restore point whenever an install or upgrade takes place.

XP GUI
XP removes the clutter from the taskbar by grouping like applications together. For example, multiple copies of Internet Explorer are grouped and accessed by clicking on the drop-down box.

Fast User Switching
If the user joins a domain with a computer that uses Windows XP Professional, the user will not be able to use Fast User Switching.