

FUNDAMENTALS OF COMPUTERS

SYLLABUS

UNIT I

Components of a computer - Input Devices - Central Processing Unit - Output Devices - Memory - Secondary Storage - Hardware and Software - Operating System.

UNIT II

DOS Commands - Internal Commands - External Commands - GUI - GUI concepts - Character User Interface.

UNIT III

Desktop - My computer - Network - Network Neighbourhood - Recycle Bin - The Task Bar - Start Button - Running Programs - What's New in Windows'95 - Graphical Device Interface - Dynamic Data Exchange (DDE - Object Linking & Embedding (OLE) - Networking.

UNIT IV

Programmes - Documents - Setting - Find - Help - Run - Shut down - Working with Start Button - Programmes item - Close a programme - Toggle between programmes - Settings, item - Control Panel - Display Option - Find item - Shut down.

UNIT V

Working with Files and Folders - Window Explorer item - What is there on my computer Create a new folder Copy a file to floppy - Delete a file or folder - Recycle Bin - Multiple Selection - Printers - Setup Printer - Document Printing - Installing Application Programmes - Installing Hardware System Tools - Scan Disk option - Data Compression Option - Defragmenting Disk option - Paint Brush.

UNIT I

LESSON

1

COMPONENTS OF A COMPUTER

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1.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss the components of computer such as hardware, software, etc.
- Explain the input devices and output devices
- Define central processing unit, memory and secondary storage

1.1 INTRODUCTION

Computer has become a part of daily life. Though, a machine, a computer means differently to different people on the basis of how they interact with it. Thus, a computer engineer's view of a computer is different from that of a computer designer, which in turn is different from that of a computer-user.

A manager generally falls in the category of users. For a manager a computer is a very potent tool. The success of a manager depends, to a large extent, on how effectively (s)he can use this tool. In order that one is able to harness most of a tool it is imperative to have a proper appreciation of the tool.

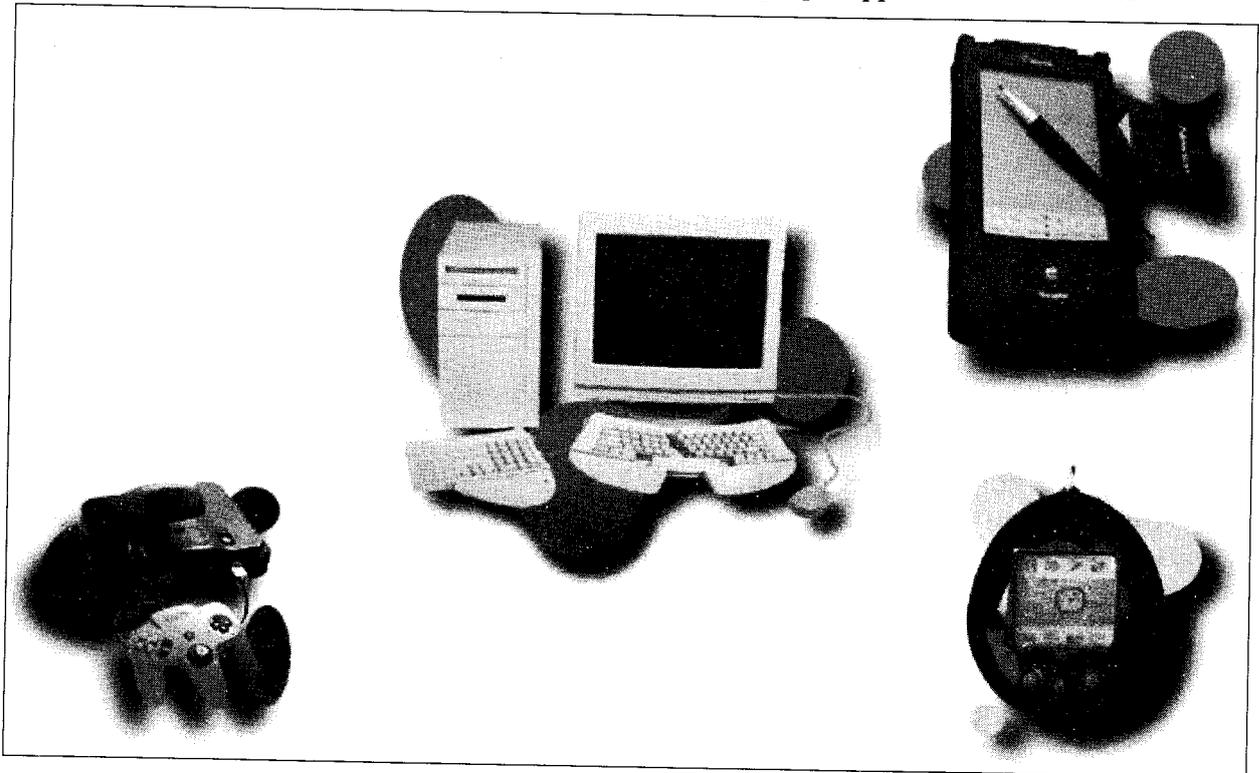


Figure 1.1: Various forms of Computer Devices

It is always better to know a little bit of the internals of a machine just as it helps knowing a bit of carburetor and spark-plug while driving a car. This lesson aims at making the readers acquainted with the basic innards of a computer in simple and idealized form – idealized because computers are far more complex than what is presented here.

1.2 COMPONENTS OF COMPUTER SYSTEM

A computer also known as computer system (since it is made up of integrated components input and output devices, storage central processing unit) works for a common objective of data processing. It consists of six elements:

- Hardware
- Software

- People
- Procedures
- Data
- Connectivity

Hardware & Software

The physical components of a computer system such as electromagnetic and mechanical devices, key board, VDU, dot matrix/laser printers, plotter, mouse etc., are parts of hardware.

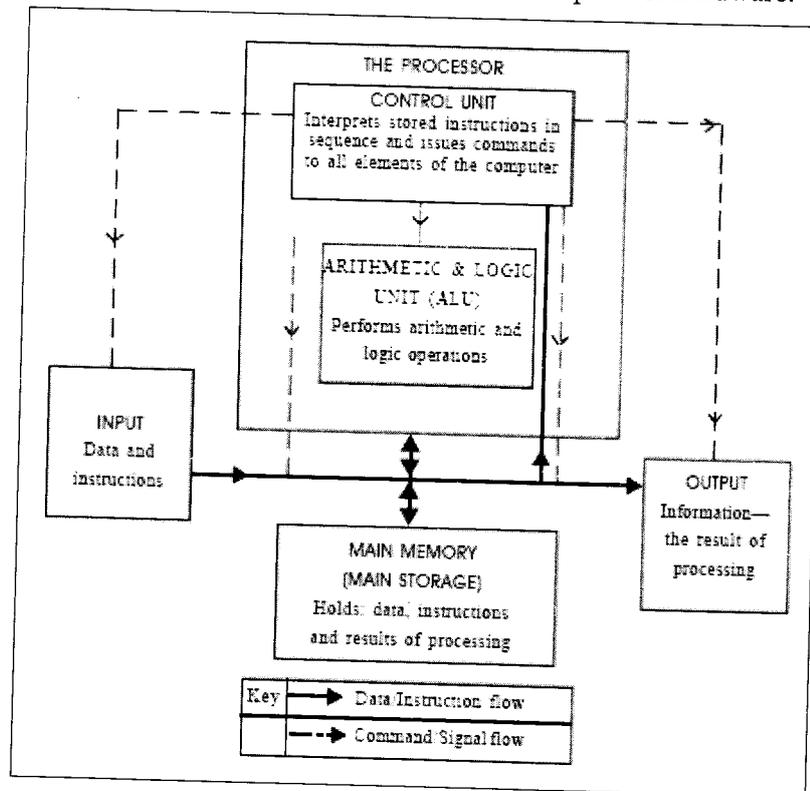


Figure 1.2: Elements of a Computer System showing its "Logical Structure"

Computer hardware, although capable of performing lots of useful functions, does not work by itself. It needs to be instructed. The instructions that hardware understands do only very primitive tasks like moving the data in or out of the memory, adding two numbers etc. For more complex operations the instructions are grouped together. A sequence of finite number of instructions is called a computer programme or simply a programme.

When instructions/programmes are placed in the primary memory of the computer, the CPU starts executing them one by one.

Software is the term used to describe the set of instructions that tells the hardware how to perform a task. They include operating system software, application and utility software. It has now been replaced with Windows operating system almost entirely. IBM created its own version of DOS later on. It was named PC-DOS to differentiate it from Microsoft's version of DOS which is subsequently known as MS-DOS.

People

The personnel who operate the computer hardware and develop the software.

Procedure

The rules, regulations and methods through which the computer responds to software.

Data

The facts and figures which have not been processed are called data. These are to be processed by computer. The processed data will become information.

How Hardware makes system useful?

HARDWARE is.....The physical parts of a computer

Hardware is a collective term. Hardware includes not only the computer proper but also the cables, connectors, power supply units, and peripheral devices such as the keyboard, mouse, audio speakers, and printers.

Devices are any machines or components that are attached to a computer. Examples of devices include disk drives, printers, mice, and modems. These particular devices fall into the category of peripheral devices because they are separate from the main computer.

Most devices, whether peripheral or not, require a programme called a device driver that acts as a translator, converting general commands from an application into specific commands that the device understands.

Critical Hardware

Hardware of a computer is made up of complex electronic circuits. For a user the details of the circuitry are not important. However, the hardware units with which a user has to interact must be clearly understood. For convenience, the hardware of a computer can be classified in the following categories:

1. Input Devices
2. Output Devices
3. Central Processing Unit (CPU)
4. Memory or Storage
5. Bus
6. Motherboard

Let us deal with each of these hardware components in slightly more detail.

1. ***Input Devices:*** The form in which data is available to a user is not always in the same form as is accepted by computer hardware.

Input devices are hardware equipment that receive data and instructions from users, convert the data and instructions into a form that can be processed by the computer and passes the same to the computer.

Hence, if you have to enter employees' names into the computer you do not have to write it on a piece of paper and shove the paper inside the computer. You will need some input device for this. A keyboard is an example of input device.

2. **Output Devices:** The result, produced by a computer after processing, is not always in user readable form. An output device is hardware equipment that translates this non-readable result into a form understood by the users. A VDU (Visual Display Unit) or monitor is an example of output device.
3. **Central Processing Unit (CPU):** Central processing unit is to computer what brain is to our body. It is the master organ of a computer. No computer can exist without a CPU. It is composed of two simpler hardware units - Arithmetic Logic Unit (ALU) and Control Unit (CU). CU controls all the activities of other hardware units while ALU performs all the calculations. Computer CPUs are very fast in their calculations and swift in control.
4. **Memory or Storage:** This hardware is the place where a computer stores all the data and instructions given to it. The results of the processing are also stored here. A computer has many types of memories. Some memories are directly connected to the CPU and are extremely fast as far as storage and retrieval of data is concerned. These memories are called primary memory - RAM (Random Access Memories) and ROM (Read Only Memories) belong to this category of memories. The CPU takes data and instructions stored only in the primary memories.

Primary memories are also of various types. The one that loses its contents when power is switched off is known as volatile memory such as RAM. Some memories retain the data and instructions stored on them even after the power is switched off such as ROM. These memories are known as non-volatile memories.

Secondary storage devices are placed outside the system unit and can be carried from one system to another allowing portability of data and instructions. Floppy disks or diskettes, hard disks and CD-ROM are some of the secondary storage devices.

Input devices, output devices and secondary storage devices are not directly connected to the CPU and hence are known as peripheral devices or simply peripherals.

5. **Bus:** Bus is the communication line through which all these hardware components are connected to each other.

The relation between various hardware components of a computer system is depicted in the figure shown below:

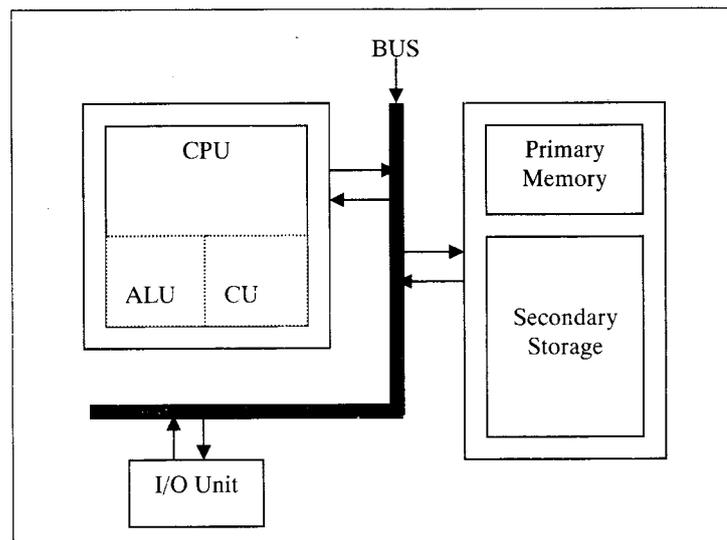


Figure 1.3: Internal Working of CPU

6. **Motherboard:** Motherboard, also called as *System Board*, is the most important hardware component of a microcomputer. Motherboard is so called as all the other boards (printed circuit boards having chips or other electronic components) of the computer are connected to this board, hence it is like the mother of all other boards.

1.3 INPUT DEVICES

Input devices are used to input data, information and instructions into the RAM. These are "stand-alone" data entry stations. These units usually have a small processor attached to a keyboard and a visual display unit. The processor checks for the accuracy of data at the time of entry.

The common input devices are mentioned below:

Keyboard: The keyboard is one of the most common input devices of computers. The layout of the keyboard is like that of the traditional Qwerty typewriter. Most keyboards have three sections of keys: the standard typing keys, cursor movement keys and the numeric keypad. To help users enter numbers quickly, keyboard provides a numeric keypad that functions much like a 10-key calculator. To select the numeric keypad's operation, we need to use the Num Lock key. Most PCs come with a standard keyboard, which is flat in appearance. Keyboard's keys match with that of a typewriter. The keyboard also includes special purpose function keys, arrow and cursor control keys. The layout of a simple keyboard can be seen in the Figure given below:

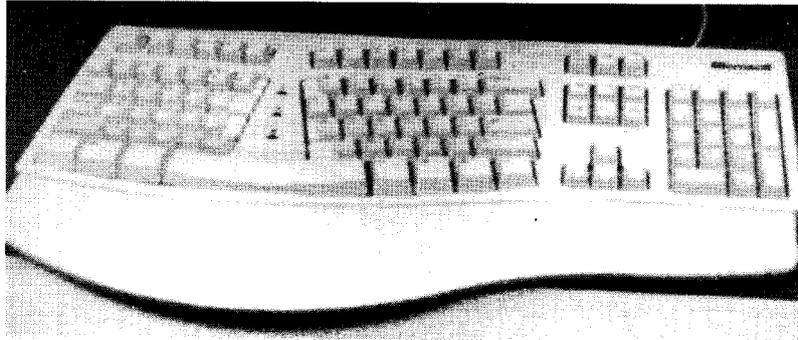


Figure 1.4: Keyboard

Mouse: While working with a display we are mostly pointing to some area in the display to select an option and move across on the screen to select subsequent options. Mouse is a handy device which can be moved on a smooth surface to simulate the movement of cursor that is desired on the display screen. An optical mouse offers quiet and reliable operation. But a mechanical mouse is much cheap.

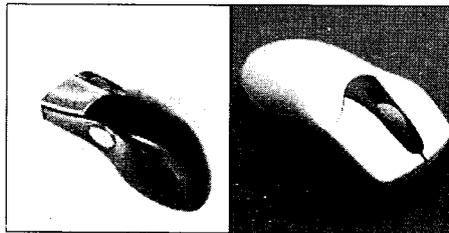


Figure 1.5: Mouse

Within Windows, user will make extensive use of mouse operations, which he/she refers to as "point and click operations." To point the mouse, simply aim the mouse pointer that appears on the screen at the object of desire. To move mouse pointer across the screen, simply move the mouse across the desk. To click mouse, press and release the mouse-select button (normally the left-mouse button). Many operations within Windows require that double-click mouse by pressing and releasing the mouse-select button two times in quick succession. For notebook PCs, touch pad, track ball or other pointer devices are also available. They are assisted with additional keys for clicking. To reduce the strain on wrist there is pad, which elevates the wrist while using the keyboard or mouse.

Trackball: A trackball looks like a mouse, as the roller is on the top with selection buttons on the side. It is also a pointing device used to move the cursor and works like a mouse. For moving the cursor in a particular direction, the user spins the ball in that direction. It is sometimes considered better than mouse, because it requires little arm movement and less desktop space. It is generally used with portable computers.

Alternate Input Devices

Light pen: Light pen is a pointing device, which is used to select a displayed menu item or draw pictures on the monitor screen. It's a pen shaped device allowing natural movement on the screen. The pen contains the light receptor and is activated by pressing the pen against the display screen. Receptor is the scanning beam which helps in locating the pen's position. Suitable system software is provided to initiate necessary action when we locate an area on the display surface with the help of the light pen. It consists of a photocell and an optical system placed in a small tube. When its tip is moved over

the monitor screen and the pen button is pressed, its photocell-sensing element detects the screen location and sends the corresponding signal to the CPU.

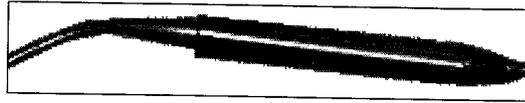


Figure 1.6: Light Pen

Touch Screen: Touch screen is sensitive to human fingers. Using this device, the user can point to a selection on the screen instead of pressing keys.

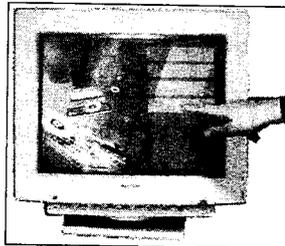


Figure 1.7: Touch Screen

Game Controller: A game controller is a device used with games or entertainment system used to control a playable character or object, or otherwise provide input in a computer game. A controller is typically connected to a game console or computer by means of a wire, cord or nowadays, by means of wireless connection. Controllers which have been classified as games controllers are keyboards, mice, game pads, joysticks, etc

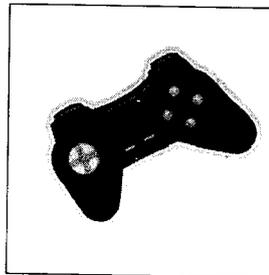


Figure 1.8: A Game Controller

Optical Bar-code Reader (OBR): It can scan a set of vertical bars of different widths for specific data and is used to read tags and merchandise in stores, medical records, library books, etc.

Image Scanner: Scanner is mainly used in Desktop Publishing applications. Scanner is used for digitizing images such as photographs, forms, documents, etc., in computer memory. Some scanners can also read text by converting them to digital code. These scanners are very useful for converting the typed pages into word-processing files. Graphics scanners convert a printed image in video image without converting it to digital code.

Optical Character Reader (OCR): It is also an optical scanner, which is capable of detecting alphanumeric characters typed or printed on paper using an OCR font. OCR devices are used for large volume applications like reading of passenger tickets; computer printed bills of credit card companies and reading of ZIP codes in postal services. The text, which is to be scanned, is illuminated by a low-frequency light source. The dark areas on the text absorb the light while light areas reflect it.

The photocells of OCR device receive this reflected light and provide binary data corresponding to dark and light areas.

Microphone: Sometimes abbreviated as mic, a microphone is a hardware peripheral that allows computer users to input audio into their computers.

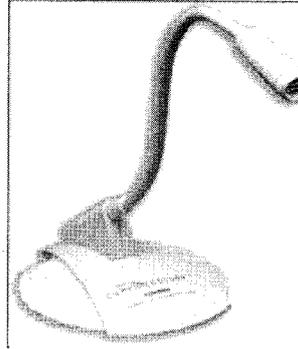


Figure 1.9: Microphone

Voice-input Devices: These devices can recognize the human voice. Voice recognition techniques, along with several other techniques to convert the voice signals to appropriate words and derive the correct meaning of words, are comprehensive speech recognition systems. Today devices are available to recognize and interpret human voices within a limited scope of operation. They seem to be very useful but are not popular due to storage of limited vocabularies and variations in the way of pronouncing words by different persons.

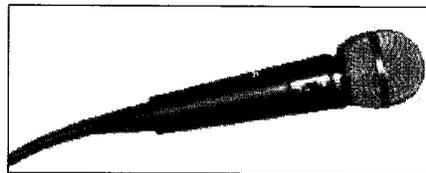


Figure 1.10: Voice-input Devices

Digital camera: A type of camera that stores the pictures or video it takes in electronic format instead of on film. There are several features that make digital cameras a popular choice when compared to film cameras. First, the feature often enjoyed the most is the LCD display on the digital camera. This display allows users to view photos or video after the picture or video has been taken, which means if you take a picture and don't like the results, you can delete it; or if you do like the picture, you can easily show it to other people. Another nice feature with digital cameras is the ability to take dozens, sometimes hundreds of different pictures.

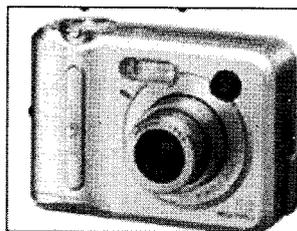


Figure 1.11: Digital Camera

1.4 CENTRAL PROCESSING UNIT

Central Processing Unit (CPU) is the main component or “brain” of a computer, which performs all the processing of input data. Its function is to fetch, examine and then execute the instructions stored in the main memory of a computer. In microcomputers, the CPU is built on a single chip or Integrated Circuit (IC) and is called as a *Microprocessor*. The part of a computer (a microprocessor chip) that does most of the data processing, the CPU and the memory form the central part of a computer to which the peripherals are attached. The Central Processing Unit (CPU) is the part of a computer that interprets and carries out the instructions contained in the software.

The CPU consists of the following distinct parts:

- **Arithmetic Logic Unit:** The arithmetic and logic unit of CPU is responsible for all arithmetic operations like addition, subtraction, multiplication and division as well as logical operations such as less than, equal to and greater than. Actually, all calculations and comparisons are performed in the arithmetic logic unit.
- **Control Unit:** The control unit is responsible for controlling the transfer of data and instructions among other units of a computer. It is considered as the “Central Nervous System” of computer, as it manages and coordinates all the units of the computer. It obtains the instructions from the memory, interprets them and directs the operation of the computer. It also performs the physical data transfer between memory and the peripheral device.
- **Registers:** Registers are small high speed circuits (memory locations) which are used to store data, instructions and memory addresses (memory location numbers), when ALU performs arithmetic and logical operations. Registers can store one word of data (1 word = 2 bytes & 1 byte = 8 bits. Details of BITS & BYTES are discussed later in this lesson) until it is overwritten by another word. Depending on the processor’s capability, the number and type of registers vary from one CPU to another. Registers can be divided into six categories viz. General Purpose Registers, Pointer Registers, Segment Registers, Index Registers, Flags Register and Instruction Pointer Register, depending upon their functions. The detailed functions of each and every register is beyond the scope of this book.
- **Buses:** Data is stored as a unit of eight bits (BIT stands for Binary Digit i.e. 0 or 1) in a register. Each bit is transferred from one register to another by means of a separate wire. This group of eight wires, which is used as a common way to transfer data between registers is known as a *bus*. In general terms, bus is a connection between two components to transmit signal between them. Bus can be of three major types viz. Data Bus, Control Bus and Address Bus. The data bus is used to move data, address bus to move address or memory location and control bus to send control signals between various components of a computer.
- **Clock:** Clock is another important component of CPU, which measures and allocates a fixed time slot for processing each and every micro-operation (smallest functional operation). In simple terms, CPU is allocated one or more clock cycles to complete a micro-operation. CPU executes the instructions in synchronization with the clock pulse.

The clock speed of CPU is measured in terms of *Mega Hertz* (MHz) or Millions of Cycles per second. The clock speed of CPU varies from one model to another in the range 4.77 MHz (in 8088 processor) to 266 MHz (in Pentium II). CPU speed is also specified in terms of *Millions of Instructions Per Second* (MIPS) or *Million of Floating Point Operations Per Second* (MFLOPS).

1.4.1 Different Types of CPUs

There aren't really different types of CPU, but there are some major differences between CPUs. Like Bus Sizes – we have 32 & 64 bits. Some support SSE, SSE2 and SSE3. But there are different processor architectures which you are probably talking about. There are SPARC, IA64, X86, X64, IBM Cell and more.

There are many different processors on the market. However, there are only a few that you should consider purchasing. Whether you're buying a computer off the shelf, building it from scratch, or upgrading your CPU, you must put some time and thought into which processor to buy. The choice you make today will affect your computer's speed and functionality for years to come.

There are two primary manufacturers of computer microprocessors. Intel and Advanced Micro Devices (AMD) lead the market in terms of speed and quality. Intel's desktop CPUs include Celeron, Pentium, and Core. AMD's desktop processors include Sempron, Athlon, and Phenom. Intel makes Celeron M Pentium M and Core mobile processors for notebooks. AMD makes mobile versions of its Sempron and Athlon, as well as the Turion mobile processor which comes in Ultra and Dual-Core versions. Both companies make both single-core and multi-core processors.

The following are the three types of CPUs:

1. CISC: Complex Instruction Set Computers
2. RISC: Reduced instruction Set Computers
3. MISC: Minimal Instruction Set Computers

1.4.2 Digital Signal Processor (DSP)

A digital signal processor is a specialized microprocessor designed specifically for digital signal processing, generally in real-time. DSPs can also be used to perform general-purpose computation, but they are not optimized for this function. DSPs can also be purely software, and are usually used to re-encode audio for Internet radio stations in real-time.

Interrupt Structure

A signal informing a programme that an event has occurred is an interrupt. When a programme receives an interrupt signal, it takes a specified action. Interrupt signals can cause a programme to suspend itself temporarily to service the interrupt.

Interrupt signals can come from a variety of sources. For example, every keystroke generates an interrupt signal. Interrupts can also be generated by other devices, such as a printer, to indicate that some event has occurred. These are called hardware interrupts. Interrupt signals initiated by programmes are called software interrupts. A software interrupt is also called a trap or an exception.

PCs support 256 types of software interrupts and 15 hardware interrupts. Each type of software interrupt is associated with an interrupt handler — a routine that takes control when the interrupt occurs. For example, when you press a key on your keyboard, this triggers a specific interrupt handler. The complete list of interrupts and associated interrupt handlers is stored in a table called the interrupt vector table, which resides in the first 1 K of addressable memory.

The processor is a highly-tuned machine that is designed to do one thing at a time. However, we use our computers in a way that requires the processor to at least appear to do many things at once. In Windows 95, you may have been editing a document while downloading information on your modem and listening to a CD simultaneously. The processor is able to do this by sharing its time among the

various programmes it is running and the different devices that need its attention. It only appears that the processor is doing many things at once because of the blindingly high speed that it is able to switch between tasks.

Most of the different parts of the PC need to send information to and from the processor, and they expect to be able to get the processor's attention when they need to do this. The processor has to balance the information transfers it gets from various parts of the machine and make sure that they are handled in an organized manner. There are two basic ways that the processor can do this:

- **Polling:** The processor can take turns going to each device and asking if they have anything they need it to do. This is called polling the devices. In some situations this technique is used; however, it is not used by the processor in a PC for a couple of basic reasons. One reason is that it is wasteful; going around to all the devices constantly asking if they need the attention of the CPU wastes cycles in which the processor could be doing something useful. This is particularly true because in most cases the answer will be "no". Another reason is that different devices need the processor's attention at differing rates; the mouse needs attention far less frequently than say, the hard disk, when it is actively transferring data.
- **Interrupting:** The other way that the processor can handle information transfers is to let the devices request them when they need its attention. This is the basis for the use of interrupts. When a device has data to transfer, it generates an interrupt that says "I need your attention now, please". The processor then stops what it is doing and deals with the device that requested its attention. It actually can handle many such requests at a time, using a priority level for each to decide which to handle first.

1.4.3 Microprocessor History

A microprocessor, also known as a CPU or central processing unit, is a complete computation engine that is fabricated on a single chip. The first microprocessor was the Intel 4004, introduced in 1971. The 4004 was not very powerful. All it could do was add and subtract, and it could only do that 4 bits at a time. But it was amazing that everything was on one chip. Prior to the 4004, engineers built computers either from collections of chips or from discrete components (transistors wired one at a time). The 4004 powered one of the first portable electronic calculators.

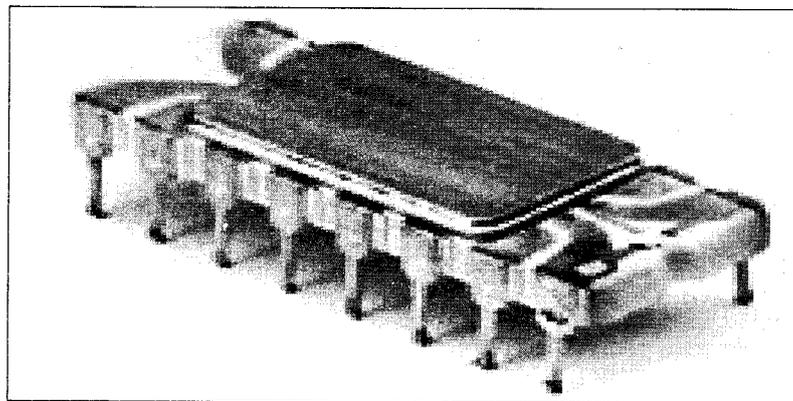


Figure 1.12: Intel 4004 Chip

The first microprocessor to make it into a home computer was the Intel 8080, a complete 8-bit computer on one chip, introduced in 1974. The first microprocessor to make a real splash in the market was the Intel 8088, introduced in 1979 and incorporated into the IBM PC (which first appeared

around 1982). If you are familiar with the PC market and its history, you know that the PC market moved from the 8088 to the 80286 to the 80386, to the 80486, to the Pentium I, to the Pentium II, to the Pentium III, and hence to the Pentium 4. Intel makes all of these microprocessors, and all of them are improvements on the basic design of the 8088. The Pentium 4 can execute any piece of code that ran on the original 8088, but it does it about 5,000 times faster.

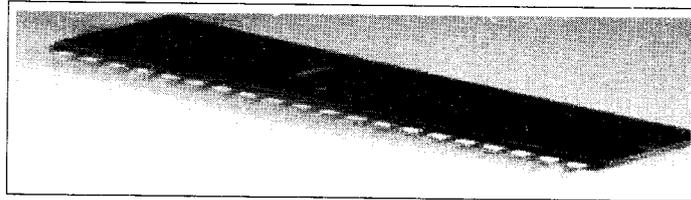


Figure 1.13: Intel 8080

1.4.4 Processor Instruction Sets

The job of all processors is to execute instructions, which are the commands that make up the machine language that the processor understands. Most software programmes are written in higher-level languages, but they must be translated into the processor's machine language to enable the computer to run (execute) them. This is called compiling the programme to machine language.

Collectively, all of the various instructions that the processor can execute are called its instruction set. The instruction set determines what sort of software can run on the processor; in order for two processors to be compatible, they must (among other things) be able to execute the same instructions.

Machine Language

Computers represent instruction sets in a particular way, and this representation is what we call machine language.

Machine language is a coding scheme which instructs the computer as to what to do. In the same way as we used different notations for representing numbers (2's complement, excess notation), we need a coding scheme which will allow us to represent each of our items in the instruction set in binary. We can't just tell the machine "add together 2 and 4". It doesn't understand our words. It also needs to be told where to fetch data from memory and where exactly to store the result. The machine uses strings of 1's and 0's.

A typical machine language represents a certain instruction by way of a special code. These special codes used for representing instructions comprise of different sections (called fields), which describe different aspects of the instruction:

1. The first part of an instruction code is called the operation code (op-code for short). This indicates which operation is to be performed (e.g. addition, retrieval of a data item from memory etc.)
2. The second part is called the operand field. This part of the code fills in the details which are needed before the operation specified in (1) can be performed. For example, if the op-code field specifies addition, the operand fields will tell the machine which memory addresses hold the pieces of data which are to be summed.

So what do these op-code and operand fields look like? Well, they are simply bit patterns – strings of 0's and 1's. (Remember – the computer only understands binary).

So a computer may well store an instruction as:

Operation Code	Address Field 1	Address Field 2	Address Field 3
A Typical Machine Language Coding For An Instruction			

The operations which we represent in the op-code fall into three categories.

1. Data transfer
2. Arithmetic/Logic
3. Control (sometimes divided into two separate categories of compare and branch)

The *Data Transfer* group concern operations, which cause some movement of data from one location to another. This could be loading the contents of a memory cell in RAM into a register on the CPU; or it could be storing the results of an operation from a CPU register back into a RAM memory cell.

The *Arithmetic/Logic* operations involve the usual mathematical type of operation such as addition, but also includes logical operations such as “is X greater than Y?” or “is A equal to B?” The condition codes are special registers which are used for storing the results of these logical operations and can be set to “1” if the result of the logical operation is true, or “0” if the result is false.

The *Control Operations* are those, which somehow affect the execution of a programme. Usually, this means that a logical operation is performed, and then, depending upon the results of that operation, the programme execution follows one “path” or another. In other words, if $X > Y$ then execute this set of instructions, otherwise execute this other group of instructions (The “jump” and “halt” instructions).

Instruction Set

It is a set of commands that a certain CPU understands. These are very basic instructions that are used into the logic of the CPU.

1.4.5 Processor Structure

Before we look at basic processor structure, we need to briefly touch on two concepts: von Neumann machines and pipelined, clocked logic systems.

Von Neumann Machines

In the early 1950s, John Von Neumann proposed the concept of a stored programme computer – an architecture which has become the foundation for most commercial processors used today. In a Von Neumann machine, the programme and the data occupy the same memory. The machine has a Programme Counter (PC) which points to the current instruction in memory. The PC is updated on every instruction. When there are no branches, programme instructions are fetched from sequential memory locations. (A branch simply updates the PC to some other location in the programme memory.) Except for a handful of research machines and a very small collection of commercial devices, all of today’s commercial processors work on this simple principle.

1.4.6 Basic Processor Structure

Here, we will consider the basic structure of a simple processor. We will examine the flow of data through such a simple processor and identify bottlenecks in order to understand what has guided the design of more complex processors.

Here we see a very simple processor structure – such as might be found in a small 8-bit microprocessor. The various components are:

Arithmetic Logic Unit (ALU)

This circuit takes two operands on the inputs (labelled A and B) and produces a result on the output (labelled Y). The operations will usually include, at a minimum:

- Add, subtract
- And, or, not
- Shift right, shift left

ALUs in more complex processors will execute many more instructions.

Register File

A set of storage locations (registers) for storing temporary results. Early machines had just one register – usually termed an accumulator. Modern RISC processors will have at least 32 registers.

Instruction Register

The instruction currently being executed by the processor is stored here.

Programme Counter

The programme counter holds the memory address of the next instruction to be executed. It is updated every instruction cycle so as to point to the next instruction in the programme. (Control for the management of branch instructions – which change the programme counter by other than a simple increment – has been omitted from this diagram for clarity. Branching instructions and their effect on programme execution and efficiency will be examined extensively later).

Memory Address Register

This register is loaded with the address of the next data word to be fetched from or stored into main memory.

Address Bus

This bus is used to transfer addresses to memory and memory-mapped peripherals. It is driven by the processor acting as a bus master.

Data Bus

This bus carries data to and from the processor, memory and peripherals. It will be driven by the source of data, ie the processor, memory or peripheral device.

Multiplexed Bus

Of necessity, high performance processors provide separate address and data buses. To limit device pin counts and bus complexity, some simple processors multiplex address and data onto the same bus: naturally this has an adverse affect on performance.

Executing Instructions

Let's examine the steps in the execution of a simple memory fetch instruction, e.g.

<p>101c₁₆: lw \$1,0(\$2) In this, and most following, examples, we'll use the MIPS instruction set.</p>	<p>This instruction tells the processor to take the address stored in register 2, add 0 to it and load the word found at that address in main memory into register 1. This is chosen because</p> <ul style="list-style-type: none"> • it's simple, • it exists in one widely available range of machines produced by SGI and • there is a public domain simulator for MIPS machines, which we will use for some performance studies.
<p>As the next instruction to be executed (our lw instruction) is at memory address 101c₁₆, the program counter contains 101c.</p>	<p>For convenience, most numbers - especially memory addresses and instruction contents - will be expressed in hexadecimal. When orders of magnitude and performance are being discussed, decimal numbers will be used: this will generally be obvious from the context and the use of exponent notations, e.g. 5×10^{12}.</p>

Execution Steps

1. The control unit sets the multiplexor to drive the PC onto the address bus.
2. The memory unit responds by placing 8c410000₁₆ - the lw \$1,0(\$2) instruction as encoded for an MIPS processor - on the data bus from where it is latched into the instruction register.
3. The control unit decodes the instruction, recognises it as a memory load instruction, and directs the register file to drive the contents of register 2 onto the A input of the ALU and the value 0 onto the B input. At the same time, it instructs the ALU to add its inputs.
4. The output from the ALU is latched into the MAR. The controller ensures that this value is directed onto the address bus by setting the multiplexor.
5. When the memory responds with the value sought, it is captured on the internal data bus and latched into register 1 of the register file.
6. The programme counter is now updated to point to the next instruction and the cycle can start again.

As another example, let's assume the next instruction is an add instruction:

1020 ₁₆ : add \$1,\$3,\$4	This instruction tells the processor to add the contents of registers 3 and 4 and place the result in register 1.
--------------------------------------	---

1. The control unit sets the multiplexor to drive the PC onto the address bus.
2. The memory unit responds by placing 00232020₁₆ - the encoded add \$1,\$3,\$4 instruction - on the data bus from where it is latched into the instruction register.
3. The control unit decodes the instruction, recognises it as an arithmetic instruction and directs the register file to drive the contents of register 1 onto the A input of the ALU and the contents of register 3 onto the B input. At the same time, it instructs the ALU to add its inputs.

4. The output from the ALU is latched into the register file at register address 4.
5. The programme counter is now updated to point to the next instruction.

1.5 OUTPUT DEVICES

The output normally can be produced in two ways – either on a display unit/device or on a paper. Other kinds of output as speech output, is also being used in certain applications.

Monitors: Visual Display Unit (VDU), commonly called as monitor is the main output device of a computer. It consists of a Cathode Ray Tube (CRT), which displays characters as an output. It forms images from tiny dots, called pixels. That are arranged in a rectangular form. The sharpness of the image (screen resolution) depends upon the number of pixels.

There are different kinds of monitors depending upon the number of pixels. Depending upon the resolution, monitors can be classified as follows:

- (a) CGA (Colour Graphics Adapter)
- (b) MDA (Monochrome Display Adapter)
- (c) HGA (Hercules Graphics Adapter)
- (d) EGA (Enhanced Graphics Adapter)
- (e) VGA (Video Graphics Adapter)
- (f) SVGA (Super VGA)

The differences between these monitors are summarised in *Table 1.1*. Depending upon the colour of display, monitors can be classified as Monochrome (with single colour black/white display) and Colour (with all colours display) Monitors. The pictures of two different models of color monitors are shown in Figure 1.13.

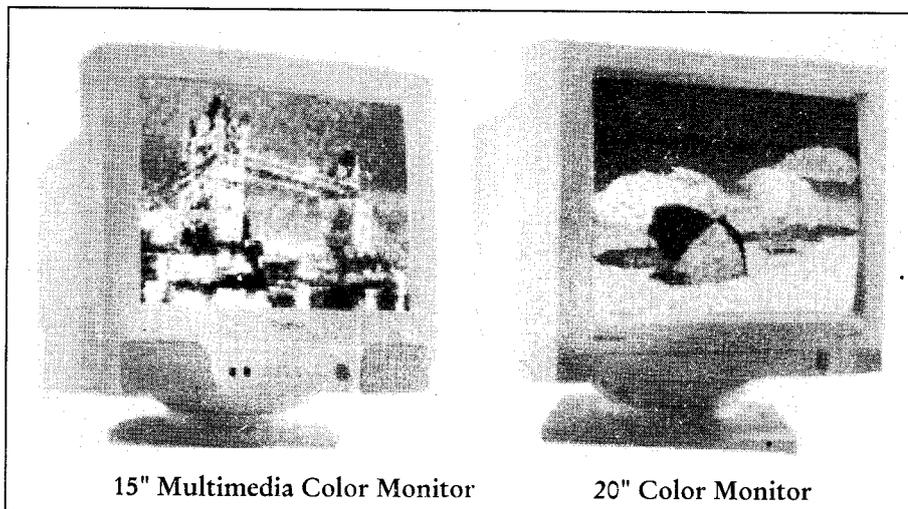
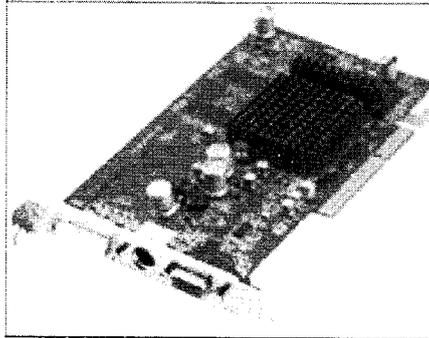


Figure 1.14: Two Models of Color Monitors

Table 1.1 Comparison among different Types of Monitors

Type of Monitor	Display Type	Text Resolution	Graphics Resolution (Pixels)
CGA	Text & Graphics	Fair quality	320 × 200
MDA	Text only	Good quality	-
HGA	Text & Mono Graphics	Fair quality	320 × 200
EGA	Text & Enhanced Graphics	Good quality	640 × 350
VGA	Text & Video Graphics	Much better than all the above	640 × 480
SVGA	Text & Video Graphics	Best quality	1600 × 1280

Video controller: Also known as a graphics card, video card, video board, or a video controller, a video adapter is an internal circuit board that allows a display device, such as a monitor, to display images from the computer.

**Figure 1.15: Video Controller**

PC Projector: A projector is a device that uses light and lenses to take an image and project a magnified image onto a larger screen or wall. Projectors can magnify still or moving images depending on how they are built. The image must be shone through a sealed tube or frame when passing through the lenses to maintain focus.

**Figure 1.16: PC Projector**

Speakers: A hardware device connected to a computer's sound card that outputs sounds generated by the card.

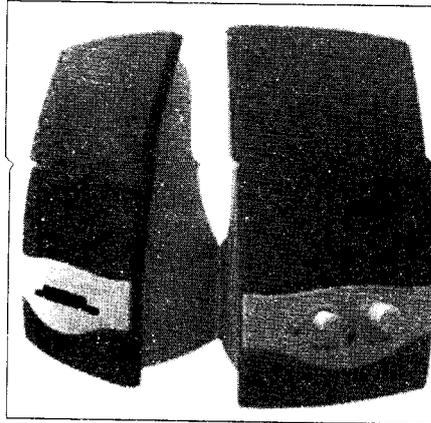


Figure 1.17: Speaker

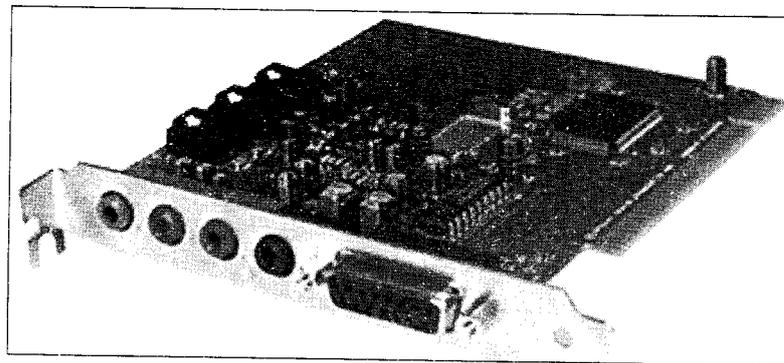


Figure 1.18: Sound Card

Printer: Printers are used for producing output on paper. There are a large variety of printing devices which can be classified according to the print quality and the printing speed. On the basis of the way impressions are made on the paper, printers are of two types:

- **Impact printers:** In these types of printers, printing takes place by striking at the paper through a ribbon soaked in ink. The impression on the paper is created by pressing a rigid object over an ink-soaked ribbon.
- **Non-impact printers:** In this type of printers, there is no physical touch of any object on the paper. On the basis of how much is printed in a single operation, printers are of three types:
 - ❖ **Character printers:** These types of printers are capable of printing one character or letter at a time. The conventional typewriter also types a letter at a time.
 - ❖ **Line printers:** These printers can print one line of characters or letters in one go. Line printers are obviously much faster than character printers. However, they are more expensive than character printers.
 - ❖ **Page printers:** As the name suggests page printers can print the whole page at one time. These printers are fastest but costliest at the same time. The speed of a printer is generally measured in terms of the following units:

- ◆ *Character Per Second (CPS)*: Number of characters printed in one second is expressed in terms of CPS.
- ◆ *Lines Per Minute (IPM)*: It is the measure of printer capacity in terms of number of lines printed per minute.
- ◆ *Page Per Minute (PPM)*: It is the measure of printer capacity in terms of number of pages printed per minute.

Some of the popular types of printers are dealt with hereunder.

Dot Matrix Printer (High Speed Printer): Dot matrix printers are impact printers. The printer head has an assembly of a fixed number of pins and tiny hammers. These hammers strike at the pins, which in turn make impression of dots on the paper loaded in the printer through an ink-soaked ribbon.

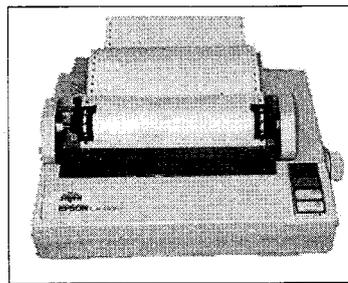


Figure 1.19: Dot Matrix Printer

The prints on paper are thus made up of these small dots. The quality of printout depends on the number of pins in dot-matrix printer. The more pins, the better quality of prints and more expensive. These types of printers do not produce very high quality printing and are therefore used in high volume draft printing.

It is the cheapest of all type of printers. The speed and quality of printing suits high volume output for analysis and review. Due to impact nature of printing, it can print more than one copy at a time. In cases where print out is required in duplicate or triplicate, this type of printer is more suitable. Such situations arise very often in banking industry. A copy is to be generated for the customer, one copy for the branch and another copy for head-office.

However, they suffer from some limitations. Due to mechanical impact on the paper, it makes lot of noise. The speed may not be adequate for some types of applications. The print quality is not suitable for commercial communication. It has very limited capability for color printing. It frequently requires maintenance due to wear and tear.

Inkjet printer: This type of printer belongs to non-impact class. Characters are formed as a result of electrically charged or heated ink being sprayed in fine jets onto the paper. The printer head consists of nozzles. Individual nozzles produce high resolution (up to 400 dots per inch or 400 dpi) dot matrix characters. Magnetized plates in the ink's path direct the ink onto the paper in the desired shape. Inkjet printers are capable of producing high quality print approaching that produced by laser printers. A typical inkjet printer provides a resolution of 300 dots per inch, although some newer models offer higher resolutions. In general, the price of inkjet printers is lower than that of laser printers. However, they are also considerably slower. Another drawback of inkjet printers is that they require a special type of ink. Because inkjet printers require smaller mechanical parts than laser printers, they are especially popular as portable printers.

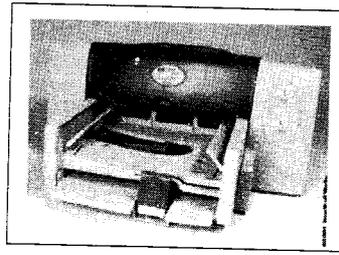


Figure 1.20: Inkjet Printer

Laser printer: This printer also belongs to non-impact type. A drum is initially electrically charged and then a high intensity laser beam is used to discharge selected areas on the drum where nothing is to be printed. These discharged areas correspond to the white area of the printed document.

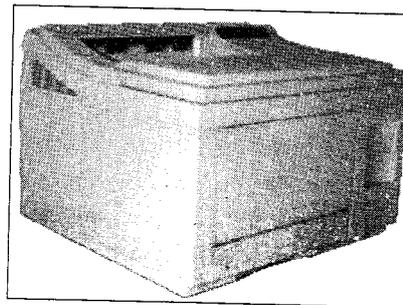


Figure 1.21: Laser Printer

Dry ink or toner is attracted to parts of the drum with a high charge. The drum rotates and transfers the toner to the paper which has an even greater electrical charge. Finally a heater fixes the toner onto the paper. After printing this page the drum is cleaned by de-electrifying it. The process continues for another page. These printers are fast (6-8 pages per minute) and a very high resolution (300 - 600 dpi) but are costliest of all the printers.

Color Printers: Color printers are the new standard in digital color printing. The complete family of digital color printers effectively balances low total cost of ownership with high levels of performance and productivity to directly benefit your bottom line. Compared with other color laser printers, the new C5000, C7000 and C9000 Series printers employ our innovative Digital LED and OKI Single Pass Color technologies. These technologies allow our digital printers to deliver high-speed, high-resolution, high-quality print output, and unmatched media flexibility, unsurpassed in the industry. Color printers from OKI Printing Solutions enable you to create high-impact color reports, presentations, mailers, banners and many other types of printed business communications, without the expense of using outside commercial printers.

Dye Sublimation Printers: "Dye-sub" printers were among the first photo-quality color computer printers, emerging in the early 1990s. Sadly most of the prints made with these machines had faded by the time we entered the New Millennium. The latest dye-sub printers allegedly produce more archival prints but this whole technology seems to be fading in favor of ink jet. Color management is a problem with dye-sub, as with ink jet. These are CMYK devices.

Fujix 3000 (and now 4000): Though rather long in the tooth, this is the choice of most imaging professionals. The Fujix machines uses three lasers to expose a specially treated "donor paper" which is then thermally developed and transferred onto "receiver paper". It is a traditional silver halide process but one need not maintain chemistry or clean processor rollers. Resolution is 400 dpi on an 8.5 × 11

sheet (Fujix 3500) or 12 × 18 (Fujix 4000). Image quality is the best of any printer available, comparable to an Ilfochrome, and archival qualities are reputed to be good. The printer is a standard piece of office equipment and the expended donor paper goes back UPS to Fuji for recycling and disposal. Consumables cost \$2-4 per page and you can make transparencies as well as opaque photos.

Barcode printers: Barcode printers typically come in fixed sizes of 4 inches, 6 inches or 8 inches wide. Although a number of manufacturers have made differing sizes in the past, most have now standardised on these sizes. The main application for these printers is to produce barcode labels for product and shipping identification.

The printers use a fixed width thermal print head, pressing onto a paper or plastic label, over a driven rubber roller called a platen. Between the print head and the label is sandwiched a very thin thermal transfer ribbon (or sometimes called "foil"), which is a polyester film which has been coated on the label side with a wax, wax-resin or pure resin "ink". The ribbon is spooled onto reels up to 625 meters (1965 feet) long and is driven through the printing mechanism in sync with the labels, at speeds of up to 12 inches per second (although 6 inches per second is adequate for most applications).

As the label and ribbon are driven beneath the printhead together, tiny pixels across the width of the printhead are heated and cooled so as to melt the "ink" off the polyester film and onto the label. This process happens very quickly and accounts for the fast speed of the printers and is dry instantly. Thermal printheads are often 203 dots per inch (8 dots per mm) or 300 dpi (12 dots per mm). Though some manufacturers now make 600 dpi printers to produce very small barcodes for electronics industries (look inside the battery compartment of your mobile phone.)

Because of the high print speeds, the label printers have become very sophisticated, with powerful processors and large memory capacities, to allow them to produce the label images to be printed at the same speed as the print mechanism. To achieve this speed, almost all thermal label printers use special internal description languages to allow the label to be laid out inside the printers' memory prior to printing.

Each manufacturer has their own language and some are very complex and difficult to work with. For example to print a barcode on a label, the controlling computer would send a series of codes to the printer, requesting a particular barcode type and specifying its size and location on the label, along with the data to be printed as a barcode. The printer will then use pre-defined algorithms to construct the barcode, keeping very strictly to the resolution allowed by the printhead, to create the best possible barcode on that particular type of printer. Barcodes have very strict rules for accurate printing, to ensure readability in a wide range of circumstances.

Label Printers: Labels come in two main types: Thermal (sometimes referred to as Direct Thermal) and Thermal Transfer. A huge variety of specialist materials and adhesives are available to suit most applications. These include plain white paper packaging labels, durable rating plates, and tamper-evident labels.

Thermal transfer printing is one of the commercial areas where Mac-based businesses could be at a disadvantage compared to PC/Windows equipped offices. Some manufacturers in this market provide Windows compatible drivers, barcode and labelling software – such as Bartender – bundled with their products, but may not offer equivalent Mac software. Brother, for example, is a major manufacturer that is cross-platform/compatible with Macs. Independent software and driver developers' offerings do exist and are another option for the Mac-centered business. It may be an option to invest in a

Windows PC to handle labelling tasks if your Macs are all older, but the current line of Macs also run Windows, with dual Operating Systems.

It should be noted that for most professional barcode printers programming documentation for the printing protocols used is available at no charge.

Thermal ribbons come in three main types – wax, wax-resin or pure resin and are almost always black (other colors sometimes used are red and blue). These different types are made to print onto different label materials and are used when the life of the label needs to be long or the labels need to survive harsh environments. Wax ribbons are for printing onto paper labels, where the life of the label can be years but must be kept dry and must not be abraded or subjected to certain chemicals or oil, which would melt the wax image. Wax-resin ribbons produce a finer image on very smooth paper or coated paper labels. The printed image is much more durable than wax, but can still only stand slight contact with water. Finally pure resin ribbons are formulated to print onto plastic labels such as polyester, polypropylene and vinyl. The "ink" is designed to slightly dissolve into or adhere to the plastic surface of the label and becomes extremely durable, depending on the plastic material and ribbon make used. Most printer manufacturers offer ribbon/label combinations which are known to work well together, which is particularly important as some combinations produce no image at all. Plastic labels with resin ribbons will survive outside in full sunlight, can stand immersion in water and may be resistant to chemicals and oils dependent on type. Often used in Automotive and Aircraft parts manufacture, any items stored outside and essential for the labelling of hazardous chemicals which must remain identifiable, for example, after being submerged in sea water for extended periods.

Thermal printing technology can be used to produce color images by adhering a wax-based ink onto paper. As the paper and ribbon travel in unison beneath the thermal print head, the wax-based ink from the transfer ribbon melts onto the paper. When cooled, the wax is permanently adhered to the paper. This type of thermal printer uses a like-sized panel of ribbon for each page to be printed, regardless of the contents of the page. Monochrome printers have a black panel for each page to be printed, while color printers have either three (CMY) or four (CMYK) colored panels for each page. Unlike dye-sublimation printers, these printers cannot vary the dot intensity, which means that images must be dithered. Although acceptable in quality, the printouts from these printers cannot compare with modern inkjet printers and color laser printers. Currently, this type of printer is rarely used for full-page printing, and is now employed for industrial label printing due to its waterfastness and speed. These printers are considered highly reliable due to their small number of moving parts. Printouts from color thermal printers are sensitive to abrasion, as the wax ink can be scraped, rubbed off, or smeared.

1.6 MEMORY

Memory system is a valuable extension in Von Neumann architecture. It is one of the central resources required for a computer operation. Memory is organized in words. Each word may consist of one byte, two bytes or more. Each memory location is addressable and has unique fixed address.

A programme resides on a disk as a binary executable file. The programme must be brought into memory and placed within a process for it to be executed. The instructions and data must be loaded into the memory. The address where these components of a programme be loaded is decided, controlled and managed by the operating system.

Assigning an address to an instruction or data or variable is known as binding. The addresses assigned to high level language programme components residing on a secondary storage device are symbolic addresses, viz. variable names, function names etc. When this programme is compiled, the addresses are translated into relative addresses in the object programme. Another translation of the relative addresses into relocatable addresses (relocatable address is an address that can be reassigned to a different physical location) takes place when this object code is linked and loaded into the memory. Thus, each binding is a mapping from one address space to another address space. The responsibility of these address translations is basic responsibility of operating systems. How to utilize memory optimally by manipulating objects in the memory is referred to as memory management.

Dynamic loading of programme refers to the strategy in which a routine is not loaded until it is called. It affects better memory utilization. Dynamic loading does not require any special support from the operating system.

There are in general two types of memories.

- **Primary memory:** This type of memory is directly connected to the CPU. They are comparable in speed to CPU and therefore are expensive. Some of the primary memories (Main memory) are:
 - ❖ **RAM (Random Access Memory):** This primary memory is volatile, meaning that it loses its contents when power is switched off. A typical PC has 64 MB RAM these days.
 - ❖ **ROM (Read Only Memory):** This type of memory is fixed into the PC circuitry and is essentially non-volatile. All the machine-level instructions are stored on it and is provided by the manufacturer.
 - ❖ **Cache memory:** This memory is just like RAM, a little bit faster than RAM. It is used to compensate the speed difference between CPU and RAM. A typical PC has 128KB of Cache memory these days.
- **Secondary memory (storage):** These storage devices are not directly connected to the CPU. Devices called drive controllers or simply drives sit in between the device and the CPU. Therefore, they are also referred to as peripherals. These devices have very high storage capacity and are considerably cheaper. However, they are pretty slow as compared to primary memories.
- **Flash Memory:** Flash memory (sometimes called “flash RAM”) is a type of constantly powered non-volatile memory which means that it stores information on a silicon chip in a way that does not need power to maintain the information in the chip. It can be erased and reprogrammed in units of memory called blocks. It is a variation of Electrically Erasable Programmable Read-Only Memory (EEPROM), which, unlike flash memory, is erased and rewritten at the byte level, which is slower than flash memory updating. Normal EEPROM only allows one location at a time to be erased or written, meaning that flash memory can operate at effectively higher speeds when the system uses it to read and write to different locations at the same time. Flash memory is often used to hold control code such as the Basic Input/Output System (BIOS) in a personal computer. When BIOS needs to be changed (rewritten), the flash memory can be written to in block (rather than byte) sizes, making it easy to update. On the other hand, flash memory is not as useful as Random Access Memory (RAM) because RAM needs to be addressable at the byte (not the block) level.

Flash memory offers fast read access times and solid-state shock resistance. These characteristics explain the popularity of flash memory for applications such as storage on battery-powered devices like cellular phones and PDAs.

Flash memory is based on the Floating-Gate Avalanche-Injection Metal Oxide Semiconductor (FAMOS transistor), which is essentially an NMOS transistor with an additional conductor suspended between the gate and source/drain terminals.

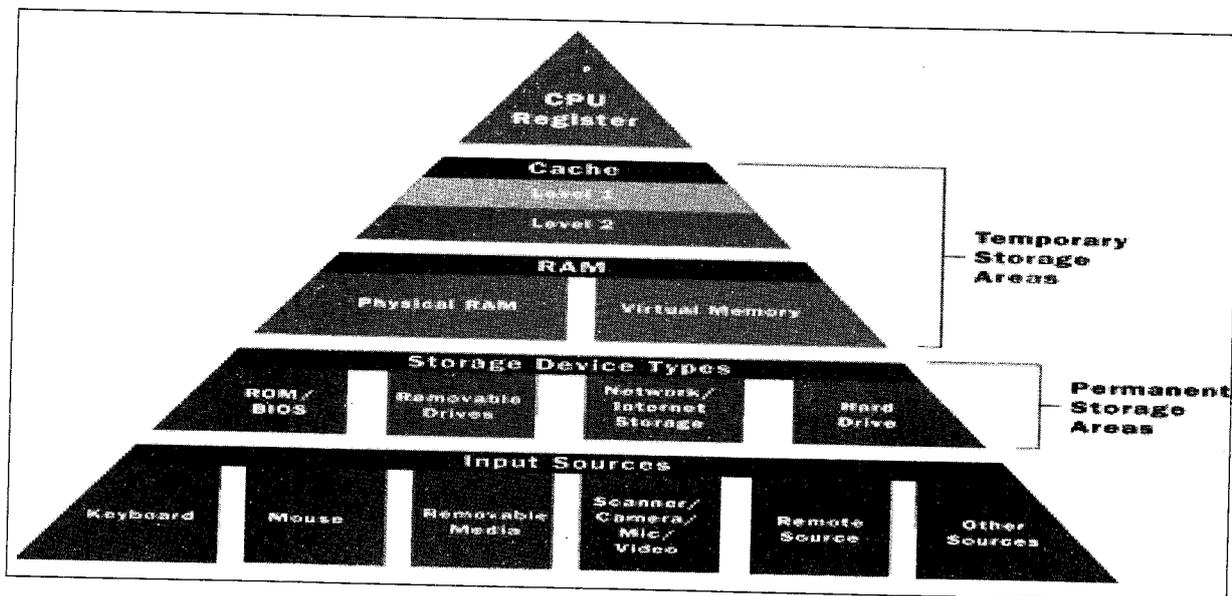
Flash memory is made in two forms: NOR flash and NAND flash. The names refer to the type of logic gate used in each storage cell. Flash memory is often used in MP3 players, digital cameras and mobile phones.

1.6.1 Virtual Memory

Virtual memory is a common part of most operating systems on desktop computers. It has become so common because it provides a big benefit to users at a very low cost.

Most computers today have something like 32 or 64 megabytes of RAM available for the CPU to use. Unfortunately, that amount of RAM is not enough to run all of the programmes that most users expect to run at once.

For example, if you load the operating system, an e-mail programme, a Web browser and a word processor into RAM simultaneously, 32 megabytes is not enough to hold it all. If there were no such thing as virtual memory, then once you filled up the available RAM your computer would have to say, "Sorry, you cannot load any more applications. Please close another application to load a new one." With virtual memory, what the computer can do is look at RAM for areas that have not been used recently and copy them onto the hard disk. This frees up space in RAM to load the new application.



Because this copying happens automatically, you don't even know it is happening, and it makes your computer seem like it has unlimited RAM space even though it only has 32 megabytes installed. Because hard disk space is so much cheaper than RAM chips, it also has a nice economic benefit.

Speed Concerns

The read/write speed of a hard drive is much slower than that of RAM, and the technology of a hard drive is not geared toward accessing small pieces of data at a time. If your system has to rely too

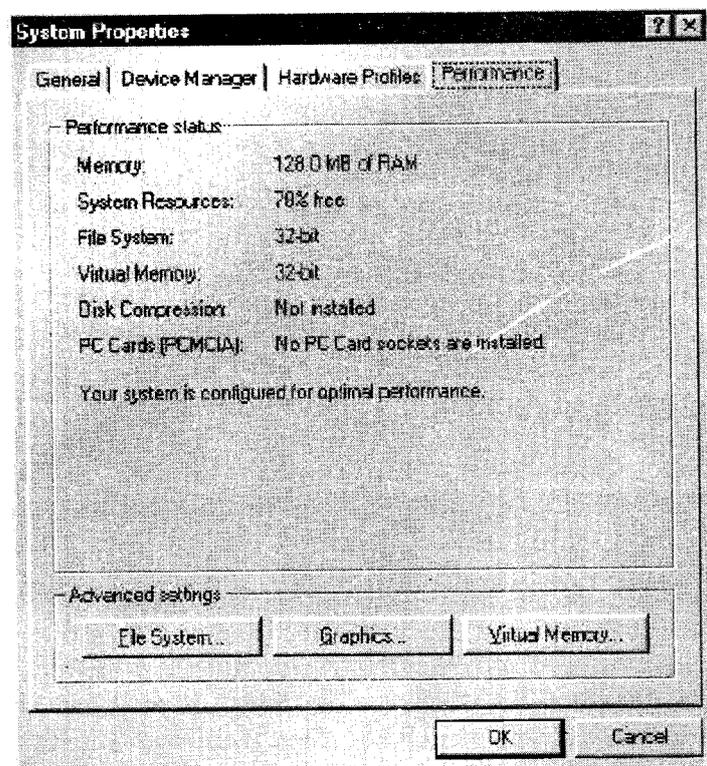
heavily on virtual memory, you will notice a significant performance drop. The key is to have enough RAM to handle everything you tend to work on simultaneously — then, the only time you “feel” the slowness of virtual memory is when there’s a slight pause when you’re changing tasks. When that’s the case, virtual memory is perfect. When this is not the case, the operating system has to constantly swap information back and forth between RAM and the hard disk. This is called thrashing, and it can make your computer feel incredibly slow.

The area of the hard disk that stores the RAM image is called a page file. It holds pages of RAM on the hard disk, and the operating system moves data back and forth between the page file and RAM. On a Windows machine, page files have a .SWP extension.

Configuring Virtual Memory

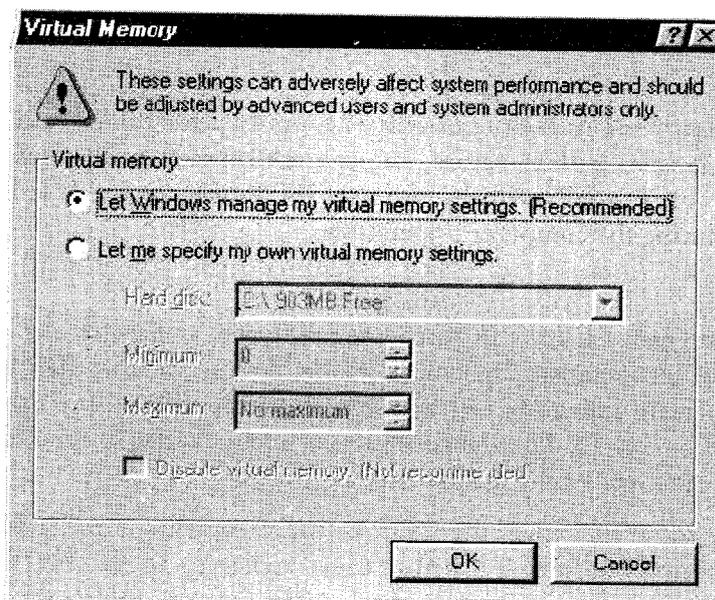
Take Windows 98 as an example of a typical operating system that has virtual memory. Windows 98 has an intelligent virtual memory manager that uses a default setting to help Windows allocate hard drive space for virtual memory as needed. For most circumstances, this should meet your needs. But you may want to manually configure virtual memory, especially if you have more than one physical hard drive or speed-critical applications.

To do this, open the “Control Panel” window and double-click on the “System” icon. The system dialog window will open. Click on the “Performance” tab and then click on the “Virtual Memory” button.



Click on the option that says, “Let me specify my own virtual memory settings.” This will make the options below that statement become active. Click on the drop-down list beside “Hard disk” to select

the hard drive that you wish to configure virtual memory for. Remember that a good rule of thumb is to equally split virtual memory between the physical hard disks you have.



In the “Minimum” box, enter the smallest amount of hard drive space you wish to use for virtual memory on the hard disk specified. The amounts are in megabytes. For the “C” drive, the minimum should be 2 megabytes. The “Maximum” figure can be anything you like, but one possible upper limit is twice the physical RAM space. Windows default is normally 12 megabytes above the amount of physical RAM in your computer. To put the new settings into effect, close the dialog box and restart your computer.

1.6.2 Memory Allocation

The amount of hard drive space you allocate for virtual memory is important. If you allocate too little, you will get “Out of Memory” errors. If you find that you need to keep increasing the size of the virtual memory, you probably are also finding that your system is sluggish and accesses the hard drive constantly. In that case, you should consider buying more RAM to keep the ratio between RAM and virtual memory about 2:1. Some applications enjoy having lots of virtual memory space but do not access it very much. In that case, large paging files work well.

One trick that can improve the performance of virtual memory (especially when large amounts of virtual memory are needed) is to make the minimum and maximum sizes of the virtual memory file identical. This forces the operating system to allocate the entire paging file when you start the machine. That keeps the paging file from having to grow while programmes are running, which improves performance. Many video applications recommend this technique to avoid pauses while reading or writing video information between hard disk and tape.

Another factor in the performance of virtual memory is the location of the page file. If your system has multiple physical hard drives (not multiple drive letters, but actual drives), you can spread the work among them by making smaller page files on each drive. This simple modification will significantly speed up any system that makes heavy use of virtual memory.

Main Memory Unit

The main memory, also known as the primary memory, is a part of the central processing unit and is a combination of both RAM (Random Access Memory) and ROM (Read Only Memory).

Random Access Memory

The random access memory is a read-write memory i.e. information can be read as well as written into this type of memory. It is volatile in nature, i.e., the information it contains is lost as soon as the system is shut down, unless it is 'saved' by the user for further usage. It is basically used to store programmes and data during the computer's operation.

RAM Basics

A memory chip is an Integrated Circuit (IC) made of millions of transistors and capacitors. In the most common form of computer memory, Dynamic Random Access Memory (DRAM), a transistor and a capacitor are paired to create a memory cell, which represents a single bit of data. The capacitor holds the bit of information - a 0 or a 1. The transistor acts as a switch that lets the control circuitry on the memory chip read the capacitor or change its state.

For dynamic memory to work, either the CPU or the memory controller has to come along and recharge all of the capacitors holding a 1 before they discharge. To do this, the memory controller reads the memory and then writes it right back. This refresh operation happens automatically thousands of times per second.

This refresh operation is where dynamic RAM gets its name. Dynamic RAM has to be dynamically refreshed all of the time or it forgets what it is holding. The downside of all of this refreshing is that it takes time and slows down the memory.

Memory cells are etched onto a silicon wafer in an array of columns (bitlines) and rows (wordlines). The intersection of a bitline and wordline constitutes the address of the memory cell.

DRAM works by sending a charge through the appropriate column (CAS) to activate the transistor at each bit in the column. When writing, the row lines contain the state the capacitor should take on. When reading, the sense-amplifier determines the level of charge in the capacitor. If it is more than 50 percent, it reads it as a 1; otherwise it reads it as a 0. The counter tracks the refresh sequence, based on which rows have been accessed and in what order. The length of time necessary to do all this is so short that it is expressed in nanoseconds (billionths of a second). A memory chip rating of 70ns means that it takes 70 nanoseconds to completely read and recharge each cell.

Memory cells alone would be worthless without some way to get information in and out of them. So the memory cells have a whole support infrastructure of other specialized circuits. These circuits perform functions such as:

- Identifying each row and column (row address select and column address select)
- Keeping track of the refresh sequence (counter)
- Reading and restoring the signal from a cell (sense amplifier)
- Telling a cell whether it should take a charge or not (write enable)

Other functions of the memory controller include a series of tasks that include identifying the type, speed and amount of memory, and checking for errors.

Static RAM uses a completely different technology. In static RAM, a form of flip-flop holds each bit of memory. A flip-flop for a memory cell takes four or six transistors along with some wiring, but never has to be refreshed. This makes static RAM significantly faster than dynamic RAM. However, because it has more parts, a static memory cell takes up a lot more space on a chip than a dynamic memory cell. Therefore, you get less memory per chip, and that makes static RAM a lot more expensive.

So static RAM is fast and expensive, and dynamic RAM is less expensive but slower. So static RAM is used to create the CPU's speed-sensitive cache, while dynamic RAM forms the larger system RAM space.

Memory Modules

Memory chips in desktop computers originally used a pin configuration called Dual Inline Package (DIP). This pin configuration could be soldered into holes on the computer's motherboard or plugged into a socket that was soldered on the motherboard. This method worked fine when computers typically operated on a couple of megabytes or less of RAM, but as the need for memory grew, the number of chips needing space on the motherboard increased.

The solution was to place the memory chips, along with all of the support components, on a separate Printed Circuit Board (PCB) that could then be plugged into a special connector (memory bank) on the motherboard. Most of these chips use a Small Outline J-lead (SOJ) pin configuration, but quite a few manufacturers use the Thin Small Outline Package (TSOP) configuration as well. The key difference between these newer pin types and the original DIP configuration is that SOJ and TSOP chips are surface-mounted onto the PCB. In other words, the pins are soldered directly to the surface of the board, not inserted in holes or sockets.

Memory chips are normally only available as part of a card called a module. You've probably seen memory listed as 8×32 or 4×16 . These numbers represent the number of the chips multiplied by the capacity of each individual chip, which is measured in Megabits (Mb), or one million bits. Take the result and divide it by eight to get the number of megabytes on that module. For example, 4×32 means that the module has four 32-megabit chips. Multiply 4 by 32 and you get 128 megabits. Since we know that a byte has 8 bits, we need to divide our result of 128 by 8. Our result is 16 megabytes!

The type of board and connector used for RAM in desktop computers has evolved over the past few years. The first types were proprietary, meaning that different computer manufacturers developed memory boards that would work only with their specific systems. Then came SIMM, which stands for single in-line memory module. This memory board used a 30-pin connector and was about $3.5 \times .75$ inches in size (about 9×2 cm). In most computers, you had to install SIMMs in pairs of equal capacity and speed. This was because the width of the bus is more than a single SIMM. For example, you would install two 8-megabyte (MB) SIMMs to get 16 megabytes of total RAM. Each SIMM could send 8 bits of data at one time, while the system bus could handle 16 bits at a time. Later SIMM boards, slightly larger at 4.25×1 inch (about 11×2.5 cm), used a 72-pin connector for increased bandwidth and allowed for up to 256 MB of RAM.

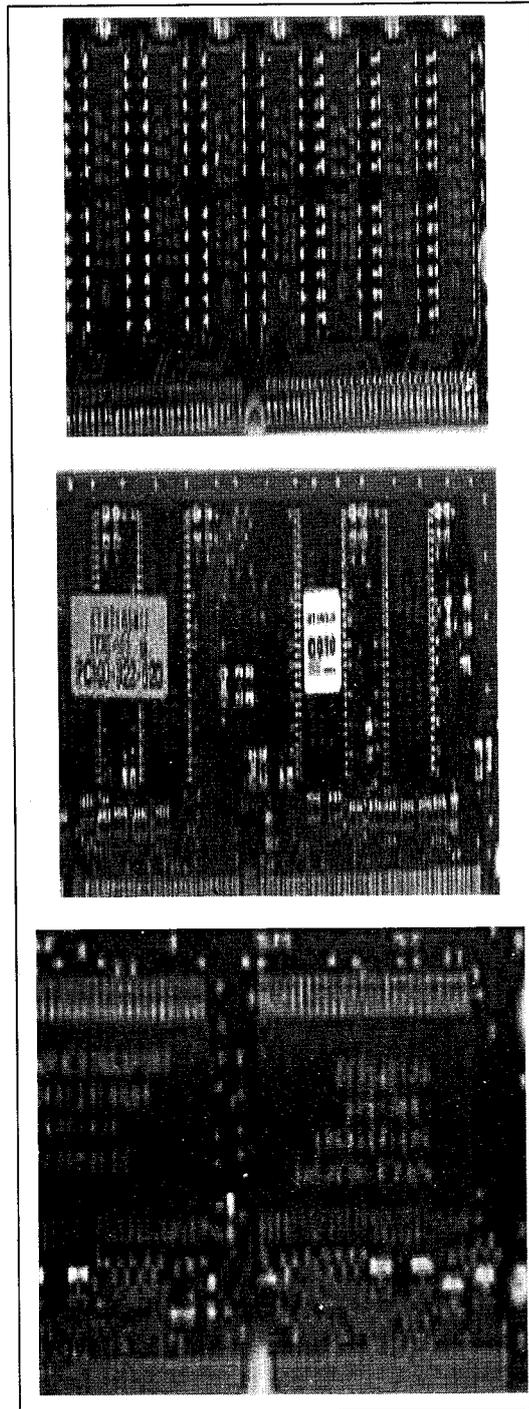


Figure 1.22: From the Top: SIMM, DIMM and SODIMM Memory Modules

Common Ram Types

- **SRAM:** Static Random Access Memory uses multiple transistors, typically four to six for each memory cell, but doesn't have a capacitor in each cell. It is used primarily for cache.

- **DRAM:** Dynamic Random Access Memory has memory cells each with a paired transistor and capacitor, requiring constant refreshing.
- **FPM DRAM:** Fast Page Mode Dynamic Random Access Memory was the original form of DRAM. It waits through the entire process of locating a bit of data by column and row and then reading the bit before it starts on the next bit. The maximum transfer rate to L2 cache is approximately 176 MBPS.
- **EDO DRAM:** Extended Data-out Dynamic Random Access Memory does not wait for the entire the processing of the first bit before continuing to the next one. As soon as the address of the first bit is located, EDO DRAM begins looking for the next bit. It is about five percent faster than FPM. The maximum transfer rate to L2 cache is approximately 264 MBPS.
- **SDRAM:** Synchronous Dynamic Random Access Memory takes advantage of the burst mode concept to greatly improve performance. It does this by staying on the row containing the requested bit and moving rapidly through the columns, reading each bit as it goes. The idea is that most of the time the data needed by the CPU will be in sequence. SDRAM is about five percent faster than EDO RAM and is the most common form in desktops today. The maximum transfer rate to L2 cache is approximately 528 MBPS.
- **DDR SDRAM:** Double Data Rate Synchronous Dynamic RAM is just like SDRAM except that it has higher bandwidth, meaning greater speed. The maximum transfer rate to L2 cache is approximately 1,064 MBPS (for DDR SDRAM 133 MHz).
- **RDRAM:** Rambus Dynamic Random Access Memory is a radical departure from the previous DRAM architecture. Designed by Rambus, RDRAM uses a Rambus In-line Memory Module (RIMM), which is similar in size and pin configuration to a standard DIMM. What makes RDRAM so different is its use of a special high-speed data bus called the Rambus channel. RDRAM memory chips work in parallel to achieve a data rate of 800 MHz, or 1,600 MBPS. Since they operate at such high speeds, they generate much more heat than other types of chips. To help dissipate the excess heat Rambus chips are fitted with a heat spreader, which looks like a long thin wafer. Just like there are smaller versions of DIMMs, there are also SO-RIMMs designed for notebook computers.
- **Credit Card Memory:** Credit card memory is a proprietary self-contained DRAM memory module that plugs into a special slot for use in notebook computers.
- **PCMCIA Memory Card:** Another self-contained DRAM module for notebooks, a card of this type is not proprietary and should work with any notebook computer whose system bus matches the memory card's configuration.
- **CMOS RAM:** CMOS RAM is a term for the small amount of memory used by the computer and some other devices to remember things like hard disk settings. This memory uses a small battery to provide it with the power it needs to maintain the memory contents.
- **VRAM:** VideoRAM, also known as MultiPort Dynamic Random Access Memory (MPDRAM), is a type of RAM used specifically for video adapters or 3-D accelerators. The “multiport” part comes from the fact that VRAM normally has two independent access ports instead of one, allowing the CPU and the graphics processor to access the RAM simultaneously. VRAM is located on the graphics card and comes in a variety of formats, many of which are proprietary. The amount of VRAM is a determining factor in the resolution and color depth of the display. VRAM is also used

to hold graphics-specific information such as 3-D geometry data and texture maps. True multiport VRAM tends to be expensive, so today, many graphics cards use SGRAM (synchronous graphics RAM) instead. The performance is nearly the same, but SGRAM is cheaper.

Read Only Memory (ROM)

The Read Only Memory contains non-volatile or permanent information. As the name suggests, the information contained in this type of memory can only be read; it cannot be altered or overwritten. Information is entered into the ROM chip at the time of manufacturing. ROM chips are used for applications which require a permanent information, for example, a programme for the functioning of the visual display unit, or a programme for controlling the working of a washing machine etc.

With the advent of technology, erasable ROMs have become available. We shall discuss these and other ROM's in the following section.

Types of ROM

- ***Programmeable Read Only Memory (PROM):*** A PROM program is used to record information in the PROM chip. Information once programmed into the PROM chip is permanent and cannot be changed or erased. The process of entering the information into the PROM chip is known as “burning the PROM.” PROM chips are seldom used in modern day computers, but they still find their use in devices where a permanent ROM is required.
- ***Masked Read Only Memory (MROM):*** In the masked ROM, the information is permanently recorded by the masking and metallization process. It is not easy to perform this process as a large infrastructure is required, and, therefore, it is usually the manufacturers who perform this process.
- ***Erasable Programmeable Read Only Memory (EPROM):*** An EPROM is an erasable PROM. An EPROM can be (re) programmed using an EPROM programmer. Exposing it to high intensity ultraviolet light for 30 minutes (approximately) can erase the contents of an EPROM chip. An ultraviolet source with a wavelength of 2537Å (angstrom) is used for this purpose. The process of changing the contents is not convenient, as the chip has to be removed from the board for exposure to the ultraviolet light source. Another disadvantage is that the user can't erase the contents of a single memory location, and the entire memory contents have to be erased. The EPROM chip is cheap, reliable and widely available.
- ***Electrically Erasable Programmeable Read Only Memory (EEPROM):*** EEPROM is an electrically erasable PROM. The use of electrical signals can alter the information, and so the chip need not be removed from the board. One major advantage that this chip has over the EPROM is that even a single memory can be altered, i.e., the entire memory need not be erased and reprogrammed, unless so required. The change in the contents of the EEPROM chip is made in milliseconds, which is much less than the erasing time for EPROM.
- ***Non-volatile RAM:*** A non-volatile RAM combines a static RAM and EEPROM. Such a device operates as normal RAM but, in case of power-failure, the entire contents of the RAM are stored in EEPROM. When the power is restored, the data from EEPROM is transferred back to the RAM.

The main memory is a fast memory, i.e., it has small access time. It is because of its limited capacity that it is fast. The main memory contains the programmes that are currently being worked on. It passes on this information to the control unit as and when required. In case, the CPU wants to access some data that is present in a secondary storage device, this data is first transferred to the main memory and then processed.

The main memory is for costlier than the secondary storage devices. Although the ROM IC's of various computers do not vary much in their capacities, the RAM chips are available in wide ranges of storage capacities. In fact, the capacity of the random access memory is an important specification of a computer.

A larger RAM means that larger programmes (in terms of memory) can be loaded and executed. Suppose you want to run a 68-KB programme on a machine with 64-KB. This means that the whole programme cannot be loaded into the main memory, at once resulting in either the non-execution of the programme or a very slow execution.

A 64-K memory means that there are approximately 64000 (65,536 to be precise) storage locations which can store 1 bit of data each.

Different memories can be classified on the basis of their concepts:

1. **Access Mode:** Which means how easily they are accessible.
2. **Access Time:** The average time required to reach a storage location and obtain its content is called access time.
3. **Transfer Rate:** The transfer rate is the number of characters or words that a device can transfer per second after it has been positioned at the beginning of the record.
4. **Capacity and Cost:** The capacity and cost may depend upon the requirement and the budget.

The main memory has a very low access time and a very high transfer rate. It is limited in capacity and costlier than secondary storage devices.

1.6.3 Cache Memory

The cache memory lies in the path between the processor and the main memory. The cache memory has lesser access time than the main memory and is faster than the main memory. A cache memory may have an access time of 100ns, while the main memory may have an access time of 700ns.

The cache memory is very expensive and is limited in capacity. Earlier, cache memories were available separately, but the latest microprocessors contain the cache memory on the chip itself.

The need for the cache memory arises because of the mismatch between the speeds of the main memory and the CPU. The CPU clock as discussed earlier is very fast, whereas the main memory access time is comparatively slower. Hence, no matter how fast the processor is, the processing speed depends more on the speed of the main memory (the strength of a chain is the strength of its weakest link). It is because of this reason that a cache memory, having access time closer to the processor speed, was introduced.

The cache memory stores the programme (or its part) currently being executed or which may be executed within a short period of time. The cache memory also stores temporary data that the CPU may frequently require for manipulation.

The cache memory works according to various algorithms, which decide what information it has to store. These algorithms work out the probability to decide which data would be most frequently needed. This probability is worked out on the basis of past observations.

1.7 STORAGE DEVICES

Primary memory (especially RAM) stores the data, instructions and information temporarily during processing by CPU. When the computer is switched off, this memory gets erased. How does a computer store the data, information and software permanently, so that they can be retrieved whenever required? Certainly, there must be some storage devices in the computer. Now, we will discuss about different Storage Devices, sometimes also called as Secondary Memory Devices.

There are many storage devices used with microcomputers. Some of the common storage devices are explained below and are shown in Figure 1.23.

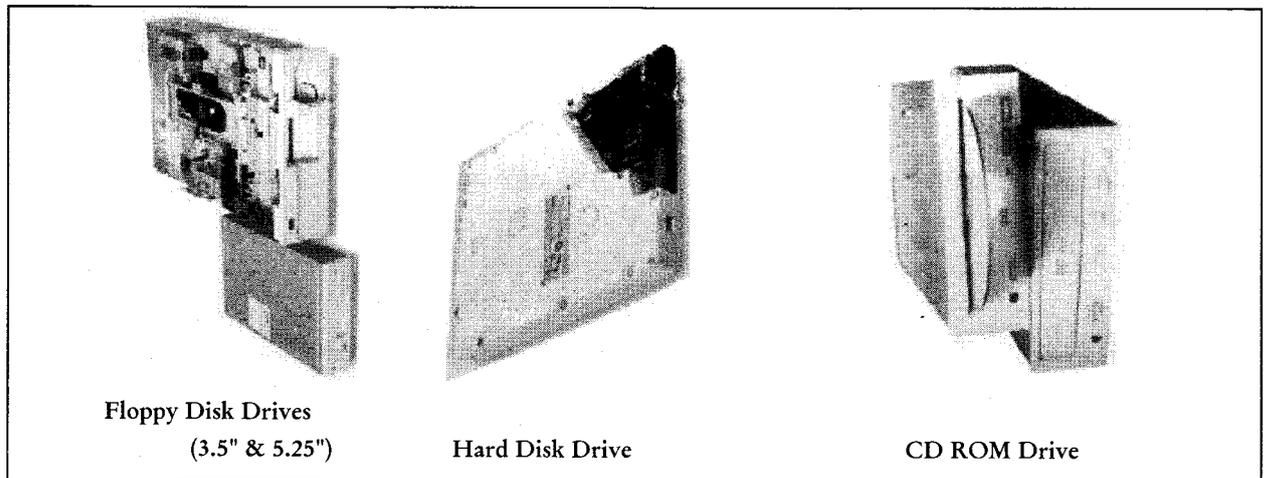


Figure 1.23: Common Storage Devices

Data is stored inside a computer in the memory. The storage capacity of a memory device is measured in the following units:

1 Nibble	= 4 bits
1 Byte	= 8 bits
1 Kilobyte (KB)	= 1024 Bytes (2^{10})
1 Megabyte (MB)	= 1024 KB
1 Gigabyte (GB)	= 1024 MB
1 Terabyte (TB)	= 1024 GB

These devices are non-volatile. The stored data remains there as long as not erased intentionally.

1.7.1 Magnetic Storage Devices

This type of storage device has a layer of coating of some magnetic substance on a rigid or flexible surface. The drive is equipped with a read-write head assembly that can convert the data and instructions represented in the form of 0 and 1 into some form of magnetic signal. These magnetic signals can then be stored on the medium.

- **Floppy disks:** Floppy disk was introduced by IBM. The first floppy disks used to be 8-inch in diameter. As it got smaller and smaller gradually it started being called diskette. Next smaller

diskette was 5.25-inch in diameter. These days 3.5-inch diameter diskettes having 1.44 MB storage space are most popular on microcomputers for storing data and programmes. You can easily calculate that as many as 400 pages of printed book can be stored on a single floppy disk.

A floppy disk is provided with a small sliding switch called write-protect notch. If this switch is on (that is when you can see through the whole from one side to another) nothing can be written on the disk. This facilitates data safety. If this switch is on your data cannot be deleted.

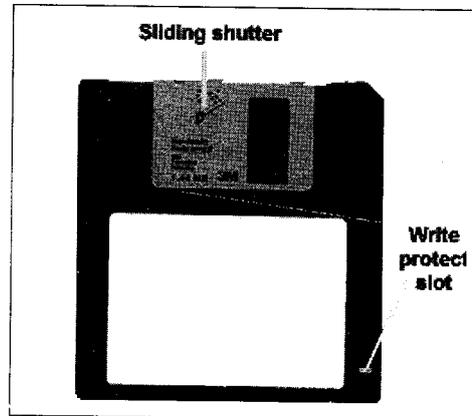


Figure 1.24: Floppy Disk

- **Hard disks:** Hard disks have existed since 1950s. Earlier they used to be 20 inches in diameter, holding just a few megabytes. Hard disks have hard platters that hold the magnetic medium, as opposed to the flexible plastic film found in tapes and floppies. A hard disk is able to store a large amount of information in a small space (usually 40GB). A hard disk can also access any of its information in a fraction of a second.

Unlike floppy disks hard disks are packed with the drive itself. A typical hard-disk drive looks like the one shown below.

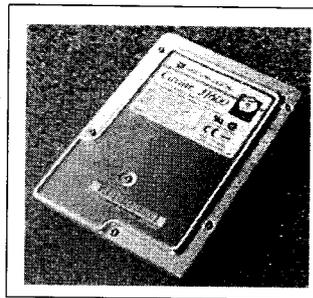


Figure 1.25: Hard Disk

Hard disks have very large capacity. They are thus used to store data and programmes that are very frequently used. Because of their fast speed they mostly act as active storage or online storage rather than backup storage.

Hard disk drives are fixed inside the computer casing and hence are not easily removable. They are not as portable as floppy disks are. However, some hard disks are detachable and can be inserted into a drive just like floppy disks.

Hard disks are very delicate and can easily get damaged if some pressure is applied on the drive. It can also get damaged if it suffers jerks when it is being carried from one place to another. It is also very sensitive to power fluctuations.

- **Magnetic tapes:** Magnetic tapes are similar to the tapes that you see in audio cassettes or video cassettes. Large computer systems use this medium for data storage purposes mostly as data backup. They are strictly sequential access media. Tapes are divided into tracks (usually 7 or 9 in number) running parallel to the length of the tape. One of the tracks is used to detect data transmission errors and to control them. Magnetic tapes can store as much as 10GB of data. It is reusable. You can erase it and rewrite new data. It has high data transfer rate and is yet cheap. However, the main disadvantage of a magnetic tape is that it allows only sequential access. The records cannot be easily updated and modified without copying them on another medium. Tapes are not long lasting and are very vulnerable to heat and magnetic disturbances.
- **Zip disks:** Zip disks are similar in looks to floppy disks. They are slightly bigger and thicker than floppy disks. On a Zip disk however, the magnetic coating is of much higher quality. The read/write head is significantly smaller than that of a floppy disk (by a factor of 10 or so). The smaller head, combined with a head positioning mechanism similar to that used in a hard disk enables a Zip drive to pack thousands of tracks per inch on the track surface. Zip drives also use a variable number of sectors per track to make the best use of disk space. All of these things combine to create a floppy disk that holds a huge amount of data.

Their capacity typically lies between 100MB and 250MB, making them ideally suited for backing up data and programmes from the hard disks.

1.7.2 Optical Storage Devices

In these types of storage media signals stored are in the form of light. 0's and 1's are converted into light information and is stored on the media by read-write head assembly of the driver. Conversely, while reading the disk, bit-pattern of 0's and 1's stored on it are generated.

- **CD-ROM:** CD-ROM stands for Compact Disk-Read Only Memory. It is an optical disk impressed with a series of spiral pits in a flat surface. A CD is burnt by high-intensity laser beams in bit-pattern form which can be read optically by laser.

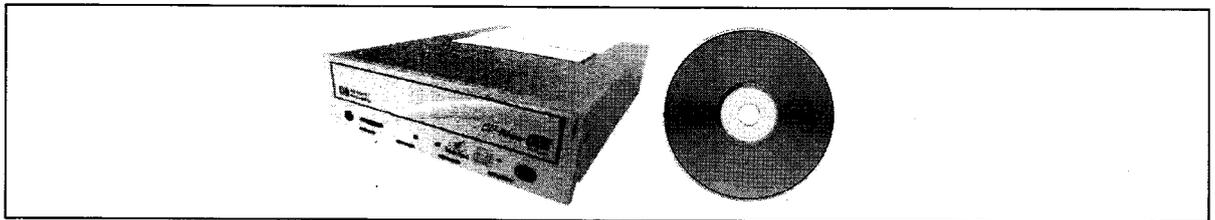


Figure 1.26: CD-ROM

The optical disk is a random access storage medium; information can be easily read from any point on the disk. A standard CD-ROM can store up to 650Mb of data, with 14,500 tracks per inch (tpi). That is equivalent in space to as many as 465 floppy disks! With this capacity, an entire encyclopedia can be stored on a CD. Not only text but animation, video and sound can also be stored.

Writing data and/or programmes on a CD is known as burning the CD. There are CDs on which data and programmes can be written only once but can be read any number of times. Such CDs are called write-once CDs. There are other CD-ROMs where information can be written onto them by the user. These are called read/writable CD-Rs and these are becoming a popular and cheap method for storage. With the help of CD-Writer (CDWR) drive you can use such disks again and again.

- **DVD-ROM:** DVD stands for Digital Versatile Disks. They look identical to a CD-ROM. However, DVD can store between 4.7GB and 17GB of data. They are used for storage of high quality video and audio applications. Movies are frequently stored on DVDs.
- **CD-Recordable:** CD-R (for compact disc, recordable) is a type of write once, read many (worm) compact disc (CD) format that allows one-time recording on a disc. The CD-R (as well as the CD-RW) format was introduced by Philips and Sony in their 1988 specification document, the Orange Book. Prior to the release of the Orange Book, CDs had been read-only audio (CD-Digital Audio, described in the Red Book), to be played in CD players, and multimedia (CD-ROM), to be played in computers' CD-ROM drives. After the Orange Book, any user with a CD recorder drive could create their own CDs from their desktop computers.
- **CD-Rewritable:** CD-RW (for compact disc, rewriteable) is a compact disc (CD) format that allows repeated recording on a disc. The CD-RW format was introduced by Hewlett-Packard, Mitsubishi, Philips, Ricoh, and Sony, in a 1997 supplement to Philips and Sony's Orange Book. CD-RW is Orange Book III (CD-MO was I, while CD-R was II). Prior to the release of the Orange Book, CDs had been read-only audio (CD-Digital Audio, described fully in the Red Book), to be played in CD players, and multimedia (CD-ROM), to be played in computers' CD-ROM drives. After the Orange Book, any user with a CD Recorder drive could create their own CDs from their desktop computers. CD-RW drives can write both CD-R and CD-RW discs and can read any type of CD.

Short for CD-Rewritable disk, a type of CD disk that enables you to write onto it in multiple sessions. One of the problems with CD-R disks is that you can only write to them once. With CD-RW drives and disks, you can treat the optical disk just like a floppy or hard disk, writing data onto it multiple times.

The first CD-RW drives became available in mid-1997. They can read CD-ROMs and can write onto today's CD-R disks, but they cannot write on normal CD-ROMs. This means that disks created with a CD-RW drive can only be read by a CD-RW drive. However, a new standard called MultiRead, developed jointly by Philips Electronics and Hewlett-Packard, will enable CD-ROM players to read disks create by CD-RW drives.

Many experts believe that CD-RW disks will be a popular storage medium until DVD devices become widely available.

- **Photo CD:** Photo CD is a system introduced by Kodak for digitizing and storing black and white or color negatives or transparencies on compact disks your computer can read. Each disk can hold about 100 high quality images.

You can have a Photo CD made from your film at the same time it is developed, or you can have a disk made from a collection of slides or cut negatives. The first method is more convenient and costs less per frame; the second method lets you choose the images you want scanned and usually

costs less overall. You can also have images appended to an existing Photo CD; this creates what is called a multisession disk.

Regardless of whether you start with a negative or a slide, your photographs are stored on the CD as positive images, and you can get excellent results from either. Kodak does not currently offer a service for scanning prints to Photo CD -- to do this you will either need a flatbed scanner or you will need to photograph the prints and send in the film to be developed and scanned.

Check Your Progress

Fill in the blanks:

- (a) Motherboard is called Board also.
- (b) Input devices are used to input data, information and instructions into the
- (c) Scanner is widely used in applications.
- (d) COM is a technique to produce output on a media.

1.8 LET US SUM UP

Hardware refers to the physical component of a computer. The hardware components are classified into 7 types – (i) Motherboard, (ii) Input Devices, (iii) Output devices, (iv) Storage Devices, (v) Cards, (vi) Ports and Cords and (vii) Powersupply. Motherboard contains mainly the CPU chip, memory chip, I/O interface, expansion slots and logic circuits. Keyboard and Mouse are the basic input devices of today's PC. Trackball, Light Pen, Touch Screen, Joystick, Digitizer, Scanner, Optical Character Reader (OCR), Bar Code Reader, and Voice Input Devices are the other input devices that are used for various special purposes. Monitor and Printer are the main output devices of a PC. There are many types of monitors primarily based either on the quality of output. Printers are also of many types depending upon their printing quality and speed. Plotter, another output device, is used to print high quality graphics and drawings. Computer Output Microfilm (COM) is also an output device which is used to produce output on a microfilm media. Winchester Disk (hard disk), Floppy Disk, Compact Disk (CD), Magnetic Disk, Video Disk and Magneto Optical (MO) Disk are the main storage devices of a computer. Cards, Cords and Ports are the other important hardware components. Powersupply is considered as the 'Heart' of a PC, because it provides the power source to a computer.

1.9 KEYWORDS

OCR: Optical Character Reader

CD: Compact Disk

MO: Magneto Optical

COM: Computer Output Microfilm

UPS: Uninterrupted Power Supply

CVT: Constant Voltage Transformer

1.10 QUESTIONS FOR DISCUSSION

1. Define hardware. Discuss, in brief, the classification of hardware components of a microcomputer.
2. What is a motherboard? Write the names of various components of motherboard.
3. Name the basic input devices of a PC and explain their functions in brief.
4. What is a trackball? How does it differ from mouse and joystick?
5. Name the input device used:
 - (a) to create drawings and pictures
 - (b) for digitizing photographs and documents
6. Explain the differences between CGA, EGA and SVGA monitors. Which of these monitors has the best quality display?
7. What is the difference between impact and non-impact printers? Classify the following category of printers as impact (I) or non-impact (N) printer and write their functions.
8. Explain the difference between character, line and page printers. Give examples.

Check Your Progress: Model Answer
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- | |
|---|
| <ol style="list-style-type: none">(a) System board(b) RAM(c) Desktop Publishing(d) Microfilm |
|---|

1.11 SUGGESTED READINGS

Ramesh Bangia, *Business Systems*, Laxmi Publication.

Robert J Thierauf, *Data Processing for Business and Management*, John Wiley & Sons.

Elias M. Awad, *Business Data Processing*, Prentice-Hall.

Gershon J. Wheeler, Donlan F. Jones, *Business Data Processing: An Introduction*, Addison-Wesley Pub. Co.

Barbara J. Burian, Stuart S. Fink, *Business Data Processing*, Prentice-Hall.

LESSON

2

COMPUTER SOFTWARE

CONTENTS

- 2.0 Aims and Objectives
- 2.1 Introduction
- 2.2 Explanation of Computer Software
 - 2.2.1 Definition
 - 2.2.2 Application
- 2.3 Basic Types of Software
 - 2.3.1 System Software
 - 2.3.2 Application Software
- 2.4 Operating System
- 2.5 Let us Sum up
- 2.6 Keywords
- 2.7 Questions for Discussion
- 2.8 Suggested Readings

2.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Define computer software
- Describe the basic types of software
- Explain the operating system

2.1 INTRODUCTION

A commercial organization performs various activities. The important ones among them include financial accounting, inventory control, and payroll. Most of these activities are carried out manually. As the dimensions of these activities increase, the organization may prefer to mechanize the activities to operate smoothly. Computer manufacturers have come to the rescue of business organizations. They have developed packages/programmes, for carrying out the activities like payroll preparation, inventory control, invoicing system, and financial accounting. This lesson discusses these four important computerized applications in detail.

When we consider the payroll problem, it is obligatory on the part of every employer to pay the wages to employees within a prescribed time limit. When the number of employees is large, it is preferred to have a computerized system of preparing the pay bills rather than manual ones. A computer software package on payroll thus becomes an integral part of a large business organization.

Similarly, financial accounting is another field where computerization can play an important role. The financial accounting package is one which helps the organization in preparing various financial reports, ledgers, and journals of monetary transactions. In a large production-oriented organization, it is essential to have a control over the investment in inventory of raw materials. A computerized inventory control system can reduce considerable amount of time in processing the data which is necessary to control inventory.

2.2 EXPLANATION OF COMPUTER SOFTWARE

Software can make a computer perform many tasks. Who creates software? Qualified and trained users create software. These users are called programmers. Programmers also use computers for creating programmes. They require tools for writing a programme, for converting the programmes into machine instructions and for executing the programmes.

The software that allows programmers to develop programmes and software is known as software development tool. These tools provide to the programmers ease of designing and developing software having desired functions. Some of the popular software development tools are - Visual Basic, Visual C++, Java, etc.

File Management Utilities

These utilities provide file management capabilities like copying, comparing, searching, listing and sorting the files. Although these features are offered by many operating systems, utility programmes provide better user-friendly environment along with some additional features. Norton Utilities (NU) and PC TOOLS are the most commonly used file management utilities.

Data Compression Utilities

These utilities compress or decompress files that are stored on floppy and hard disks. As compressed files take up very less space in disks, data compression utilities are widely used during copying of data from hard disk to floppy disks. PKZIP/PKUNZIP programmes are commonly used examples of data compression utilities.

Diagnostic Utilities

These utilities can detect bugs (errors in hardware/software) in computers. For instance, the problems of floppy and hard disks can easily be detected by a popular utility programme called Norton Disk Doctor (NDD). QAPLUS and Disk Manager (DM) are other examples of utilities that can detect and remove many bugs in storage devices, software and other components of computers.

Virus Detection and Removal Utilities

These utilities are used to detect and eradicate the different types of viruses. Before discussing their importance, let us first discuss, what is a Virus?

Virus is an unauthorised software that is used to invade and disrupt the normal working of computer. Like biological viruses, computer virus spreads from one computer to another generally through floppy disks. There are many problems caused by viruses like damage of data, loss of user interface, unexpected screen messages, system crashes etc. The potential problems caused by viruses in today's organisational computer systems are the worst. There are many types of viruses and their numbers is increasing day by day. The users and managers must take precautionary measures to control the spread of these viruses.

There are many utilities, such as Nashscan, SmartDog, Dr. Solomon's Anti-Virus Toolkit etc. that can detect and remove most of the viruses and are popularly called as Virus Scanners. These virus scanners must be upgraded from time to time for detection and removal of new viruses.

Text Editing Utilities

These utilities are used to create, edit and print the non-document texts such as programmes, data etc. Norton Editor (NE) is the most common example of text editor. Most operating systems, including DOS, also has inbuilt text editor programme.

Performance Monitoring Utilities

These utilities provide information about the efficiency of computer working. For instance, QAPLus, PC Tools and Norton Utilities provide performance monitoring capabilities by providing information about speed, storage capacity and other features of the system.

Spooling Utilities

In multi-user/networking environments, the input and output devices are generally slow. In such environment, the processing of computer is also slowed down. To control the computer from being slowed down, the spooling programmes are used. spooling (Simultaneous Peripheral Operations OnLine) programme is used to buffer data for the printer and remote batch terminals. This programme sends the output to the disk and printer does not interact with CPU during printing. Spooling utilities are used mainly in computer systems with multi-user/networking environment.

2.2.1 Definition

Software is a collection of computer programmes that allows the users to use the computer for a specific purpose. Without software the hardware can do nothing useful. No software no work! By creating appropriate software a computer may be made to do almost anything under its capability. Software, loaded into the primary memory, is lost the moment power supply to the memory is switched off. Therefore, software is usually stored on secondary storage devices so that you do not have to enter it into the computer's memory each time through an input device. *A software is a programme or set of instructions, which is required to use the computer.* Many types of software are available for various applications. The software development field is so advanced that day by day existing software are becoming outdated and new software are coming in the market. So, we must get aware of the latest developments in the software industry.

2.2.2 Application

Software that are required for general and special purpose applications like database management, word processing, accounting etc. are called *Application Software*. Some of the examples of application software are dBASE, Word Star, Tally etc. Application software are developed using system software

by Application Programmers. Application software can be further classified into following two types:

- (i) General Purpose Application Software (Database Management Packages, Word Processors, Spreadsheets etc.)
- (ii) Special Purpose Application Software (Accounting, Inventory, Production Management etc.)

2.3 BASIC TYPES OF SOFTWARE

Software can be classified on a number of different bases. On the basis of the purpose served, they can be classified as follows:

1. System software
2. Application software

2.3.1 System Software

All the hardware components are also referred to as hardware resources. System software is the collection of programmes that control the functioning of all the hardware resources directly. No computer hardware exists in operational condition unless it is equipped with system software.

System software is not directly visible to the users. Most of the system software automatically gets loaded into the main memory when the computer system is switched on.

The most important system software is an operating system. An operating system is system software that controls the functions of all the resources. Without this a user cannot do anything with a computer. Operating systems are responsible for getting commands or a programme from a user and getting it executed by the relevant hardware. You have to learn the commands of an operating system to interact with the computer running that operating system. It also controls the storage and retrieval of data and programmes to and from secondary storage devices. The relation between operating system, hardware and application software is shown in figure shown below:

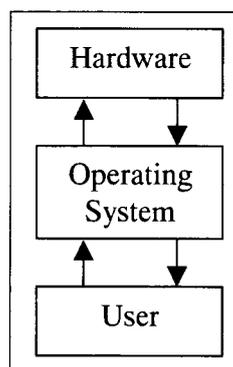


Figure 2.1: Relationships between Hardware and User

There are a number of operating systems available to the computer-users, these days. Some of the most popular ones for personal computers are:

- (i) **DOS (Disk Operating System):** DOS was the most popular operating system used on personal computers before the advent of Windows operating system. It was developed by Microsoft

Corporation for IBM (International Business Machines) Personal Computers (PCs) and IBM compatible computers. It was small in size and could be stored on a single floppy disk, thus the name. It has been now replaced with Windows operating system almost entirely. IBM created its own version of DOS later on. It was named PC-DOS to differentiate it from Microsoft's version of DOS which is subsequently known as MS-DOS.

- (ii) **Windows:** This operating system was also developed by Microsoft Corporation. It has become the most popular operating system on personal computers. The most important feature of this operating system is that it uses Graphical User Interface (GUI). In GUI system, the tasks are represented as small icons. Using a pointing input device like a mouse, a user can select a task and execute it by clicking at it. The earliest version of this user-friendly operating system was Microsoft Windows 3.0 released in early 90s, Windows was well taken by the personal computer community. Since then the Windows has undergone a number of revisions resulting in Windows 3.1, Windows 95, Windows 98, Windows NT to the latest versions Windows 2000 and Windows XP. This has been done in order to cater to the emerging computing environments and increasing needs.
- (iii) **OS/2:** This operating system was designed for more powerful microcomputers.
- (iv) **Macintosh:** This operating system has been developed for Apple computers. It has very user-friendly and powerful GUI.
- (v) **UNIX:** This is a multi-user, multi-processing and multi-tasking operating system. It is very popular with bigger computers like mini computers.
- (vi) **LINUX:** This operating system was developed based on UNIX. It is available to the user for free. It is very useful for website development and hosting on the Internet. It has very rich and powerful set of networking functions.

If installed on a computer, operating systems load automatically into the memory once the computer is started without any intervention from the users. This process is called bootstrapping or booting.

2.3.2 Application Software

Computer is a general purpose machine. It implies that if you load appropriate software the computer can play a song, can let you play games, can allow you to print salary details of employees of a company, and so on.

The software that instructs the computer to perform some specific set of tasks pertaining to one application is known as application software. There are wide varieties of application software available in the market. For each purpose there are many application software. You have to install these software on a machine on the top of the operating system to get it up and running.

Some of the most frequently used application software are:

- **Word processor:** Word processing is a set of activities involving writing letters and documents, editing them and printing them. The software, which allows you to carry out these activities on a computer, is known as word processor. Microsoft Word, Ami Pro, Word Star, Soft Word are some popular word processing software packages.
- **Spreadsheets:** Engineers, researchers and managers have to make lot of calculations. They use a large sheet of paper divided into cells or boxes. They write the figures into these cells and make

further calculations based on these figures. Each time they make any change in one cell they have to update all other cells with the current result. Such a sheet is known as spreadsheet. An application software that allows the users to use a computer like a spreadsheet is known as spreadsheet software. Some popular spreadsheet software packages are Microsoft Excel and Lotus-123.

- **Database management systems:** Organizations have lots of information to record and maintain. They also have to perform calculations and processing on the stored information. A collection of large volume of systematically organized data is known as database. A database needs management continuously. An application software that allows the users to use a computer for database management is known as database management system. Microsoft Access, Dbase, FoxBase, FoxPro, Oracle, Sybase, DB2, Focus, Ingress, Microsoft SQL Server are some of the most popular database management systems.
- **Graphics packages:** A lot of artwork and drawing are nowadays done using computers. An application-software that allows one to draw and manipulate images is known as graphics software. Graphics-software helps users manipulate visual images. CorelDraw and Adobe Photoshop are very popular graphics software packages.
- **Communication software:** Computers are playing a very important role in communication. Through the Internet you can send and receive e-mails. Cellular phones use computers at the back-end extensively. An application-software that allows one to carry out electronic communication through computer is known as communication software.

A user can send and receive e-mails using software called e-mail client. An online e-mail client allows accessing mails only when connected to the Internet while an off-line e-mail client lets the users read e-mails even when not connected to the Internet. Microsoft Outlook Express, Organizer, Eudora Lite, etc., are a few very popular e-mail clients.

It is clear, therefore, that a computer can function differently according to the software running on it. For a user, a computer is nothing but the software running on it!

2.4 OPERATING SYSTEM

The usage of an operating system with respect to a computer can easily be compared to the usage of the heart with respect to the human body. Without operating system a computer is simply of no use. The visible part of an operating system is the Graphical User Interface (GUI) – and yet most of what an operating system does is invisible.

Computer hardware provides us with the means of processing and storing information. However, the 'bare' machine on its own is virtually useless. In order to make the computer perform useful work for us, it has to be 'driven' by means of programmes-software which specify the tasks to be done. The combination of hardware and software provide a total usable system.

The lesson covers most of the basic topics of operating systems. A brief idea about the operating system is discussed along with the different types of operating systems like serial processing, simple batched system, multiprogrammed batched system, time sharing system etc.

You know a computer does not do anything without properly instructed. Thus, for each one of the above power-on activities also, the computer must have instructions. These instructions are stored in a

non-volatile memory, usually in a ROM. The CPU of the computer takes one instruction from this ROM and executes it before taking next instruction. ROMs are of finite size. They can store only a few kilobytes of instructions. One by one the CPU executes these instructions. Once, these instructions are over, the CPU must obtain instructions from somewhere. Where these instructions stored and what are their functions?

Usually these instructions are stored on a secondary storage device like hard disk, floppy disk or CD-ROM disk. These instructions are collectively known as operating system and their primary function is to provide an environment in which users may execute their own instructions. Once the operating system is loaded into the main memory, the CPU starts executing it. Operating systems run in an infinite loop, each time taking instructions in the form of commands or programmes from the users and executing them. This loop continues until the user terminates the loop when the computer shuts down.

In order to exploit the most from a computer, therefore, a deep understanding of operating system is a must.

Role

An operating system manages all aspects of a complex system.

Imagine what will happen if three programmes running on a computer all try to print their output simultaneously on the same printer. The first few lines might be from programme one and the next few lines might be from programme two and so on with the result resulting in chaos. The operating system can bring order to potential chaos by buffering all the output destined for the printer on the disk.

The primary task of operating system is to keep track of who is using which resource, to grant resource request, to account for usage, and to mediate conflicting request from different programmes and users.

When a computer has multiple users, the needs for managing and protecting the memory, input/output devices and other resources are vary necessary. These needs arise because it is usually necessary to share expensive resource such as tapes drives and phototypesetters.

Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

For large systems, the operating system has even greater responsibilities and powers. It is like a traffic cop – it makes sure that different programme and users running at the same time do not interfere with each other. The operating system is also responsible for security, ensuring that unauthorized users do not access the system.

An operating system performs the following services for applications:

1. In a multitasking system where multiple programmes are run at the same time, the operating system determines which applications should run in what order and how much time should be allowed for each application before another application gets its turn.
2. It sends messages to each application or interactive user (or to a system operator) about the status of operation and any errors that may have occurred.

3. It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports.
4. It arranges the sharing of internal memory among multiple applications.
5. It can off-load the management of what are called batch jobs (for example, printing) so that the initiating application is freed from this work.
6. In computers that can provide parallel processing, an operating system manages to divide the instructions of a programme so that it runs on more than one processor at a time.

Other Operating System Functions

The operating system provides for several other functions including:

1. System tools (programmes) used to monitor computer performance, debug problems, or maintain parts of the system.
2. A set of libraries or functions which programmes may use to perform specific tasks especially relating to interfacing with computer system components.

The operating system makes these interfacing functions along with its other functions operate smoothly and these functions are mostly transparent to the user.

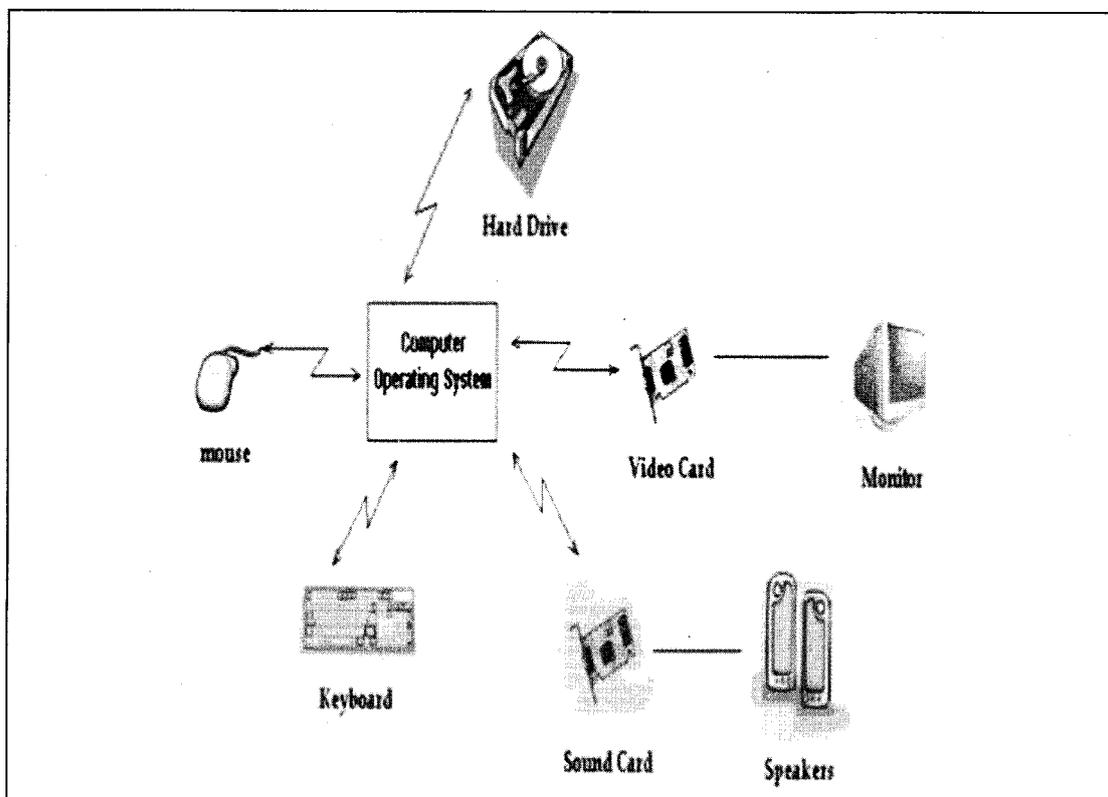


Figure 2.2: Interface of an Operating System

Check Your Progress

Fill in the blanks:

- (i) Software can make a computer perform many
- (ii) The software that allows programmers to develop programmes and software is known as tool.
- (iii) System software is not directly to the users.
- (iv) Computer hardware provides us with the means of and storing information.

2.5 LET US SUM UP

Software can make a computer perform many tasks. Who creates software? Qualified and trained users create software. These users are called programmers. Software is a collection of computer programmes that allows the users to use the computer for a specific purpose. All the hardware components are also referred to as hardware resources. System software is the collection of programmes that control the functioning of all the hardware resources directly. Computer is a general purpose machine. It implies that if you load appropriate software the computer can play a song, can let you play games, can allow you to print salary details of employees of a company, and so on. The usage of an operating system with respect to a computer can easily be compared to the usage of the heart with respect to the human body.

2.6 KEYWORDS

System software: It is the collection of programmes that control the functioning of all the hardware resources directly.

Application software: The software that instructs the computer to perform some specific set of tasks pertaining to one application is known as application software.

OS/2: This operating system was designed for more powerful microcomputers.

Macintosh: This operating system has been developed for Apple computers. It has very user-friendly and powerful GUI.

2.7 QUESTIONS FOR DISCUSSION

1. Explain the definition and need of computer software. Discuss the two types of computer software.
2. What is operating system? Explain its different types.
3. Differentiate between system software and application software.
4. Discuss various application software used most frequently.

Check Your Progress: Model Answer

- (i) Tasks
- (ii) Software development
- (iii) Visible
- (iv) Processing

2.8 SUGGESTED READINGS

D. Bharioke, *Fundamentals of IT*, Excel Books

V. Rajaraman, *Fundamentals of Computer*, Prentice Hall of India.

UNIT II

LESSON

3

DOS

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 - 3.6.2 Renaming a File
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- 3.13 Questions for Discussion
- 3.14 Suggested Readings

3.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss the various DOS commands
- Describe the internal commands and external commands

3.1 INTRODUCTION

DOS was developed by Microsoft primarily as a single user operating system working on Personal Computers. From 1981 till now many versions starting from Ver 1.0 till 6.2 have been released. Each successive version had its enhancements aimed at improving the management of the computer resources available to the users.

As has been explained earlier, it is essential for the operating system programmes to be resident in the memory of the computer. The process of loading these programmes into the memory is termed as Booting the computer. In DOS, these programmes are MSDOS.SYS, IO.SYS and COMMAND.COM. However MSDOS.SYS and IO.SYS are hidden programmes and cannot be seen in the Directory listing.

Loading of these programmes is done either by inserting the systems floppy (the floppy containing the above three programmes) in the floppy drive and switching on the computer. The loader programme resident in the ROM reads these programmes and loads all the instructions in the memory. The screen of the monitor displays the A prompt (A:\>), thereby signalling to the user that the computer is ready to be used.

Alternatively, if the system is not available, the computer can be booted from the hard disk.

The only difference is that the screen will now show the C prompt (C:\>) instead of the A prompt.

In order to load the DOS files from Floppy to Hard Disk the following command is used:

```
A:> SYS A: C:
```

If one needs to make a system Floppy from the Hard Disk the DOS command used is:

```
C:> SYS C: A:
```

3.2 DOS DRIVES

Under Microsoft's DOS operating system and its derivatives drives are referred to by identifying letters. Standard practice is to reserve "A" and "B" for floppy drives. On systems with only one floppy drive DOS permits the use of both letters for one drive, and DOS will ask to swap disks. This permits copying from floppy to floppy or having a programme run from one floppy while having its data on another. Hard drives were originally assigned the letters "C" and "D". DOS could only support one active partition per drive. As support for more hard drives became available, this developed into assigning the active primary partition on each drive letters first, then making a second pass over the drives to allocate letters to logical drives in the extended partition, then making a third, which gives the other non-active primary partitions their names. (Always assumed, they exist and contain a DOS-readable filesystem.) Lastly, DOS allocate letters for CD-ROMs, RAM disks and other hardware. Letter assignments usually occur in the order of the drivers loaded, but the drivers can instruct DOS to

assign a different letter. An example is network drives, for which the driver will assign letters nearer the end of the alphabets.

Because DOS applications use these drive letters directly (unlike the/dev folder in Unix-like systems), they can be disrupted by adding new hardware that needs a drive letter. An example is the addition of a new hard drive with a primary partition to an original hard drive that contains logical drives in extended partitions. As primary partitions have higher priority than the logical drives, it will change drive letters in the configuration. Moreover, attempts to add a new hard drive with only logical drives in an extended partition would still disrupt the letters of RAM disks and CD-ROM drives. This problem persisted through the 9x versions of Windows until NT, which preserves the letters of existing drives until the user changes it.

3.3 DIRECTORIES

In the DOS environment, each disk is organised into directories. Each Directory holds files. The default directory is the Root Directory and contains the minimum DOS Files. The Root Directory has no name in the DOS terminology.

The Root Directory cannot show more than 132 files in its directory listing.

Today's computing environment consists of using various computer languages and packages in order to satisfy our computing needs. If all these packages, languages and associated data, programme files etc. are kept together in the same directory, file managing and handling becomes extremely inefficient. In order to tackle this inefficiency, DOS allows users to create subdirectories within the Root Directory and within subdirectories as well.

3.3.1 Commands to Create a Directory

In order to create a directory named DEEP in the Root Directory, type in the following command:

```
C:\> MD\DEEP
```

or type

```
C:\> MKDIR\DEEP
```

3.3.2 Changing your Working Directory

In order to work with files in the directory DEEP type the following command:

```
C:\> CD\DEEP
```

3.3.3 Removing a Directory

To remove a directory, please ensure that the directory is empty and enter the command:

```
C:\> RD\DEEP
```

3.3.4 DIR Command

This command enables us to view the contents of a directory.

```
C:\> DIR - This gives a complete listing of files and directories.
```

C:\>DIR/P - This command pauses the directory listing at every screen.

C:\>DIR/W - This command shows the listing width-wise on the screen.

3.4 FILES

The most common requirement of a computer user are commands to manage his files. DOS has a naming convention for all files which states that:

Files can have names upto 8 characters. This can be followed by a (.)dot and an extension of upto 3 characters. However, special characters like commas, slashes, blanks etc. are not allowed in a file name. Hence

MYFILE is a valid file name.

MYFILE.BAK is a valid file name.

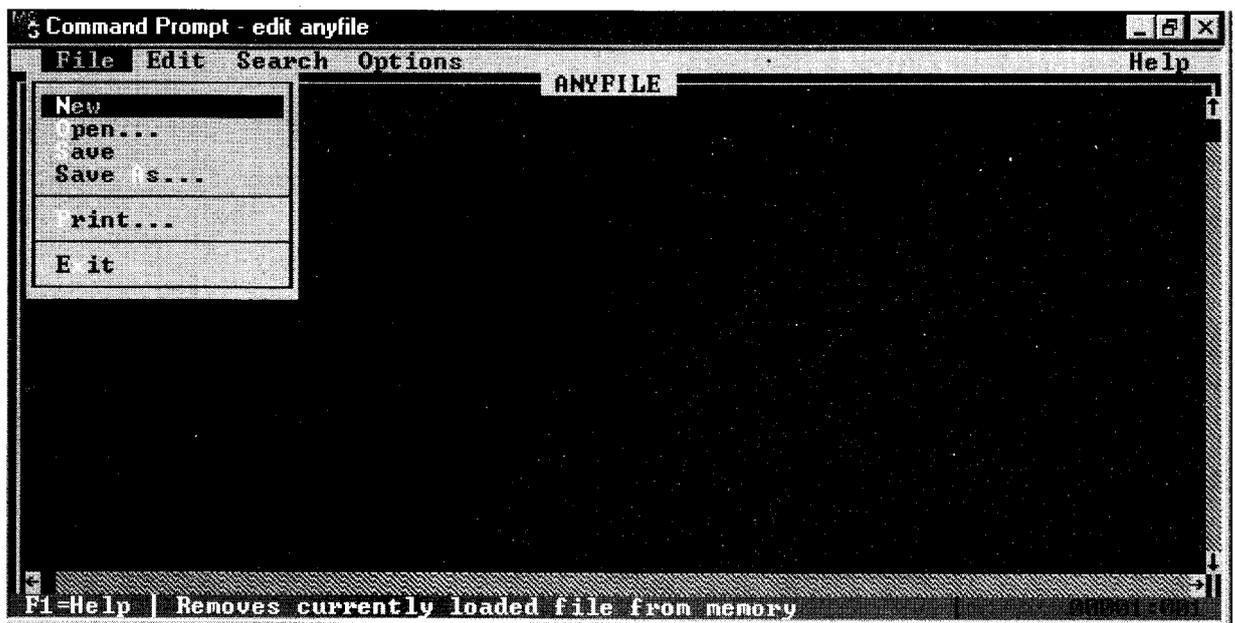
MY FILE is invalid because a blank space has been given.

MY,FILE is invalid because of the comma.

3.4.1 Creating a File using Editor

DOS has an inbuilt editor which allows you to create a file. In order to create a file named ANYFILE enter the command

C:\DOS> EDIT ANYFILE



DOS will present a screen as shown above. You can then enter your programme or text in the box and exit out of the editor by using the ALT+F key and then press X.

3.4.2 Commands to Copy Files

C:\> COPY ANYFILE A: (This command will copy the file named ANYFILE in the Root Directory to a Floppy)

C:\> COPY ANYFILE \DEEP (This command will copy the file ANYFILE from the Root Directory to the DEEP directory.)

3.5 WILD CARDS

DOS supports two wild cards '?' and '*', which allow you to specify whole groups of file names. The '?' stands for any single character in their specified position within the file name and the '*' stands for any set of characters, starting at the specified position within the name and extension and continuing till the end of the filename or extension.

For example, DIR A:??001.* will list all files having any character values in the first two position of the filename followed by 001 and any three characters in the extension.

C:\> COPY *.* A: COMMAND will copy all files in the Root Directory on to a floppy.

3.6 DOS COMMANDS

3.6.1 ATTRIB Command

C:\> ATTRIB -R ANYFILE : This command is used for making your file ANYFILE as read and write, i.e. you can both read as well as write from and to the file.

The following notations can be used with the ATTRIB command:

- +R : Makes the file read only
- +H : Suppresses the file in the directory listing, i.e. makes it hidden
- H : Unhides the previously hidden file
- +A : Changes file settings to Archived
- A : Changes file settings to not archived
- +S : Marks file as DOS system file
- S : Removes DOS system file setting

3.6.2 Renaming a File

C:\> RENAME ANYFILE MYFILE

This command allows us to rename the file named ANYFILE to MYFILE.

3.6.3 Deleting a File

C:\> DEL ANYFILE

The above command will delete the file named ANYFILE.

Erase can also be used to delete files.

3.6.4 DELTREE Command

If you wish to remove unwanted directories and their contents (files and subdirectories) use the DELTREE command.

```
C:\>DELTREE C:\deep
```

3.6.5 Printing on Screen

```
C:\>TYPE ANYFILE
```

This command will output the contents of the file ANYFILE on the screen. However, it will pause at the end of the text. As a result, you will not be able to view the total contents. In order to view screen by screen, use the Piping feature of DOS.

3.6.6 Piping

If you desire to reprocess the output obtained from a DOS command by another DOS command then one way to do this is to redirect the output to a disk file and then send the contents of the file as input to the next command.

However, DOS allows you a more convenient method in which you can combine multiple commands on a single line. This technique is called piping and uses the pipe character | to combine the DOS commands.

For instance, in the previous example if we wished to pause at every screen to view our output, we would enter the following command:

```
C:\> TYPE ANYFILE| MORE
```

MORE forces DOS to display output one screen at a time.

3.6.7 Redirection Options in DOS

Output can be redirected to various devices by using the > symbol for output and < symbol for input.

Standard target device names are as under:

CON	The screen or console
PRN	The default printing device
LPT1	Parallel printer port
COM1	Communication serial port 1
COM2	Communication serial port 2
AUX	Auxiliary output device
NUL	Null device (Suppresses output from device)

```
C:\> TYPE MYFILE >PRN
```

The above command will redirect output of the screen to the printer.

3.7 SOME DISK COMMANDS

3.7.1 Format Command

Formatting or initializing floppy or disk is the technique of creating tracks and sectors on the floppy which are ultimately used for reading and writing data from and to the floppy. The command provided by DOS for this important task is as follows:

C:\> FORMAT A: Formats the floppy in drive A.

C:\> FORMAT A:/S Formats the floppy and also transfers the systems files to the floppy.

3.7.2 Scandisk Command

C:\> SCANDISK /ALL

This command available in DOS 6.2 version analyses and repairs logical and physical disk errors. If DOS version is lower than 6.2 use CHKDISK/F command instead.

3.8 CONFIG.SYS FILE

This is a user defined file in DOS and contains additional information for the operating system regarding the environment in which the user desires to work. For instance a config.sys file may contain the following DOS commands:

DEVICE = \DOS\HIMEM.SYS

FILES = 100

BUFFERS = 40

DOS = HIGH

The device command tells DOS to look for extended memory. DOS would, by default, assume that your computer has the primary conventional memory of 640 KB only. However, HIMEM.SYS will check for extra memory.

The FILES command tells DOS that upto 100 files can be open at a given point of time. Otherwise the default of 8 files is applied by DOS.

DOS=HIGH tells DOS to load the operating system files in upper memory area leaving the conventional memory area free for applications which require more of conventional memory.

When the computer is booted, the operating system first reads the CONFIG.SYS file in order to configure the environment before bringing up the C prompt.

3.9 AUTOEXEC.BAT FILE

This is also a user defined file, which contains DOS commands to be executed before the user actually starts his session on the computer. For instance, if the user desires that the computer should check for any viruses on his hard disk the following command should be written in the AUTOEXEC.BAT file.

MSAV C:

We have so far discussed some of the very common and necessary commands and files of the disk operating system which must have given you an idea of the DOS environment & which must have illustrated some important features of DOS. We shall now discuss the commands.

3.10 INTERNAL AND EXTERNAL COMMANDS

DOS commands can be divided into two categories:

1. **Internal commands:** Internal commands are those commands that can be entered once the DOS prompt is available, i.e., they do not need any special files for their execution. For example

```
A: / > CD \DOS
```

is an internal command that changes the directory.

2. **External commands:** External commands are those commands that need separate files, containing their source codes, to invoke them. The external commands basically are accessories to the operating system that increase its extensibility.

```
A: /DOS > FORMAT C:
```

The above command would format the drive C. The file FORMAT.EXE should be present in the DOS directly of drive A: for the command to be executed as desired.

Given below are some of the common commands with their function and syntax.

Break

Type: Internal command.

Function: When the 'BREAK' command is invoked, (i.e., BREAK ON), the computer checks to see if Ctrl.C would stop the execution of the current DOS command.

Syntax: BREAK ON or OFF.

CD

Type: Internal command.

Function: The CD command is used to the change the directories which may be on the same or other drives.

Syntax: CD drive:\path.

CHKDSK

Type: External Command.

Function: The CHKDSK command analyses, diagnoses and optionally corrects comman hard disk errors. CHKDSK can also be made to work on a specific file to check whether it is contiguous (stored in adjacent areas of the disk) or noncontiguous (scattered over separate areas of the disk).

Syntax: CHKDSK drive:\path\file\switches.

CLS

Type: Internal command

Function: The CLS command clears the screen and only the operating system prompt on the top left corner is displayed.

Syntax: CLS

Copy

Type: Internal command

Function: As the name suggests the copy command is used to copy files from one destination to another.

Syntax: COPY source_drive:\path\file(s) target_drive:\path\file(s).

CTTY

Type: Internal command

Function: The CTTY command redirects a console input or output to a distant input/output device (eg. printer).

Syntax: CTTY device-name.

Suppose the device is the printer connected to LPT1. The appropriate command would be.

CTTY LPT1

Date

Type: Internal command.

Function: If the DATE command is used without any parameters, DOS displays the current system date & prompts the user to enter another. If after the DATE command, the date is included, DOS changes the date.

Syntax: DATE date.

DBLSPACE

Type: External commands.

Function: The DBLSPACE command is used to compress the data files. It can also be used to compress the entire drive. The DBLSPACE has very vast applications which are beyond the scope of this book.

Syntax: DBLSPACE/Switches drive:

DEFRAG

Type: External command.

Function: The DEFRAG command is used to arrange the files in contiguous sectors. Files become fragmented over a period of time. Hence, the DEFRAG command should be periodically used to increase the performance of the system

Syntax: DEFRAG drive:/Switches.

DEL (ERASE)

Type: Internal command.

Function: The DEL command is used to delete files.

Syntax: DEL drive\path\file(s)/switches

ERASE drive:\path\file(s)/switches

DELTREE

Type: External command.

Function: the DELTREE command is used to remove an unwanted directory, plus all files on it, and all subdirectories nested below it, in a single command.

Syntax: DELTREE/switch drive:\path.

DIR

Type: Internal command.

Function: The DIR command displays a list of files in a directory. The DIR command without parameters displays the list of files in the currently logged drive and subdirectory.

Syntax: DIR drive:\path\file(s)/switches.

DISKCOMP

Type: External command

Function: The DISKCOMP command compares the contents of two floppy disks on a track to track basis, reporting which track numbers are not identical.

Syntax: DISCOMP source; target:/switches.

DISCOPY

Type: External command

Function: The DISCOPY command copies the contents of one floppy disk to another on a track to track basis.

Syntax: DISCOPY source: target:/switches.

DOSHELP

Type: External command

Function: The DOSHELP command provides instant help to the user when invoked.

Syntax: DOSHELP Command

or

Command /?

When executed instant help is provided on the 'Command Name' entered.

DOSkey

Type: External Command.

Function: Once invoked the DOSKEY command introduces a special buffer space in which the DOS commands being entered are stored. Each time a command is entered it is added to the DOSKEY's Command buffer. These commands can be recalled.

Syntax: DOSKEY.

EDIT

Type: External Command.

Function: The EDIT command provides a text editor for the editing of text files or batch files.

Syntax: EDIT drive:\path\file/switches.

FC

Type: External command

Function: The FC command matches the contents of two files or sets of files and reports the differences between them.

Syntax: FC/switches drive:\path\file(s) drive:\path\file(s)

FDISK

Type: External Command.

Function: The FDISK command is used to partition the hard disk. This command should be used on a formatted hard disk, otherwise it may erase or overwrite the existing files.

Syntax: FDISK/switch.

Find

Type: External Command.

Function: The FIND command is used to find all occurrences of a specified character string in a file. This command is case-sensitive, i.e., it distinguishes between upper case and lowercase letters.

Syntax: Find/switches "string" drive:\path\file.

FORMAT

Type: External Command.

Function: The FORMAT command prepares a blank disk for storing, or creates a new blank disk from a used one. In other words, the disk is formatted.

Syntax: FORMAT targetdrive:/switches.

HELP

Type: External Command.

Function: The HELP command is synonymous to the DOSHELP command. It displays the syntax summary of the command name entered.

Syntax: HELP Command.

KEYB

Type: External Command.

Function: This command when invoked loads a non-standard keyboard configuration into memory.

Syntax: KEYB keyboard codepage drive:\path\library file.

The Library file usually is KEYBOARD.SYS

LABEL

Type: Internal Command.

Function: Every disk has the option of having a volume label which can be used for its identification. The LABEL command adds or modifies the volume label.

Syntax: LABEL target: Labelname.

MD

Type: Internal Command.

Function: The MD command is used for creating a new directory or subdirectory.

Syntax: MD drive:\path directoryname.

MK DIR can also be used in place of MD.

MEM

Type: External Command.

Function: The MEM command displays the information on the allocation of the random access memory.

Syntax: MEM/switches.

MORE

Type: Internal Command.

Function: The MORE command when used displays the output one screen at a time instead of continuous scrolling. The MORE command is used to display the contents of a data file or to display the output of a programme.

Syntax: MORE < drive:\path\file(s)

or

Command (parameters) | MORE

For eg.,

MORE < STUDENT.TEXT

or

TYPE STUDENT.TXT | MORE

Move

Type: Internal Command.

Function: The Move Command Moves files from one location to another. This command is quite identical to the copy command the only difference being that the source files remain intact in the case of the copy command while they are deleted in the case of the Move command.

Syntax: Move Source:\path\file(s) target:\path\file(s)

MSAV

Type: External Command.

Function: The MSAV (Microsoft anti-virus) command scans the memory for the presence of computer viruses.

Syntax: MSAV drive:\path\switches

NLSFUNC

Type: External Command

Function: The NLSFUNC command when invoked loads national language support functions which allows the user to switch to international character set tables in RAM.

Syntax: NLSFUNC drive:\path\country file

PATH

Type: Internal Command

Function: The path command searches in a list of subdirectories (specified in its syntax) for executable programme files.

Syntax: PATH drive:\path1; drive\path2

For Example,

PATH C:\DIR1 ; C:\DIR2

would look for all executable files on DIR1 & DIR2 subdirectories.

PROMPT

Type: Internal Command

Function: The PROMT Command is used to change the appearance of the Dos prompt.

Syntax: PROMPT prompt starting

The prompt may one or a combination of the following:

\$ \$ Dollar Sign (\$)

\$b Piping Symbol (I)

\$d Current date

\$g Greater than symbol (>)

\$\	Less than symbol (<)
\$q	Equal sign (=)
\$t	Current time
\$v	DOS version number
\$p	Currently logged drive and directory
\$n	Current drive
\$e	Escape character

RD

Type: Internal Command

Function: The RD Command is used to remove directories. The directory to be removed should be empty.

Syntax: N drive:\path\country file

RMDIR can also be used in place of RD.

Rename or REN

Type: Internal Command.

Function: The REN command is used to change the file names.

Syntax: REN drive:\path\oldfilename drive:\path\newfilename

RENAME can be used in place of REN.

Replace

Type: External Command.

Function: The REPLACE command is used to replace and files with new files of the same name. This command is used update data files.

Syntax: REPLACE source:\path\file(s) target:\path\switches.

The above statement replaces the files in the target directory with that of the source directory.

Sort

Type: Internal Command.

Function: The SORT command sorts data in character based files or sorts the output of DOS commands.

Syntax: SORT/Switches < drive:\path\file.

or

Command : SORT/Switches.

for eg.

TYPE STUDENT.TEXT : SORT

Time

Type: Internal Command.

Function: The TIME command is used to display or change the system time.

Syntax: TIME (displays the current system time)

TIME hh:mm:ss a/p

a & p stand for a.m. or p.m.

Tree

Type: Internal Command.

Function: The TREE command displays the subdirectory structure of a drive.

Syntax: TREE drive:\path/switches.

Type

Type: Internal Command.

Function: The TYPE command displays the contents of a file.

Syntax: TYPE drive:\path\file

The following statement.

TYPE STUDENT.TXT > PRN directs the output to the printer.

UNDELETE

Type: External Command.

Function: As the name suggests the UNDELETE command is used to UNDELETE files that have previously is not always successful in recovering the deleted files. A file may be undeleted if the disk area it occupied has not been overwritten by another file.

Syntax: UNDELETE drive:\path\file(s)/Switches

UNFORMATED

Type: External Command.

Function: The UNFORMAT command is used to recover files which were lost when the disk was formatted.

Syntax: UNFORMAT drive:/switches.

VER

Type: Internal Command.

Function: The VER command displays the version number of DOS.

Syntax: VER.

VOL

Type: Internal Command.

Function: The VOL command displays the volume label of the disk.

Syntax: VOL drive

Not all the commands have been covered, due to the scope of the book. We have tried to cover the most commonly used commands.

Check Your Progress

1. What are wild cards?
2. Define piping.

3.11 LET US SUM UP

In the DOS environment, each disk is organised into directories. Each Directory holds files. The default directory is the Root Directory and contains the minimum DOS Files.

The most common requirement of a computer user are commands to manage his files. DOS has a naming convention for all files which states that:

Files can have names upto 8 characters. This can be followed by a (.)dot and an extension of upto 3 characters. However, special characters like commas, slashes, blanks etc. are not allowed in a file name.

DOS supports two wild cards '?' and '*', which allow you to specify whole groups of file names. The '?' stands for any single character in their specified position within the file name and the '*' stands for any set of characters, starting at the specified position within the name and extension and continuing till the end of the filename or extension.

DOS commands can be divided into two categories - (1) Internal commands and (2) External commands.

3.12 KEYWORDS

DOS: It was developed by Microsoft primarily as a single user operating system working on Personal Computers.

Wild Cards: DOS supports two wild cards '?' and '*', which allow you to specify whole groups of file names.

Piping: DOS allows you a method in which you can combine multiple commands on a single line. This technique is called piping.

3.13 QUESTIONS FOR DISCUSSION

1. Explain the directory structure of DOS with examples.
2. What is the difference between a file and a directory?
3. Explain the naming conventions used by DOS.
4. What are wildcards? Explain by giving appropriate examples.
5. Differentiate between the internal and external commands of DOS by giving suitable examples.

6. What is a batch file? What is the difference between a simple batch file and an AUTOEXEC.BAT file?
7. Differentiate between the COPY, XCOPY and DISKCOPY commands with suitable examples.
8. Write down the steps to create a batch file. Create a batch file with name MOHIT.BAT to do the following steps:
 - (a) To copy all the files from the floppy disk to hard disk.
 - (b) To give a listing of all the files present on hard disk.
 - (c) To delete all the files present on the floppy disk.
9. Which of the following are valid file names:
 - (a) % # \$. abc
 - (b) Letters.doc
 - (c) Comprehend.a
 - (d) Lyrics.Path
 - (e) 999.53
10. Write the commands:
 - (a) To create a directory letters on the hard disk.
 - (b) To create another directory by the name zone on the floppy disk.
 - (c) To go to the root directory.
 - (d) To display the name of the currently active directory.
 - (e) To show the listing of files under the root directory (both pagewise as well as widthwise).
 - (f) To remove all the files with any primary name and extension CAT.
 - (g) To create a directory planner and copy all the files from the root directory to this directory.
 - (h) To show all the files having an extension EXE?
 - (i) To create a text file by the name MYFILE.
 - (j) To rename the file MYFILE as WONDER.
 - (k) To copy the file *Wonder* from the root directory to the directory PLANNER.
11. Explain the importance of following commands with suitable examples:
 - (a) CHKDSK
 - (b) DISKCOPY
 - (c) LABEL
 - (d) FORMAT
 - (e) XCOPY

Check Your Progress: Model Answer

1. DOS supports two wild cards '?' and '*', which allow you to specify whole groups of file names. The '?' stands for any single character in their specified position within the file name and the '*' stands for any set of characters, starting at the specified position within the name and extension and continuing till the end of the filename or extension.
2. If you desire to reprocess the output obtained from a DOS command by another DOS command then one way to do this is to redirect the output to a disk file and then send the contents of the file as input to the next command. However, DOS allows you a more convenient method in which you can combine multiple commands on a single line. This technique is called piping and uses the pipe character | to combine the DOS commands.

3.14 SUGGESTED READINGS

Sanjeev Gupta and Shameena Gupta, *Computer Aided Management (Using MS-Office 2003 Tools)*, Excel Books.

Manoj Kumar, M. Shamir Bhudookan, *Information Technology for 'O' Level*, Editions De L'Ocean Indien.

Joseph W. Habraken, *Microsoft Office 2003 All-In-One*, Que Publishing.

Jennifer Ackerman Kettell, Guy Hart-Davis, Curt Simmons, *Microsoft Office 2003: The Complete Reference*, McGraw-Hill Professional.

Laurie Ann Ulrich, *How to Do Everything with Microsoft Office 2003*, McGraw-Hill Professional.

LESSON

4

GRAPHICAL USER INTERFACE

CONTENTS

- 4.0 Aims and Objectives
- 4.1 Introduction: User Interface
- 4.2 Graphical User Interface (GUI)
- 4.3 Character User Interface (CUI)
- 4.4 Let us Sum up
- 4.5 Keywords
- 4.6 Questions for Discussion
- 4.7 Suggested Readings

4.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss the graphical user interface and its features
- Explain the character user interface and its features

4.1 INTRODUCTION: USER INTERFACE

In information technology, the User Interface (UI) is everything designed into an information device with which a human being may interact – including display screen, keyboard, mouse, light pen, the appearance of a desktop, illuminated characters, help messages, and how an application programme or a Web site invites interaction and responds to it. In early computers, there was very little user interface except for a few buttons at an operator's console. The user interface was largely in the form of punched card input and report output.

Later, a user was provided the ability to interact with a computer online and the user interface was a nearly blank display screen with a command line, a keyboard, and a set of commands and computer responses that were exchanged. This command line interface led to one in which menus (list of choices written in text) predominated. And, finally, the Graphical User Interface (GUI) arrived, originating mainly in Xerox's Palo Alto Research Center, adopted and enhanced by Apple Computer, and finally effectively standardized by Microsoft in its Windows operating systems.

The user interface can arguably include the total "user experience," which may include the aesthetic appearance of the device, response time, and the content that is presented to the user within the context of the user interface.

4.2 GRAPHICAL USER INTERFACE (GUI)

We have discussed the role of an operating system in managing the operations of a computer. Most microcomputers use DOS as an operating system. Although DOS is essential to operate a computer, but the user interface with DOS is not user-friendly. In order to operate the computer, one must learn DOS commands. The user is expected to memorise all DOS commands and understand their correct syntax (rules for writing statements of a language). Therefore, only DOS environment is not considered sufficient for running present day applications on PCs. Most of the present day applications related to management and other fields need a graphics-based user interface that is easy to operate. Such a graphics based user interface, that incorporates pull down menus and icons (small pictorial representations of files, programmes, storage devices etc.) is known as *Graphical User Interface*. For example, as we have discussed earlier, the operating system of Mac PCs provide graphical user interface (GUI). In IBM-compatible PCs, GUI is provided by an operating environment/ system - 'Windows'.

Windows is the most popular system software, that provides graphical user interface. Windows provides an interface, which is similar to the Macintosh user interface. In such interface, each active application is displayed in a window on the screen as shown in Figure 4.1. The application window can be closed, opened, hided, displayed, moved, resized, minimised or maximised. The user can run several applications simultaneously, each in its own window. Windows allow the user to share data among different applications. Windows provides an interactive environment, where the user is engaged in continuous dialog with the computer. In windows, although both keyboard and mouse are used as input device, the mouse is the primary tool for selecting and running window applications.

Features

- when you are allowed to work with any pointing device like mouse..
- it can use graphical images to executes commands...
- easy to access..
- easy to understand..
- works in windows..
- its slow compare to DOS...
- more memory requirment...
- expensive,high speed components required...
- it can use keyboard,mouse..
- GUI is not linked to computer itself usually linked with
- os or a programme...
- more then one task can run at a time..
- its based on graphics...

- user controls the flow of actions...
- eg. Windows...

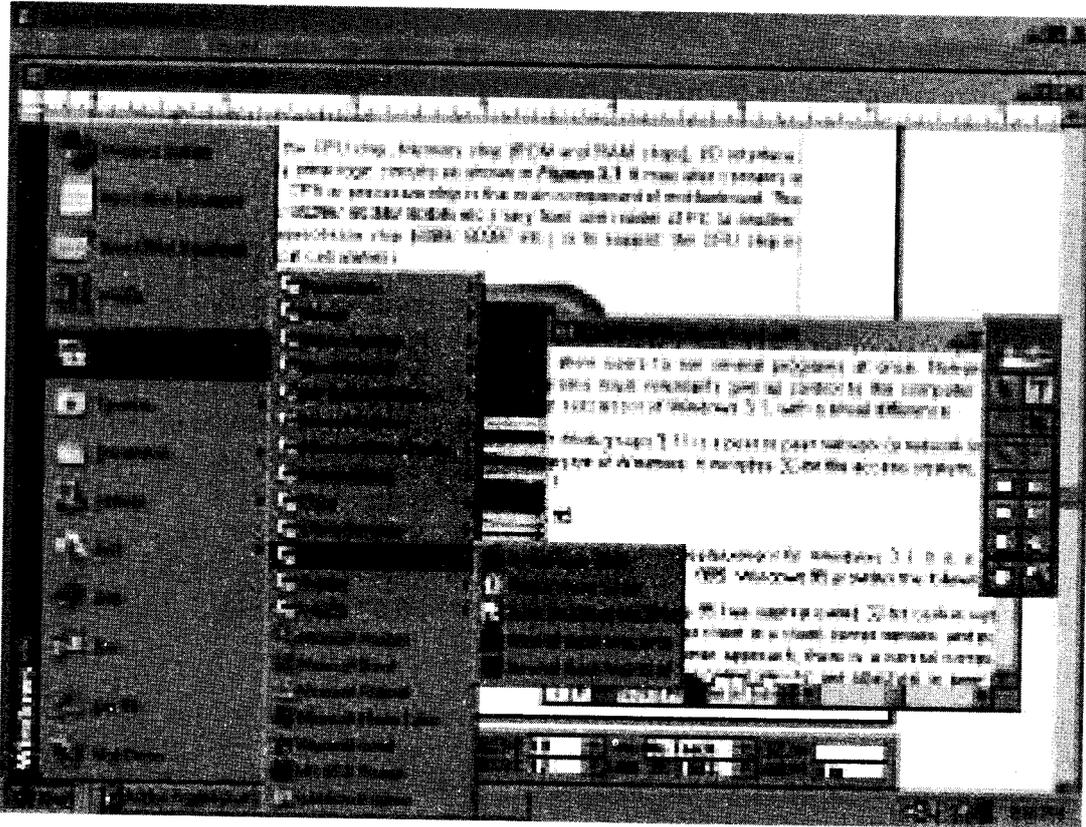


Figure 4.1: A Window Screen showing many Active Applications

The different versions of windows are Windows 1.x, Windows 2.x, Windows 3.0, Windows 3.1, Windows 3.11, Windows for Workgroups 3.11, Windows 95, Windows 98 and Windows NT. Windows 1.x, 2.x and 3.0 were the earlier attempts from Microsoft, Inc. for creating graphical user interface but were not very successful. Windows 3.1 and higher versions provide powerful and multifeatured GUI capabilities. Windows NT may appear to you user same as Windows 3.1, but it is based on entirely a different concept. Therefore, we have already discussed about Windows NT in our discussions on 'Types of Operating Systems'.

Mac OS

Mac OS is a series of graphical user interface-based operating systems developed by Apple Inc. (formerly Apple Computer, Inc.) for their Macintosh line of computer systems. The Macintosh user experience is credited with popularizing the graphical user interface. The original form of what Apple would later name the "Mac OS" was the integral and unnamed system software first introduced in 1984 with the original Macintosh, usually referred to simply as the System software.

Window 3.x

Windows 3.1 is generally misunderstood as an operating system, but actually it is not an operating system. Windows 3.1 is a graphics-based operating environment that replaces the DOS interface. In order to run Windows 3.1, DOS must be installed on the computer. Windows 3.1 has all the basic

features of other GUIs. It also provides non-preemptive multitasking features, which allow users to run several programmes at once. Non-preemptive multitasking means the programmes must voluntarily give up control to the computer for getting their turn. Windows 3.11 is the successor of Windows 3.1, with a trivial difference.

Windows for Workgroups 3.11 is a peer to peer network (a network in which any computer can be server) version of Windows. It includes 32-bit file access system, which is not provided by Windows 3.11.

OS/2 Warp

OS/2 is a single-user, multi-tasking operating system, developed jointly by IBM and Microsoft. This provides a unique feature of multitasking, where several programmes can be run simultaneously. OS/2 was the first operating system that provided users with a Graphical User Interface.

Although Windows 2000 was originally intended to provide a robust OS/2 operating environment, the success of Microsoft Windows led to a change; during the early development of Windows 2000, the Windows environment became the default. Consequently, Windows 2000 provides only limited facilities in the OS/2 environmental subsystem. OS/2 1.x character-based applications can run only on Windows 2000 on Intel x86 computers. Real-mode OS/2 applications can run on all platforms by using the MS-DOS environment. Bound applications, which have dual code for both MS-DOS and OS/2, run in the OS/2 environment unless the OS/2 environment is disabled.

Window NT

Windows NT (New Technology) is the single user 32-bit multi-tasking operating system for 386s and above, developed by Microsoft Inc. Windows NT was driven by a need to exploit the tremendous power of 32-bit microprocessors and runs applications, which are developed for DOS and Windows.

Device Drivers

The device driver is the software that operates the controller. A device driver, or software driver is a computer programme allowing higher-level computer programmes to interact with a computer hardware device.

A driver typically communicates with the device through the computer bus or communications subsystem to which the hardware is connected. When a calling programme invokes a routine in the driver, the driver issues commands to the device. Once the device sends data back to the driver, the driver may invoke routines in the original calling programme. Drivers are hardware-dependent and operating-system-specific. They usually provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface.

A driver acts like a translator between the device and programmes that use the device. Each device has its own set of specialized commands that only its driver knows. In contrast, most programmes access devices by using generic commands. The driver, therefore, accepts generic commands from a programme and then translates them into specialized commands for the device.

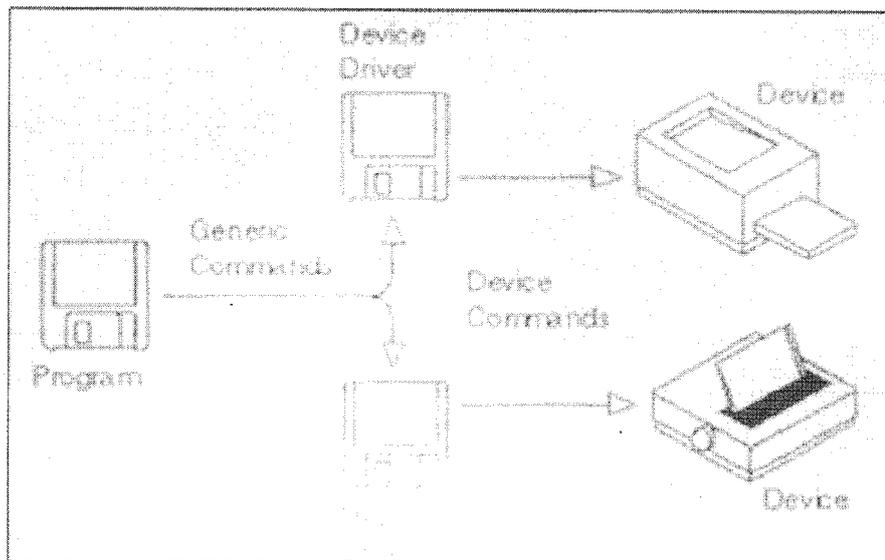


Figure 4.2: Diagram of Device Driver

4.3 CHARACTER USER INTERFACE (CUI)

Character User Interface or CUI is like Graphical User Interface which is used for the Input and Output of the Data in the computer, except in the GUI apart from text there are also graphical contents present, in CUI there is only use of text typed one after another just as commands used in MS DOS.

Features

- anything where you are allowed to work only with keyboard
- user requires commands...
- its difficult to remember all commands..
- its only in black nd white machine..
- works in DOS..
- DOS is fast compare to windows...
- memory requirment less...
- its cheap compare to GUI...
- it can only use keyboard..
- it can linked directly...
- one task can run at a time..
- its totally based on text...
- programmer controls the flow of actions...
- eg. DOS...

Check Your Progress

Fill in the blanks:

- (i) is the most popular system software, that provides graphical user interface.
- (ii) Windows 3.1 is a graphics-based operating environment that the DOS interface.
- (iii) The device driver is the software that operates the.....

4.4 LET US SUM UP

The user interface can arguably include the total "user experience," which may include the aesthetic appearance of the device, response time, and the content that is presented to the user within the context of the user interface. A set of programme design concepts has evolved over the past three decades. Although the degree of interest in each concept has varied over the years, each has stood the test of time. Windows is the most popular system software, that provides graphical user interface. Windows provides an interface, which is similar to the Macintosh user interface. In such interface, each active application is displayed in a window on the screen. The application window can be closed, opened, hided, displayed, moved, resized, minimised or maximised. Character User Interface or CUI is like Graphical User Interface which is used for the Input and Output of the Data in the computer, except in the GUI apart from text there are also graphical contents present, in CUI there is only use of text typed one after another just as commands used in MS DOS.

4.5 KEYWORDS

GUI: Graphical User Interface

CUI: Character User Interface

4.6 QUESTIONS FOR DISCUSSION

1. What is the difference between GUI and CUI?
2. What are device drivers?
3. Discuss the various features of graphical user interface.
4. Write short note on the following:
 - (i) Mac OS
 - (ii) OS/2 Warp

Check Your Progress: Model Answer

- (i) Windows
- (ii) Replaces
- (iii) Controller

4.7 SUGGESTED READINGS

D. Bharioke, *Fundamentals of IT*, Excel Books

V. Rajaraman, *Fundamentals of Computer*, Prentice Hall of India.

UNIT III

LESSON

5

DESKTOP

CONTENTS

- 5.0 Aims and Objectives
- 5.1 Introduction
- 5.2 My Computer
- 5.3 Network Neighbourhood
- 5.4 Recycle Bin
- 5.5 Taskbar
- 5.6 Start Button
- 5.7 Running Programmes
 - 5.7.1 Top Down Design
 - 5.7.2 Bottom up Design
 - 5.7.3 Hybrid Approach
- 5.8 Windows 95
- 5.9 Let us Sum up
- 5.10 Keywords
- 5.11 Questions for Discussion
- 5.12 Suggested Readings

5.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Describe the desktop, my computer, network neighbourhood, etc.
- Define running programmes
- Discuss windows 95 features

5.1 INTRODUCTION

By starting your computer you automatically load the Windows XP operating system. The first thing you see is the Desktop.



The Desktop is the main entrance to the resources stored on your computer and beyond. This desktop metaphor is the basis for all screen displays and processing activities under the control of Windows.

The following table lists the names of the icons that appear on the Windows Desktop. The desktop is a folder on your hard disk, just like any other. It's located under your windows directory (usually `c:\windows\desktop`), and can contain files, folders and shortcuts. The desktop is a good place to store newly downloaded files from the Internet, email attachments and other recent files. Depending on how your computer is set up, various items appear on your desktop when you start Windows. Listed below are six important ones:



5.2 MY COMPUTER

The My Computer icon represents your computer. To open the My Computer window, double-click on its icon. The My Computer window contains icons that look like disk drives connected to your computer. There are also three folders which provide access to the Control Panel, Printers, and Dial-Up-Networking.

Use My Computer when you want to view the contents of a single folder or disk. A disk is a device, such as a hard disk or floppy disk, on which you can store files. When you double-click My Computer on your desktop, icons representing the available drives appear in a new window. When you double-click a drive icon, a window displays the folders contained on that drive. You can then double-click an icon to open the folder or file.

Some of the following icons may appear in the My Computer window.

Double-click	To
	View the contents of the floppy disk, which is usually designated as A.
	View the contents of the hard disk, which is usually designated as C.
	View the contents of a network drive, if your computer is connected to one.
	View the contents of a compact disc in the CD-ROM drive, if your computer has one.
	View features you can use to modify your computer settings.
	Set up a printer and view information about available printers and print job status.
	Schedule or view tasks for computer maintenance.
	View the contents of a folder.
	View files and folders on a Web server, if your computer is connected to one.

5.3 NETWORK NEIGHBOURHOOD

Double-click this icon to see available resources on the network, if your computer is connected to one. (A network is a group of two or more computer systems linked together). If your computer is connected to a network, the Network Neighbourhood icon allows you to view all of the network resources available to your PC. These resources can include other computers, printers, fax servers, etc.

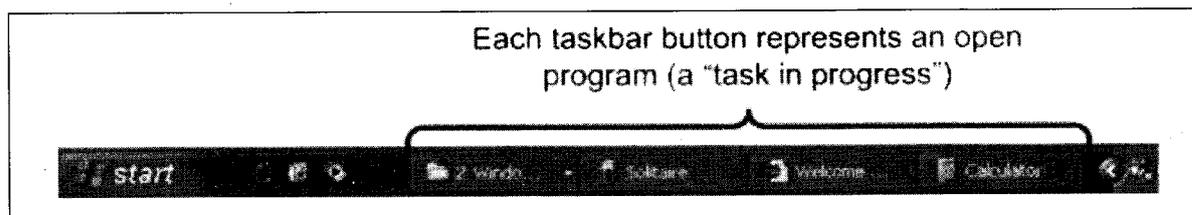
5.4 RECYCLE BIN

The Recycle Bin is a temporary storage place for deleted files. You can use it to retrieve files deleted in error. When you delete a file in Windows, it goes to the Recycle Bin. To delete the file permanently, you can empty the Recycle Bin.

5.5 TASKBAR

If you think of your computer's hard disk as a filing cabinet where all your programmes and documents (files) are stored, then you can think of your Windows desktop as being like your real "wooden" desktop. Only the things you're working with right now are on your Windows desktop, as well as your real desktop. (Not counting all the miscellaneous clutter you haven't gotten around to putting away, of course).

At any given time, you might have several programmes, folders, and documents open on your desktop. The short name for "anything that's currently open on your desktop" is *task*. That is, we can refer to each open item on your desktop – no matter what that item is, as a "task", short for "task-in-progress". The Windows taskbar, which is roughly centered across the bottom of your screen, as in figure.



When you have lots of programme windows open, they pile up on your Windows desktop, just like sheets of paper can pile up on your real desktop. You can use the taskbar to sort of "shuffle things around", so you're in control of what is, and isn't visible at the moment. Here are some things you can do with the taskbar along those lines:

- If a programme window is buried in the mess, click its taskbar button to instantly bring it to the top of the stack.
- You can also click a task's taskbar button to make it invisible (so it's not taking up any space on the desktop), then click that same button again to make it visible again.
- You can also *close* any open task (thereby removing it from the desktop and putting it back in the filing cabinet) by right-clicking its taskbar button and choosing Close.

5.6 START BUTTON

You can click the Start button to start a programme, open a document, change system settings, get Help, find items on your computer, and more. Most of the things you will learn how to do will begin with the Start button.

5.7 RUNNING PROGRAMMES

A set of programme design concepts has evolved over the past three decades. Although the degree of interest in each concept has varied over the years, each has stood the test of time. Each provides the programme designer with a foundation from which more sophisticated design methods can be applied.

5.7.1 Top Down Design

The top down design approach is based on the fact that large problems become more manageable if they are divided into a number of smaller and simpler tasks which can be tackled separately. What is really required is that each of these parts have the properties of a module.

Top down design approach is performed in a special way. The main programme is written first. It is tested before sub-programmes are written. To do this, the actual sub-programmes are replaced with stubs. The stubs simply test to see if the data is passed correctly.

After the main programme is written and checked, each module is written and tested in turn. This should first be done without the main programme in order to isolate a stub if an error occurs.

A simple main programme is written to test the sub-programmes. If the modules run properly, then it is tested with the main programme.

If the module and the main programme run properly then the next module is written and checked and so on.

To describe the programme at its highest level, we use something called the "universal programme", and then by a process of "stepwise refinement" work out the details of each part of the programme.

5.7.2 Bottom up Design

A bottom up approach would be to write the most basic subroutines in the hierarchy first and then use them to make more sophisticated subroutines.

The pure bottom up approach is generally not recommended because it is difficult to anticipate which low level subroutines will be needed for any particular programme. It can often be a useful first step to produce a library of basic functions and procedures before embarking on a major project.

In the bottom up approach it is usually assumed that the basic routines created will be general enough to be used more than once.

Using the subroutines, to construct a programme, save yourself repeating the same lines of code by reusing it.

A routine that is used many times has a very difficult status to those higher in the hierarchy. It is more like a basic instruction in the programming language than a large scale programme component.

5.7.3 Hybrid Approach

Top Down and Bottom Up approaches may not always be the most suitable choice. An intermediary approach – Hybrid Approach - is what is often used in practice. Hybrid approach takes advantage of both the top-down and bottom-up approaches. The problem is attacked from both the extremities.

While the problem is being broken down from top to bottom the solution is synthesized simultaneously from bottom upward. The process terminates somewhere midway when the final solution is obtained. A schematic illustration is given hereunder.

5.8 WINDOWS 95

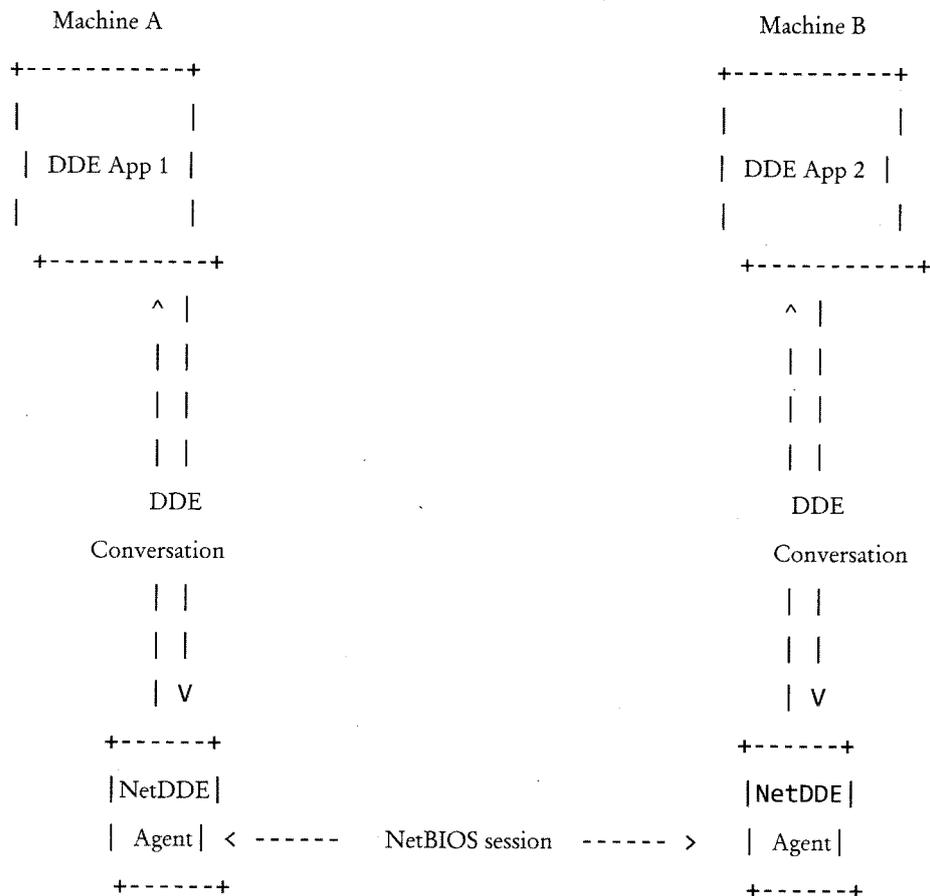
Graphical Device Interface

The Graphical Device Interface (GDI) is the graphical system that administers what emerges on the screen. It also offers graphics sustain for printers and other output devices. It sketches graphic primitives, manipulates bitmaps, and interrelates with device-independent graphics drivers, together with those for display and printer output device drivers.

Windows 95 is a much awaited replacement for Windows 3.1. It is a new 32-bit operating system from Microsoft, released in 1995. Windows 95 provides the following important features:

1. **Built-in networking:** Windows 95 has sophisticated 32-bit built-in network components, that allows it to operate both as client in a client-server network and peer-to-peer network operating system. In client-server approach, there is a central computer acting as a file server, with which workstations called 'clients' are attached. In peer-to-peer networking, every computer connected with network can work as a file server and therefore can share files and printers with other computers.
2. **Multimedia functions:** Windows 95 provides all multimedia controls and functions. Multimedia is the way of disseminating information in form of text, audio, graphics/ animated graphics and full-motion video.
3. **Preemptive multitasking:** Windows 95 provides preemptive multitasking features, which are found in operating systems like OS/2 and Windows NT. In preemptive multitasking, operating systems dictate the time slice for each programme, resulting in smoother control and fewer crashes.
4. **Memory protection:** Memory protection feature of Windows 95 ensures that one application do not crash other applications in memory.
5. **'Plug and play':** Windows 95 automates the hardware configuration process, by knowing the kind of printer, mouse and other peripherals. This feature is known as 'Plug and Play'.
6. **OLE (Object Linking and Embedding):** OLE is the key technology for Windows 95. Object Linking and Embedding is the Microsoft's standard for creating compound documents (compound document is a document made from different programmes) in windows. OLE permits seamless integration of applications in windows.
7. **Dynamic Data Exchange (DDE):** Network DDE is an expertise that permits applications that use the DDE transport to visibly exchange data above a network. It includes two main components:

- (i) The NetDDE agent. This is a service that performs as a substitute for the distant DDE application. It converses with all local DDE applications, and with distant NetDDE agents via NetBIOS as revealed in the following chart:



- (ii) A DLL that executes NetDDE API functions like NDdeShareAdd, NDdeShareDel, and so on. This DLL is generally named NDDEAPI.DLL.

In the well being of backwards compatibility, Windows 95 involves a NetDDE agent and a 16-bit NetDDE API DLL. Though, Windows 95 does not comprise a 32-bit NetDDE API DLL.

Check Your Progress

1. What is network neighbourhood?
2. Define Object Linking and Embedding (OLE).

5.9 LET US SUM UP

MS-windows is a GUI based operating system. In windows operating system, multiple applications can be simultaneously run in different windows. In MS-windows, the screen upon which icons, windows, etc., are displayed is known as desktop. The Graphical Device Interface (GDI) is the graphical system that administers what emerges on the screen.

You can explore your computer through *start button* and *taskbar*, *my computer* and *window Explorer*. The *taskbar* is a bar, which is usually located at the bottom of the screen. The start button is located at taskbar. By clicking at *start button*, start menu appears wherefrom you can start programme, open document, customize your system, get help, search for items on your computer and more.

5.10 KEYWORDS

Desktop: The Desktop is the main entrance to the resources stored on your computer and beyond.

My Computer: The My Computer icon represents your computer.

Recycle Bin: The Recycle Bin is a temporary storage place for deleted files.

Object Linking and Embedding (OLE): OLE is the key technology for Windows 95.

Dynamic Data Exchange (DDE): DDE is an expertise that permits applications that use the DDE transport to visibly exchange data above a network.

5.11 QUESTIONS FOR DISCUSSION

1. What is windows Explorer and give some of its functions?
2. What is the function of taskbar and recycle bin?
3. What are running programmes? Differentiate between top down design and bottom up design.
4. Discuss the features of windows 95.
5. What is dynamic data exchange?
6. What is My Computer? Discuss the icons that appear in this window.

Check Your Progress: Model Answer

1. Network Neighborhood icon allows you to view all of the network resources available to your PC. These resources can include other computers, printers, fax servers, etc.
2. OLE is the key technology for Windows 95. Object Linking and Embedding is the Microsoft's standard for creating compound documents (compound document is a document made from different programmes) in windows.

5.12 SUGGESTED READINGS

D. Bharioke, *Fundamentals of IT*, Excel Books

V. Rajaraman, *Fundamentals of Computer*, Prentice Hall of India.

LESSON

6

NETWORKING

CONTENTS

- 6.0 Aims and Objectives
- 6.1 Introduction
- 6.2 Fundamentals of Computer Networking
- 6.3 Different Structures of Networks
 - 6.3.1 Local Area Network (LAN)
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 - 6.3.4 Internet, Intranet and Extranet
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 - 6.5.3 Star Topology
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 - 6.5.5 Fully Connected Topology
- 6.6 Accessing and Sharing Resources in a Network
- 6.7 Networking Hardware
 - 6.7.1 Network Interface Card (NIC)
 - 6.7.2 Routers
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 - 6.7.6 Wi-Fi
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- 6.12 Questions for Discussion
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6.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Describe fundamentals of computer networking
- Explain the different structures of networks
- Define networking standards and network topology
- Analyse the networking hardware and software
- Discuss network administration

6.1 INTRODUCTION

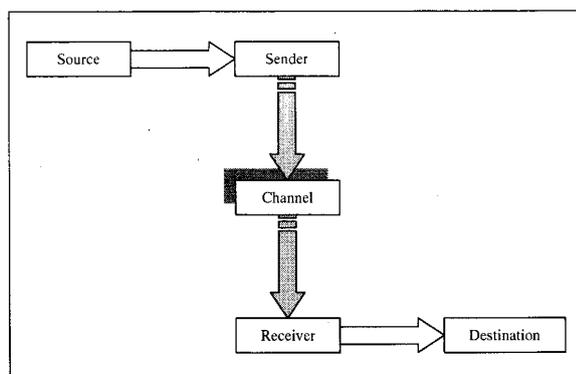
A personal computer serves its purpose well for a single user where all the programmes, data, printer and other resources stay attached to it. Most of the home applications require a single computer where you store all your programmes and data. However, in many other situations you would like to have other computers attached to your computer so that your computer may interact with those computers. This situation gives rise to computer networking.

This lesson deals with various aspects of computer networking in detail. You should be able to establish a computer network and work with your operating system to make use of the network resources after going through this unit carefully.

6.2 FUNDAMENTALS OF COMPUTER NETWORKING

Since the beginning of the human civilization, the need to communicate had paved the way to develop different techniques and methods based on circumstances and available technology. Many early forms of communication were gesture, writing and depicted on cave walls etc. With the development of language and the use of symbols, papyrus and paper facilitated to record communication for later use. The desire to communicate more and better beyond the geographical boundaries inspired man to use different techniques. Some of these techniques were based on story telling using gesture, animation and sound. This is an account about the evolution of communication during ancient time.

In 1948, Claude Shannon who worked for the Bell Telephone Company in United States of America had proposed a model of communication as shown below. This served as a basis for explaining communication since that time.



In terms of oral communication between two people, the model is applied as follows:

Source	:	The brain
Message	:	The idea, thought
Sender	:	The transmitting device, the mouth
Channel	:	The medium the message travels over, air
Receiver	:	The receiving device, the ear
Destination	:	The brain

Data communications concerns itself with the transmission of information between two locations. The transmission broadly involves sending and receiving the information. This indicates sending information between machines that are connected together by physical wires or radio links. The machines may be transmitter, telephone, computer etc.

Computer network can be defined as a group of independent computers possibly located at different physical locations inter-connected with each other so that they can communicate with each other.

In data communication system, data is transmitted from computer terminals to the information-processing unit through data communication circuits. Following two types of data transmission methods are used to carry data from its origin to the information-processing unit.

Offline: Computers are not connected by communication circuits. Data is transmitted between a terminal and information-processing unit through a magnetic tape and magnetic disk packs.

Online: Computers connected by communication circuits. Data can be instantly transmitted between a terminal and information-processing unit.

Electronic communications can be classified in two categories – *Analog* and *Digital*. In the analog form of electronic communications, information is represented as a continuous electromagnetic wave form. Digital communications represents information in binary form through a series of discrete pulses.

Purpose of Networking

Computer networking is a logical follow through of personal computer applications in homes and in small and large enterprises. To appreciate the importance and need of a computer network consider the following scenarios.

- In the present modern office almost every activity is carried out with the help of computers. Computers are installed in all the sections with many people working in each section. It is not cost-effective to attach a resource – say a printer or a disk or any other sharable resource – each to individual computers. Rather than that would it not be better if one high capacity printer is installed on one computer and the rest of the computers are able to print on that! Networking achieves this objective in a very convenient and cost-effective manner.
- Many activities require collaboration from various individuals sitting in different parts of the same office or organization. These individuals require a lot of file transfer be done among themselves. One simple approach to allow this is to copy the required files back and forth from one computer to another. This approach obviously suffers from a lot of limitations. Would it not be more convenient if the files could be transferred without any physical movement right from sitting where one is working! Networking makes this happen.

- In the present global business scenario many organizations have their offices branched over different locations spanning sometimes even continents. Networking allows them to communicate with each other in a seamless manner through highly sophisticated video-conferencing to simple e-mail exchange.

These instances are but only few from the practical applications. The benefits of computer networking far outweigh its installation and maintenance efforts. It is only natural then that almost every organization is hooked to some kind of computer network today.

To summarize the above mentioned points, the purpose of computer networking is to:

- Allow users to share computer resources like files, printers, disks etc. among each other.
- Have a centralized control on the other computers.
- Allow users to work from a place away from their own computers.

A computer network attains a better cost-benefit ratio as compared to standalone installations. You can convince yourself by considering installing a printer each to 10 computers or to have a computer network with a single printer attached to one of the networked computers and allow every user to use that printer as if it belongs to her.

6.3 DIFFERENT STRUCTURES OF NETWORKS

Just as computers differ from each other on many accounts, computer networks also differ from each other considerably. Computer networks have been classified on various bases. On the basis of the extent of geographical coverage area, computer networks can be classified into the categories shown below.

6.3.1 Local Area Network (LAN)

Computer Networks can also be classified on the basis of their geographical expanse. A local area network is a computer network in which the participating computers and computing resources are all located in a small geographical area such as a building or a university campus.

It is often a privately owned network. LANs interconnect computers and peripherals over a common communication medium in order that users might share access to connected computers, databases, files, applications, and peripherals.

LANs can also provide a connection to other networks, either through a computer which is attached to both networks, or through a device called a gateway.

A LAN consists of the following hardware:

- Nodes or workstations, usually PCs.
- One or more relatively powerful computer with large storage capacity to act as server.
- Network interface cards attached to each of the workstations and servers.
- Cables (such as twisted wire cable) to connect the computers and the peripherals.

A LAN consists of the following software:

- Network Management Software or a network operating system. Some popular network operating systems are:
 - ❖ Novel Netware
 - ❖ Windows NT Server
 - ❖ Windows 2000
 - ❖ Linux
- Applications software capable of supporting network access.
- **Server Software:** A file server is server software that can process file related requests from the client workstations. Print servers, similarly, process print related requests from the client workstations.
- **Client Software:** This software runs on the client nodes and allows requests to be sent to the server and to receive back the result.

Working of LAN

A node sends a request to a connected server on the LAN. The server processes the request and returns the result to the requesting node. For instance, to open a file, a node sends the request to a file server on the LAN. The file server searches the specified file and returns it to the node.

Advantages of LAN

- All the available peripherals and other expensive resources can be shared among the workstations.
- Application software and data can also be shared among the workstations.
- Users can communicate with each other through e-mail.

Disadvantages of LAN

- A required resource may be unavailable if the server is down.
- A LAN having few workstations may be expensive due to cost of additional hardware and software.
- If not handled properly, data security may not be assured.

6.3.2 Metropolitan Area Network (MAN)

A computer network, which is spread over a larger area than that of LAN, is called MAN. For instance, computer network connecting the computers located at hospitals in a city is a MAN.

6.3.3 Wide Area Network (WAN)

Networks covering larger area than that of MAN connecting the participating computers via telecommunication and satellite links are called WAN. A WAN may span a country or the entire world.

The common transmission media used in WAN are:

- Radio waves
- Microwaves
- Communication satellites

Some special hardware used in WAN are:

- **Bridges:** A bridge is an equipment that connects two similar networks.
- **Routers or Gateways:** A router or a gateway is hardware that connects two dissimilar computer networks.

There are generally two types of WAN, distinguished on the basis of accessibility. They are:

- **Public Networks:** These networks are controlled by the government. Public can use them by subscribing to the services. Some of the popular WANs are:
 - ❖ Integrated Services Digital Network (ISDN)
 - ❖ Public Switched Telephone Network (PSTN)
 - ❖ Public Switched Data Network (PSDN)
 - ❖ Value Added Network (VAN)

For instance, Barclays Bank has branches all over the world connected through a WAN. The central server is located in UK where all the customer information is stored. Nodes situated at remote locations can access this information and carry out transactions from almost anywhere in the world.

SWIFT network is another example of WAN. This network connects computer systems of different banks all over the world to ensure secured fund transfer and payment handling.

- **Private Networks:** These WANs are owned and controlled by a particular party and are not open for public use.

For instance, a company may have branches in many countries. A WAN may connect its branch offices. The company owns the WAN and it is not meant for public use.

6.3.4 Internet, Intranet and Extranet

The **Internet** is a world wide network of several Computer Networks connected to each other using TCP/IP protocol. Information may be shared and exchanged using web-page technology consisting of web server and web-browser pair. It is open for public use. We will learn more about the Internet later.

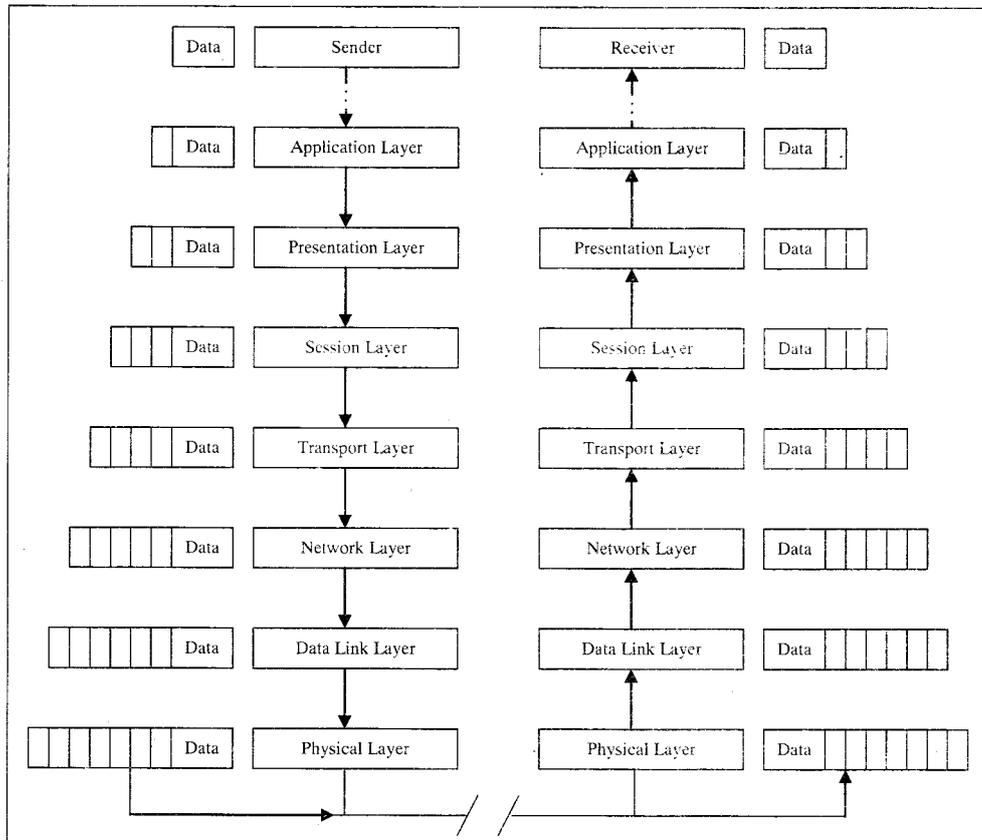
An **intranet** is a computer network private to an organization. It uses the Internet technology for information access.

An **extranet** is large scale intranet to which restricted public access is granted. Users in public having proper authorization may use this network.

6.4 NETWORKING STANDARDS

Initially every organization was free to develop its own way of establishing a computer network. However, with the rapid growth in the networking technology and as the networking transcended national and internal boundaries the need was felt to enforce network standards so that all the computers throughout the network understand what is being transmitted to them.

Consequently, several standards were designed and redesigned. The most fundamental network standard is the OSI reference model. OSI or Open System Interconnection is a standard for worldwide communications that defines a networking framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, proceeding to the bottom layer, over the channel to the next station and back up the hierarchy. The structure of the OSI is given hereunder.



The top layer - **Application layer** - supports application and end-user application. This layer provides application services for file transfers, e-mail, and other network software services. Telnet and FTP are applications that exist entirely in the application level. The application layer attaches information like the receiver's address etc. to the data being transmitted.

Presentation layer receives the packet from Application layer and translates it into network format applying encryption etc.

Session layer accepts the packet from the Presentation layer adds some more information such as communication session number etc. and passes the same to the next layer.

Transport layer attaches transparent transfer to the packet received from the Session layer and passes the new packet to the next layer.

Network layer provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node. Routing and forwarding are functions of this layer, as well as addressing, internetworking, error handling, congestion control and packet sequencing. The resultant packet passes to the next layer.

Data Link codes and decodes the data packets into bits. It also furnishes transmission protocol knowledge and management and handles errors in the physical layer, flow control and frame synchronization.

Physical layer conveys the bit stream – electrical impulse, light or radio signal – through the network at the electrical and mechanical level. It provides the hardware means of sending and receiving data on a carrier, including defining cables, cards and physical aspects.

As the packet travels through the layers its size goes on increasing. At the receiving end the reverse process takes place wherein the extra information attached to the actual data are removed as the packet moves up the ladder. Finally the transmitted data is received by the receiver.

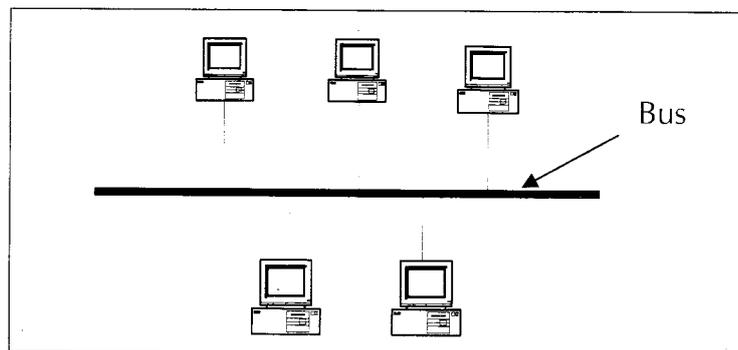
6.5 NETWORK TOPOLOGY

Computer Networks can also be classified depending on the manner the participating nodes are connected to each other. The manner in which nodes of a computer network are connected to each other is called its topology. The main network topologies are:

- Bus topology
- Star topology
- Ring topology
- Hybrid topology
- Fully connected topology

6.5.1 Bus Topology

In this topology, nodes and peripherals are all connected to a single transmission line called bus. A message along with unique address of the target computer is placed on the bus and is transmitted to all nodes. The node for which the message is directed reads the message while other nodes simply ignore it. This topology is suitable if only a few computers are to be networked.



Ethernet and Local Talk are examples of bus networks.

Advantages of Bus Topology

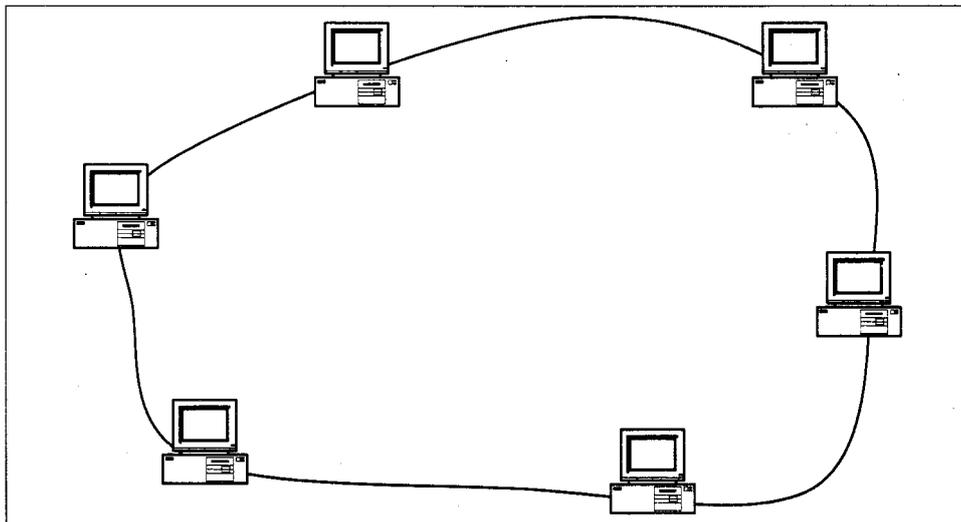
- It is comparatively cheaper.
- It is easy to install.
- It is easy to attach a new node as also to remove an existing one.

Disadvantages of Bus Topology

- It is not very reliable. If the bus fails the network fails.
- There is a limit to the number of nodes that it can support.

6.5.2 Ring Topology

The ring topology has a closed loop of connecting cable. Each node on the network has two links and forms unbroken circular configuration. Transmitted messages travel from node to node around the ring. Information may travel around the ring in one direction or both the directions. Each node must be able to recognize its own address in order to accept messages.



Token-Passing Ring and IBM Token Ring are examples of ring topologies.

Advantages of Ring Topology

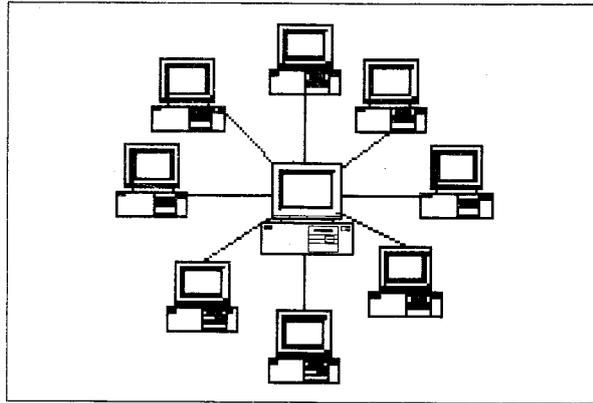
- It is very reliable.
- The network does not fail even when a link between two nodes is broken.

Disadvantages of Ring Topology

- It is more expensive than bus topology.
- The network management is complex.

6.5.3 Star Topology

All nodes in this topology are joined at a single node. This single node is called as a central node, hub, or switch, to which all other devices are attached directly. This topology is frequently used for networks in which control of the network is located in the central node.



Asynchronous Transfer Mode (ATM) is an example of star topology. This topology is very suitable in banking network systems where a master controller computer system is connected with nodes spread all over a city.

Advantages of Star Topology

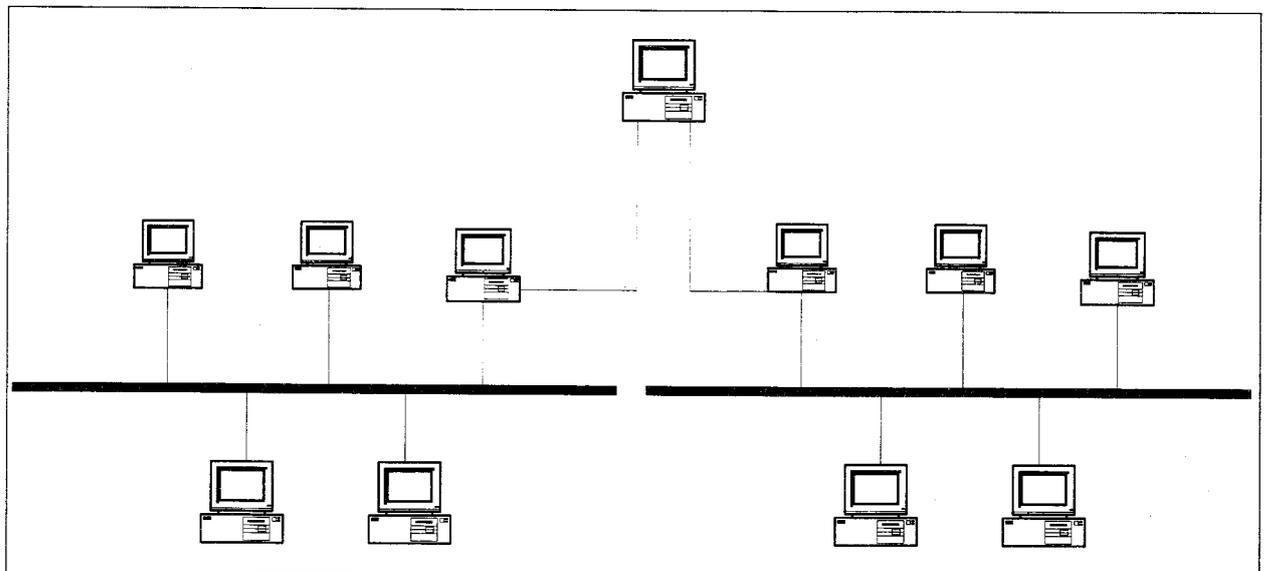
- The network is very reliable. Unless the hub fails the network remains functional.
- It allows better control and enhanced security.
- Addition and deletion of nodes is very easy.

Disadvantages of Star Topology

- It is expensive due to extra hardware needed.
- The network fails if the central computer system fails.

6.5.4 Hybrid Topology

This network topology is a mixture of above mentioned. Usually, a central computer is attached with sub-controllers which in turn participate in a variety of topologies.



Advantages of Hybrid Topology

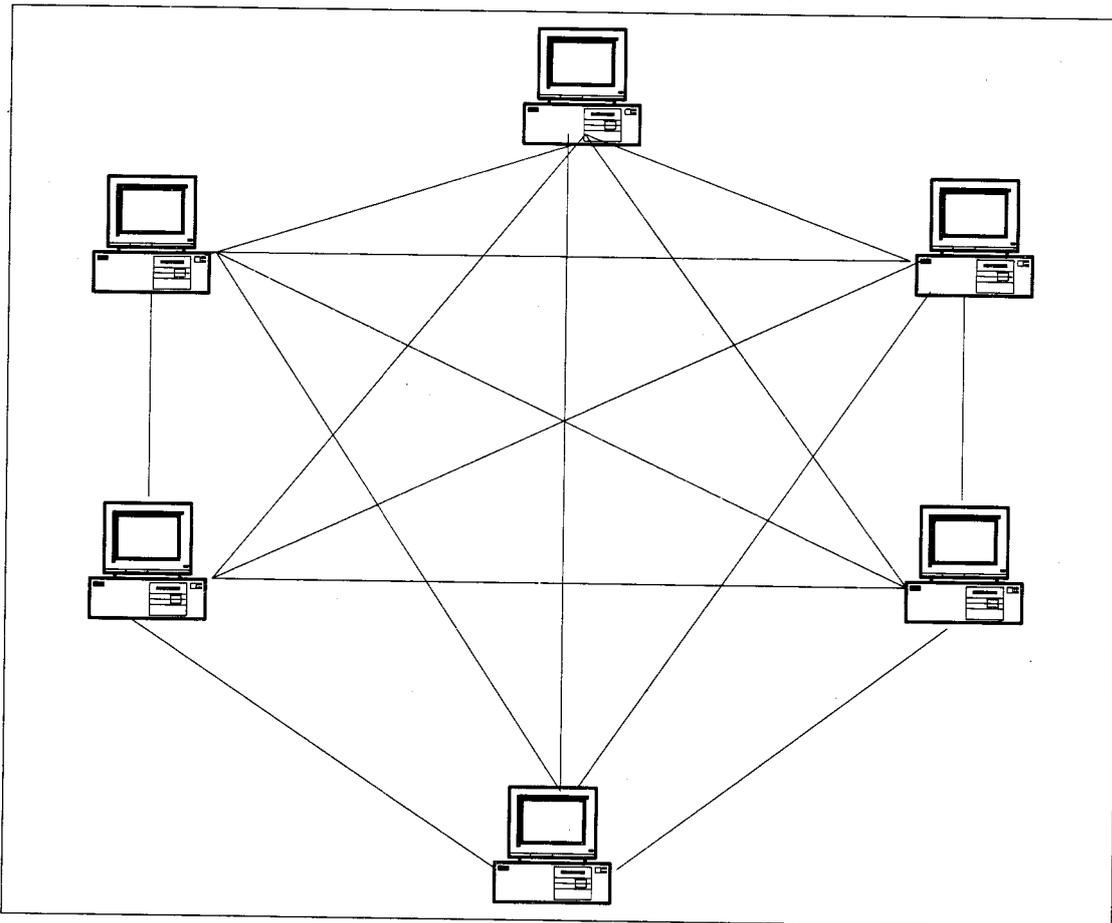
- It is extremely flexible.
- It is very reliable.

Disadvantages of Hybrid Topology

- It is expensive.
- Adding a node to it is not very easy.

6.5.5 Fully Connected Topology

In this topology all the nodes are connected to all other nodes with separate links.

***Advantages of Fully Connected Topology***

- It is extremely reliable. Breakdown of one link does not affect the network.
- Communication is faster.

Disadvantages of Fully Connected Topology

- It is very expensive.
- Additional node requires many links to be set up.

6.6 ACCESSING AND SHARING RESOURCES IN A NETWORK

If you want to use your folders when you dial into your computer from a remote location, you must share them. Likewise, if you want other network users to have access to the folders on your computer, you must share them.

By setting permissions on the shared folders, you can control the level of access that other people have to your files. The following table summarizes the shared folder permissions that you can apply and the actions they allow.

Share Level	Permissions
Full Control	Can open, read, and edit files, and can run programmes Can change permissions and take ownership of folder
Change	Can open, read, and edit files, and can run programmes
Read	Can read files and execute programmes

To Share a Folder

1. Right-click the folder you want to share, and then click Sharing.
2. On the Sharing tab, click Share this folder.
3. In Share Name, use the default name, or type a name.
You should use eight characters or less with no spaces in the share name.
4. If you want to provide a description of the folder, type the description in Comment.
5. If you want to limit the number of people who can concurrently use the folder, in User limit, click Allow, and then enter a number.
6. If you want to set permissions for specific users or groups, click Permissions, click Add, double-click the user or group to whom you want to assign permissions, and then click OK. Next, select the user or group, select or clear the appropriate Allow and Deny permission check boxes, and then click OK. Click OK again.

When you create a shared folder, the default permission is Full Control for the group Everyone.

6.7 NETWORKING HARDWARE

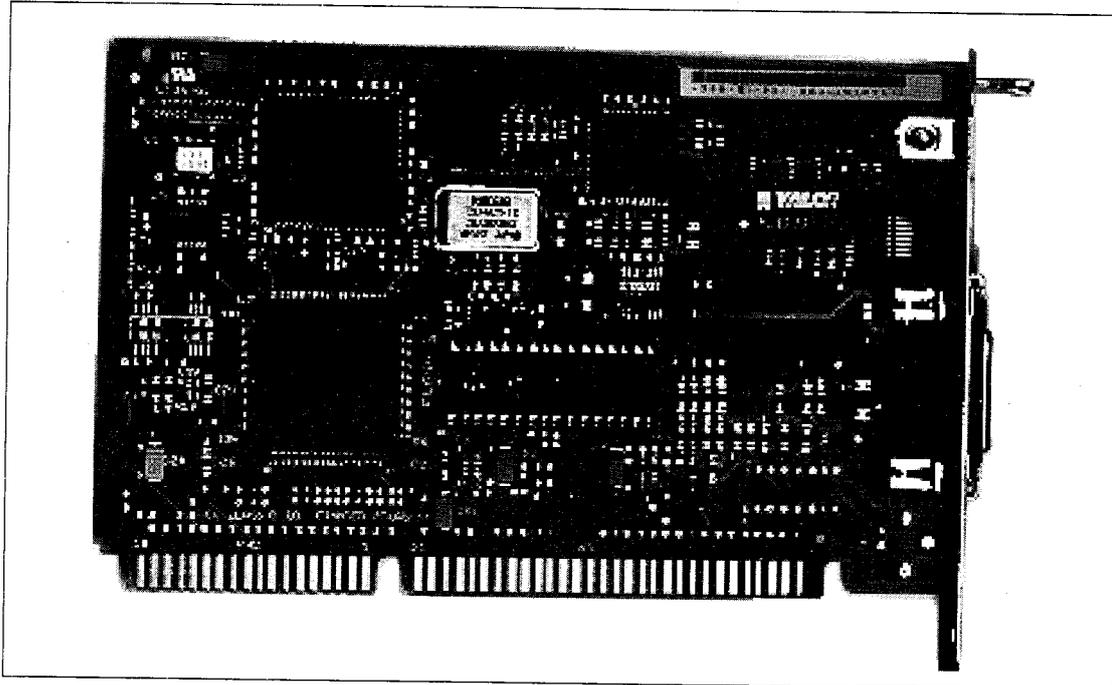
To establish a computer network between two PCs you need to carry out the networking broadly at two levels - hardware and software. Networking hardware typically includes routers, switches, access points, modems, network interface cards and cables.

Other hardware prevalent within computer networking is datacenter equipment (such as file servers, database servers and storage areas), network services (such as DNS, DHCP, email etc) as well as other specific network devices such as content delivery.

Other diverse devices which may be considered networking hardware include mobile phones, PDAs and even modern coffee machines. As technology grows and IP-based networks are integrated into building infrastructure and household utilities, network hardware becomes an ambiguous statement owing to the increasing number of 'network capable' endpoints.

6.7.1 Network Interface Card (NIC)

NIC is an add-on card that can be inserted into a PC. It can be connected to communication media leading to the NIC of another computer. A typical NIC is shown in the figure.



6.7.2 Routers

These are devices and programmes (hardware and software) used in a network to determine the path of flow of the transmitted data.

6.7.3 Gateways

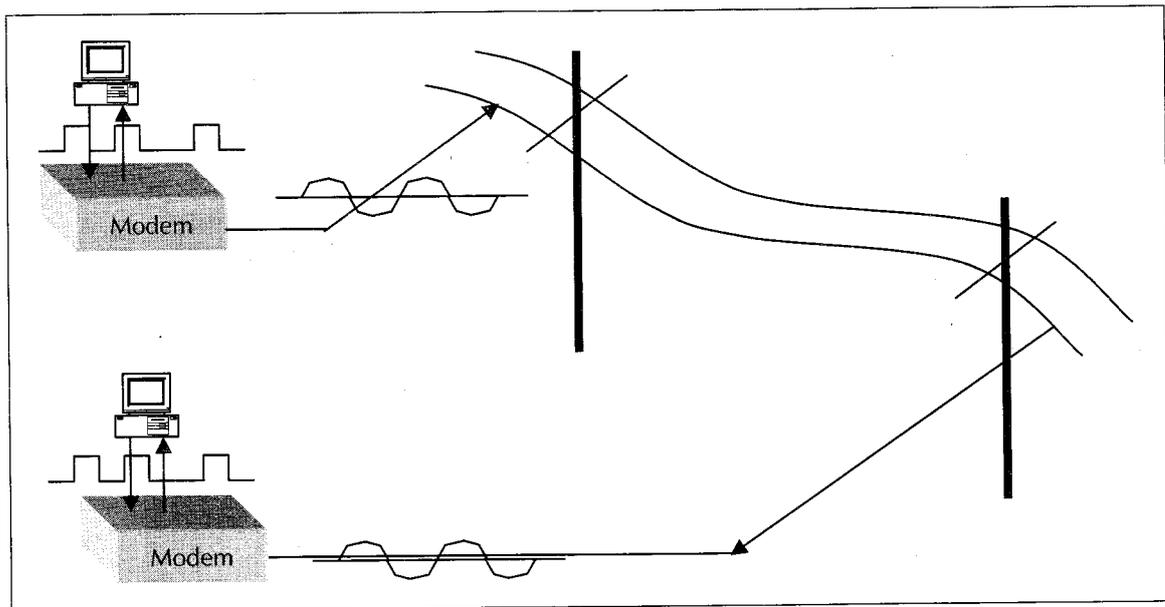
These are devices and programmes (hardware and software) that connect two networks of different kind.

6.7.4 Hubs

A hub is like a distribution box consisting of a number of ports where cables from various nodes can be directed and redirected in a LAN. They provide full bandwidth to each client, unlike BUS networks where the bandwidth is shared.

6.7.5 Modems

Modem (Modulator – DEModulator) is a device that converts digital signal into analog signal (modulation) at the sending end and analog signal into digital signal (demodulation) at the receiving end. As you know, telephone lines carry analog signals (voice) while computers work on digital signals. Therefore, in order to use telephone lines for digital transmission it is necessary to have modems at both the ends.



Generally, three types of modems are available:

- **External Modem:** This type of Modem remains outside the computer. It is attached to the computer on one side through a data cable and to the telephone line on the other side. It also has a separate power supply.
- **Internal Modem:** Internal modems are add-on cards that can be inserted into the computer. It has a jack through which telephone line can be connected.
- **Wireless Modem:** These types of Modem do not have any physical cable connection to the telephone line. They are often used in portable laptop computers.

6.7.6 Wi-Fi

On the lines of Hi-Fi for High Fidelity, Wi-Fi is unofficially known as Wireless Fidelity. It is a wireless technology brand owned by the Wi-Fi Alliance intended to improve the interoperability of wireless local area network products.

A Wi-Fi enabled device such as a PC, game console, cell phone, MP3 player or PDA can connect to the network when within range of a wireless network. The area covered by one or more interconnected access points is called a hotspot. Hotspots can cover as little as a single room with wireless-opaque walls or as much as many square miles covered by overlapping access points. Wi-Fi can also be used to create a mesh network. Both architectures are used in community networks.

Many consumer devices use Wi-Fi. Amongst others, personal computers can network to each other and connect to the Internet, mobile computers can connect to the Internet from any Wi-Fi hotspot, and digital cameras can transfer images wirelessly.

Wi-Fi allows LANs to be deployed without cabling for client devices, typically reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.

6.8 NETWORKING SOFTWARE

Once the network hardware is installed with each of the participating computers the network is ready to function. However, as you know hardware acts only under the control of some software. Therefore a network software must be installed on each of the nodes of the network.

The network software provides the implementation of various protocols among the computers on the network. *Network Drivers* are the software components that respond to the communication commands of the participating computers in the network. Every node in the network must have appropriate network drivers loaded.

Operating System provides a number of networking support. You will discover how Windows 2000 provides a complete suite of software support for establishing computer networks. Computers hooked to a network primarily perform two roles – client or server. Some computers receive requests from other computers on the network and after processing the request provide the result to the sender of the request. Such nodes are called *servers* while nodes submitting the requests are known as clients. Note that programmes can also behave like clients and servers. Thus a computer may play the role of file-server or print server or internet server etc.

6.9 NETWORK ADMINISTRATION

If your computer is physically connected to a network during installation, Setup installs the necessary software components you need to connect to the network. For example, Windows 2000 automatically detects the network adapter and installs the appropriate driver software for it.

If you want to connect to a network after Setup, use the following procedure.

This procedure assumes that you've already installed a network adapter and that your computer is physically connected to the network—for instance, by a network cable.

To connect your computer to a local area network:

1. Log on to Windows 2000 as an administrator or as a user with administrator rights.
2. Click the Start button, point to Settings, and then click Control Panel.
3. In Control Panel, double-click Network and Dial-up Connections.
4. Right-click Local Area Connection, and then click Properties.
5. Under Components checked are used by this connection, select the client software, network protocol, and service specified by your network administrator. If the selections you want aren't listed, click Install to add them. Click OK.

If you're not sure which network components to select, contact your network administrator.

Check Your Progress

1. Define network interface card.
2. What is wi-fi?

6.10 LET US SUM UP

Computer network can be defined as a group of independent computers possibly located at different physical locations inter-connected with each other so that they can communicate with each other.

Local Area Network is a computer network spanning within a small office or a building.

Application layer of OSI standard supports application and end-user application.

Presentation layer receives the packet from Application layer and translates it into network format applying encryption etc.

Session layer accepts the packet from the Presentation layer adds some more information such as communication session number etc. and passes the same to the next layer.

Transport layer attaches transparent transfer to the packet received from the Session layer and passes the new packet to the next layer.

Network layer provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node.

Data Link codes and decodes the data packets into bits.

Physical layer conveys the bit stream - electrical impulse, light or radio signal - through the network at the electrical and mechanical level.

The TCP/IP protocols are being used globally irrespective of the nature of the organizations whether it belongs to the general category of organizations or security specific sensitive organizations.

A hub is like a distribution box consisting of a number of ports where cables from various nodes can be directed and redirected in a LAN.

Network Drivers are the software components that respond to the communication commands of the participating computers in the network.

6.11 KEYWORDS

Computer Network: A group of independent computers possibly located at different physical locations inter-connected with each other so that they can communicate with each other.

Offline: Computers are not connected by communication circuits. Data is transmitted between a terminal and information-processing unit through a magnetic tape and magnetic disk packs.

Local Area Network (LAN): A computer network in which the participating computers and computing resources are all located in a small geographical area such as a building or a university campus.

Metropolitan Area Network (MAN): A computer network, which is spread over a larger area than that of LAN.

Wide Area Network (WAN): Networks covering larger area than that of MAN connecting the participating computers via telecommunication and satellite links are called WAN.

Public Networks: These networks controlled by the government. Public can use them by subscribing to the services.

Private Networks: These WANs owned and controlled by a particular party and not open for public use.

Intranet: A computer network private to an organization that uses the Internet technology for information access large scale intranet to which restricted public access is granted.

OSI or Open System Interconnection: A standard for worldwide communications that defines a networking framework for implementing protocols in seven layers.

Network Topology: The manner in which nodes of a computer network are connected to each other is called its topology.

Network Interface Card (NIC): NIC is an add-on card that can be inserted into a PC. It can be connected to communication media leading to the NIC of another computer.

Routers: Devices and programmes (hardware and Software) used in a network to determine the path of flow of the transmitted data.

Gateways: These are devices and programmes (hardware and Software) that connect two networks of different kind.

Hubs: A hub is like a distribution box consisting of a number of ports where cables from various nodes can be directed and redirected in a LAN.

Modems: Modem (Modulator – DEModulator) is a device that converts digital signal into analog signal (modulation) at the sending end and analog signal into digital signal (demodulation)

6.12 QUESTIONS FOR DISCUSSION

1. What is the purpose of a computer network?
2. Explain the various layers of OSI model.
3. What are the hardware and software components of a LAN? Explain the working of each unit with the help of a diagram.
4. Differentiate clearly between LAN, MAN and WAN using suitable examples.
5. What are the functions of transport layer in a network?
6. Networking cards, cables and hubs belong to one layer of the OSI networking model. Which layer is it?
7. Which layer of the OSI model responsible for maintaining user information during communication?
8. Where would you find a private network? Give some areas of application of private networks.
9. What are the differences between ring and bus topology?
10. If a network has to have high degree of availability which topology will you suggest? Why?
11. Compare and contrast between different LAN topologies.

Check Your Progress: Model Answer

1. NIC is an add-on card that can be inserted into a PC. It can be connected to communication media leading to the NIC of another computer.
2. On the lines of Hi-Fi for High Fidelity, Wi-Fi is unofficially known as Wireless Fidelity. It is a wireless technology brand owned by the Wi-Fi Alliance intended to improve the interoperability of wireless local area network products.

6.13 SUGGESTED READINGS

Andrew S. Tanenbaum, *Computer Networks*, Prentice Hall

Michael J., *Understanding the Networks*, Martin, Macmillan Computer Pub.

Joe Casad, *Sams Teach Yourself Tcp/Ip in 24 Hours*, Sams Publishing.

Anton Meijer, Paul Peeters, *Computer Network Architectures*, Computer Science Press.

James D. McCabe, *Practical Computer Network Analysis and Design*, Morgan Kaufmann.

UNIT IV

LESSON

7

PROGRAMMES

CONTENTS

- 7.0 Aims and Objectives
- 7.1 Introduction
- 7.2 Working with Programmes
 - 7.2.1 Running Programmes for Search
 - 7.2.2 Getting Help
 - 7.2.3 To Start a Programme by using the Run Command
 - 7.2.4 Shutting Down a Window PC
 - 7.2.5 Adding and Removing New Programmes
 - 7.2.6 To Start a Programme from the Start Button
 - 7.2.7 To Toggle between Running Programmes
 - 7.2.8 To Quit or Close a Programme
 - 7.2.9 To Minimize or Maximize a Window or Restore it to its Previous Size
 - 7.2.10 To Start a Programme Each Time you Start Windows 2000
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 - 7.2.16 Using the Advanced Menu
- 7.3 Let us Sum up
- 7.4 Keywords
- 7.5 Questions for Discussion
- 7.6 Suggested Readings

7.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Run programmes from the start menu, from explorer, from Search, from a document
- Start programmes automatically when you start windows

- Minimize running programmes
- Use run command
- Work from the command prompt
- Add and remove programmes
- Explain scheduling, adding and modifying tasks
- Use the advanced menu

7.1 INTRODUCTION

This lesson will familiarize you how to run programmes from the Start Menu, from the Explorer, from Search and from a document. You will learn how to start programmes automatically when you start your windows 2000 professional and learn how to run programmes minimized. You will learn how to use the Run command to run programmes and how to use the Command Prompt. Also since the programmes we use and might need are not always installed, we might need to add and remove some programmes according to our needs. This unit will teach you how to add and remove not only programmes but also windows components. Further you will learn about looking at registry and how to schedules tasks according to your choice.

- Running programmes minimized
- Using run command
- Working from the command prompt
- Adding and removing programmes
- Scheduling, adding and modifying tasks
- Using the Advanced Menu

7.2 WORKING WITH PROGRAMMES

7.2.1 Running Programmes for Search

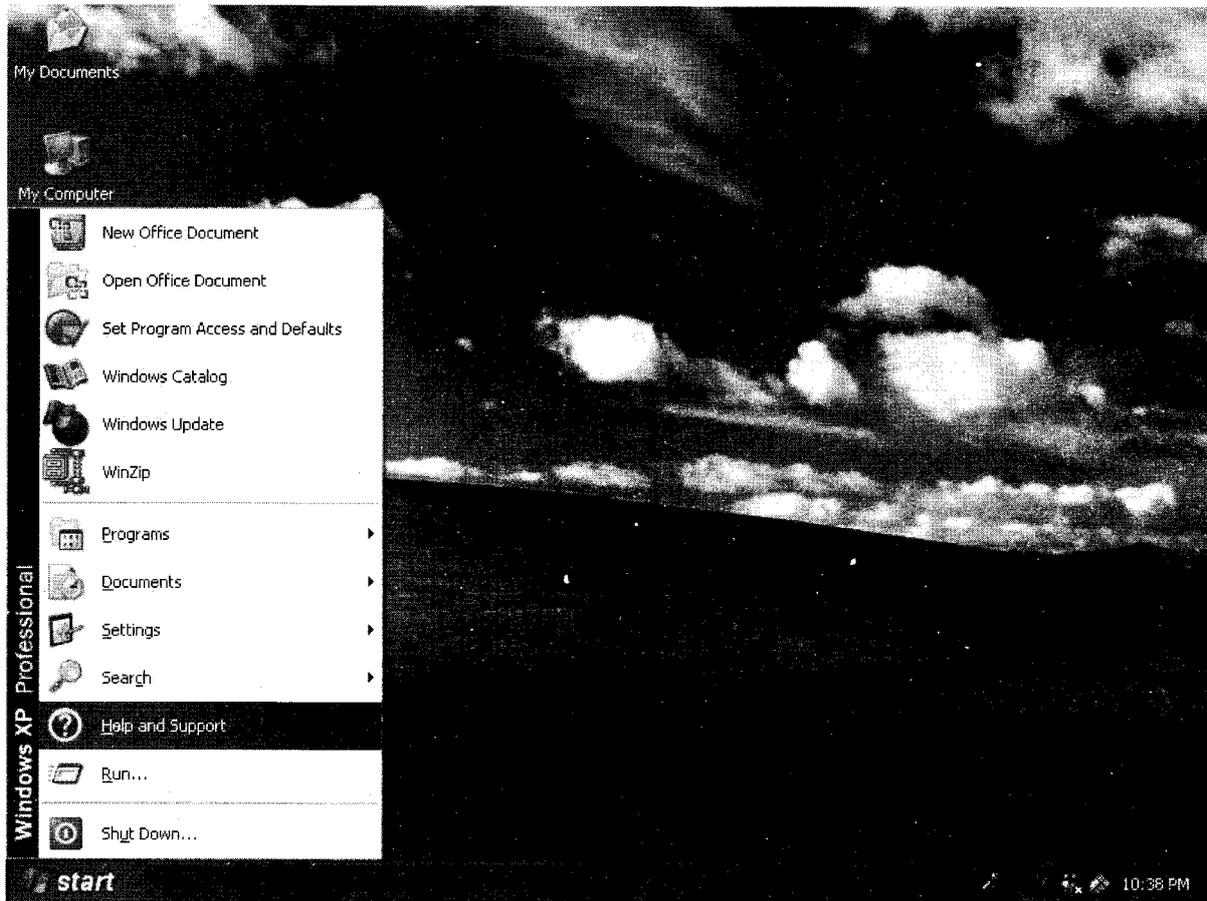
1. CLICK start
2. Go to SEARCH
3. The Search window will opened up according to which you can type what do you want to run your choice to programme.

7.2.2 Getting Help

Windows XP Help is your principal source of information for learning how to use Windows XP. Always available from the Start menu, Help describes how to perform a wide variety of tasks—from setting up a printer to connecting to the Internet. Help also contains a glossary, keyboard shortcuts, troubleshooters, an online version of this book, and links to Web-based resources.

To Open Windows XP Help

1. Click the Start button.



2. On the Start menu, click Help.

Windows XP Help appears. You can find topics listed on the Contents tab, look up keywords on the Index tab, and search for text by using the Search tab.

You can also get information about a dialog box by clicking the question mark button on the title bar and then clicking the dialog box area in question.

7.2.3 To Start a Programme by using the Run Command

1. Click Start, and then click Run.
2. In Open, type the path to the item to be opened, or click Browse to locate it.
3. The Open box lists items the user has opened recently. Click an item in the list, and then click OK to open it.
4. One can open a file or folder or connect to a shared computer by typing its path in the Open box and also connect to an Internet or intranet site.

7.2.4 Shutting Down a Window PC

There are so many different ways to turn off your Windows XP computer, let's look at some of them:

1. The standard approach - click the Start Button with your mouse, then select the Turn Off menu and finally click the Turn Off icon on the Turn Off computer dialog.
2. Press Ctrl+Esc key or the Win key and press u two times – the fastest approach.
3. Get the Shutdown utility from Download.com – it add the shut down shortcuts for you. Else create them yourself using approach
4. Create a shutdown shortcut on your desktop. Right click on the desktop, choose New Shortcut and type shutdown -s -t 00 in the area where you are asked to specify the location of the programme file. Now you can just double click this icon to turn off the computer. The best location would be your quick launch bar.
5. Press the Win key + R key to open the run window. Type shutdown -s -t 00. [s means shutdown while t means the duration after which you want to initiate the shutdown process].If some open processes or application won't let you turn off, append a -f switch to force a shut down by closing all active processes.
6. Win+M to minimize all windows and then Alt+F4 to bring the Turn Off computer dialog.
7. Open Windows Task manager (by right clicking the Windows Task bar or Alt+Ctrl+Del) and choose Shut down from the menu. Useful when the Windows are not responding.

7.2.5 Adding and Removing New Programmes

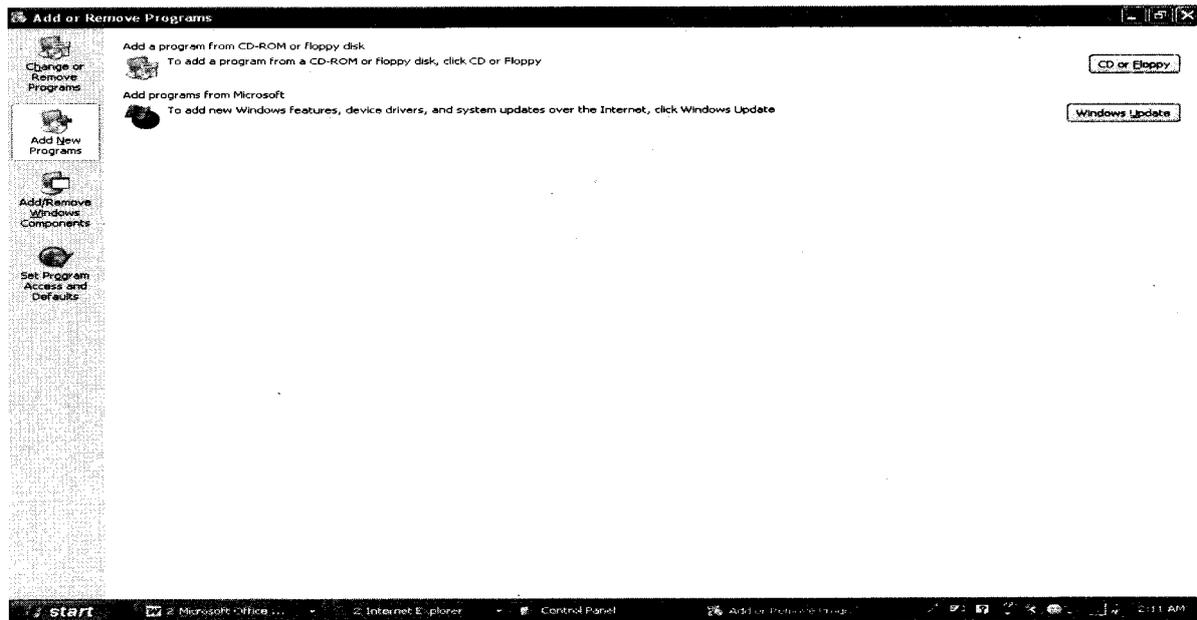
One can use Add/Remove Programmes to easily add new programmes or remove old ones that are taking up necessary space. Once installed, there are several ways to start programmes, and you can store shortcuts to programmes in convenient locations.

Programme windows are very easy to arrange, resize, and move around your screen. You can copy and paste information from one programme to another, or link information so that when you update the file in one programme the information is also updated in the linked programme. Windows 2000 also makes it easy to use your computer to perform tasks in several programmes simultaneously.

Add New Programmes

1. To add a programme from a CD or floppy disk
2. Open Add/Remove Programmes in Control Panel
3. Click Add New Programmes, and then click CD or Floppy
4. Follow the instructions on the screen.

When using Add/Remove Programmes, you can install only programmes that were written for Windows operating systems



To add a Programme from a Network

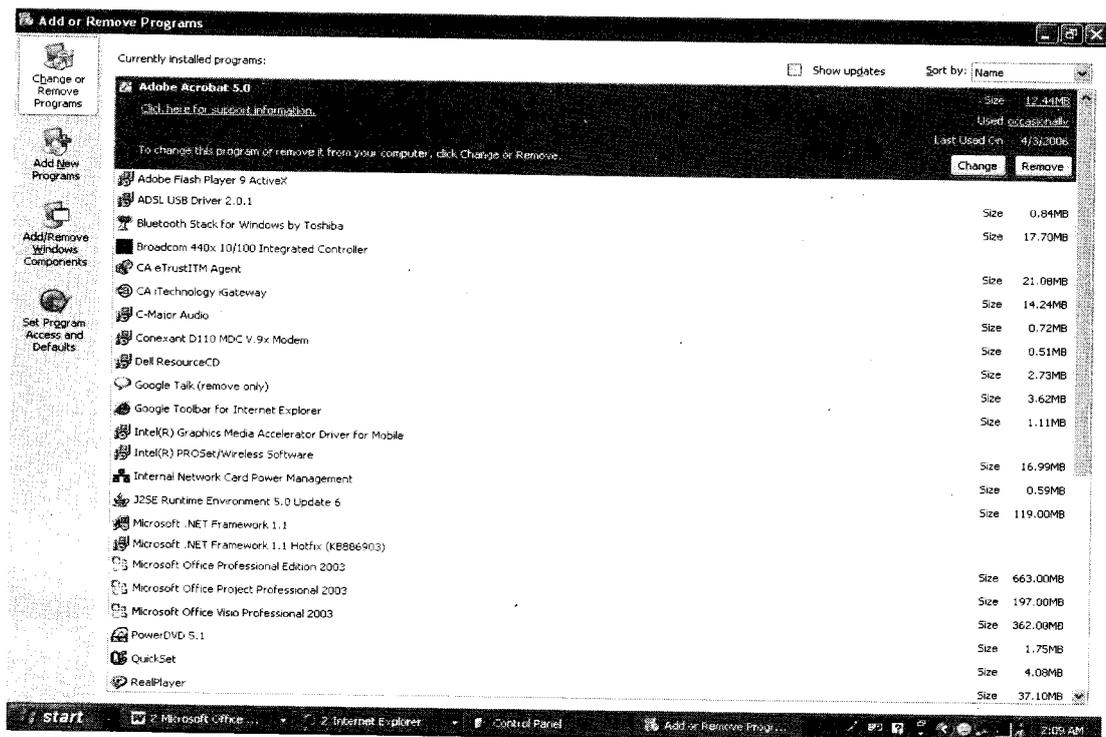
1. Open Add/Remove Programmes in Control Panel.
2. Click Add New Programmes.
3. Select the programme to be added, and then click Add.
4. Follow the instructions on the screen.

To Add Features from Microsoft Windows Update

1. Open Add/Remove Programmes in Control Panel.
2. Click Add New Programmes, and then click Windows Update.
3. Follow the instructions on the Web site to locate and add new Windows features, system updates, and device drivers.

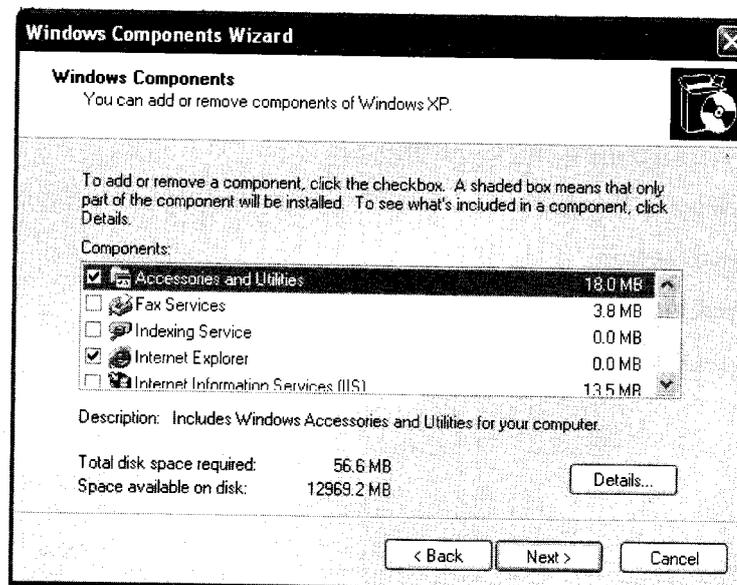
To Change or Remove a Programme

1. Open Add/Remove Programmes in Control Panel.
2. Click Change or Remove Programmes, select the programme to be changed or removed.
3. Click the appropriate button.
4. To change a programme, click Change/Remove or Change.
5. To remove a programme, click Change/Remove or Remove.



To Add or Remove a Windows 2000 Component

1. Open Add/Remove Programmes in Control Panel.
2. Click Add/Remove Windows Components.
3. Follow the instructions in the Windows Components wizard.
4. You need to be logged on as an administrator or a member of the Administrators group in add or remove Windows component. If the computer is connected to a network, network policy settings may also prevent the user from completing this procedure.



7.2.6 To Start a Programme from the Start Button

Click Start, point to Programmes, locate the programme you want to start, and then click it.

7.2.7 To Toggle between Running Programmes

After you start a programme, a button representing the programme appears on the taskbar. To switch from one running programme to another, click its taskbar button. Press ALT+TAB to switch to the last open programme or document by pressing, or cycle through open windows by holding down ALT and repeatedly pressing TAB.

7.2.8 To Quit or Close a Programme

On the File menu of the programme you are using, click Exit or click  at the far right of the title bar.

7.2.9 To Minimize or Maximize a Window or Restore it to its Previous Size

To minimize all open windows and dialog boxes, click  on the taskbar. Minimized windows appear as buttons on your taskbar. Click  again to restore all windows to their previous size. Double-clicking the window's title bar also maximizes or restores it to its previous size.

7.2.10 To Start a Programme Each Time you Start Windows 2000

1. Click Start, point to Settings, and then click Taskbar & Start Menu
2. Click the Advanced tab, and then click Advanced.
3. In the Start Menu folder, find the shortcut to the programme you want to start each time you start Windows 2000, and drag it to the Startup folder

7.2.11 To Run Programmes using Windows Explorer

To open Windows Explorer, click Start, point to Programmes, point to Accessories, and then click Windows Explorer.

1. Open Windows Explorer
2. Click the file that you want
3. On the File menu, click Properties
4. Click Change
5. Click the name of the programme that you want to open the file, or click Other to select a programme that is not listed.

7.2.12 Running Programmes from a Document

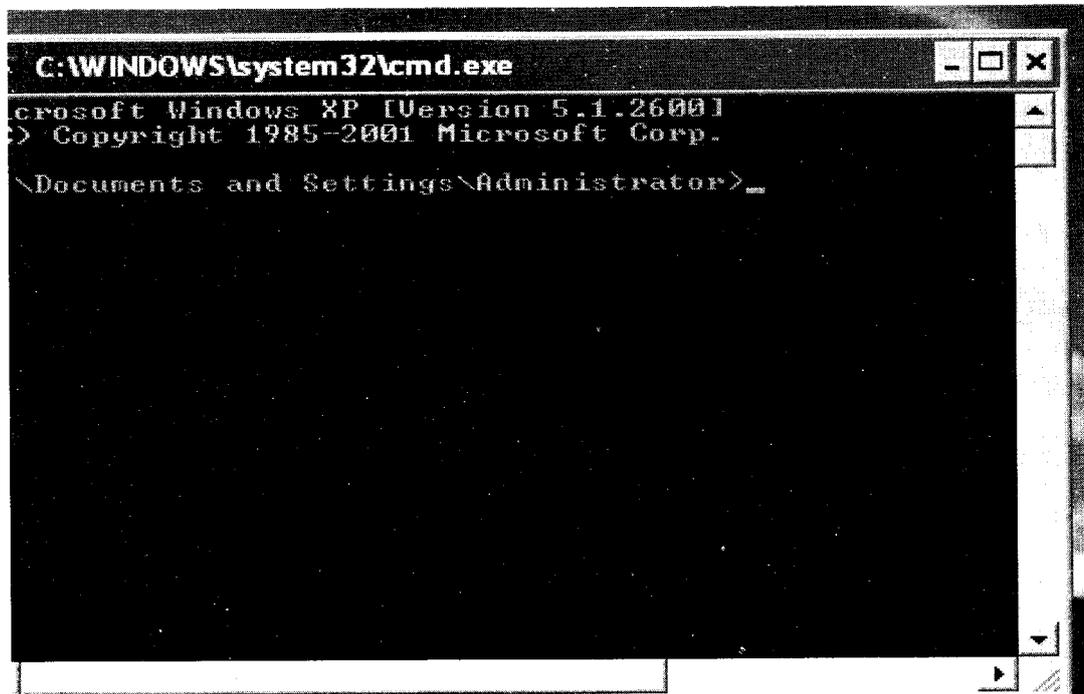
One can specify a programme by selecting a file, clicking the file menu, clicking open with, and then clicking a programme name, or clicking other, and then selecting the name of the programme.

7.2.13 Working from the Command Prompt

Opening a Command Prompt

There are two conventional ways to start a Command prompt.

1. Start, Programmes, Accessories, Command prompt
2. Start, Run and type "cmd" (minus quotes) and press enter.



7.2.14 Looking at the Registry

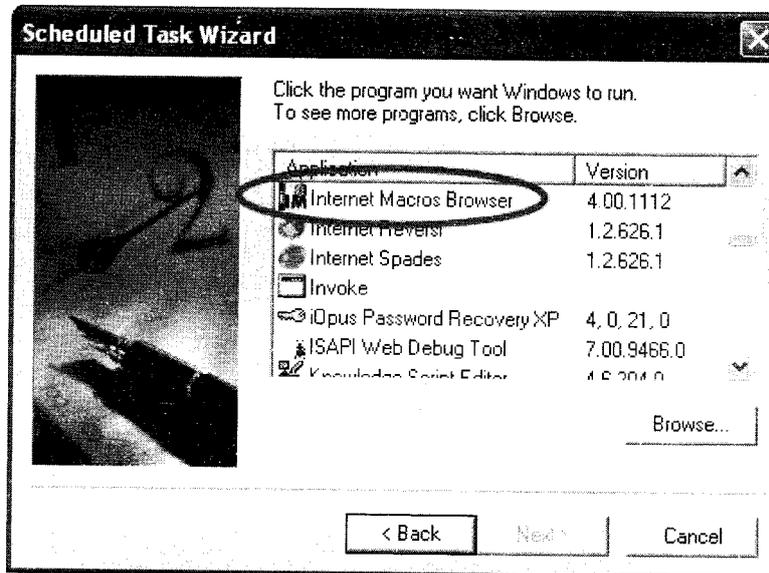
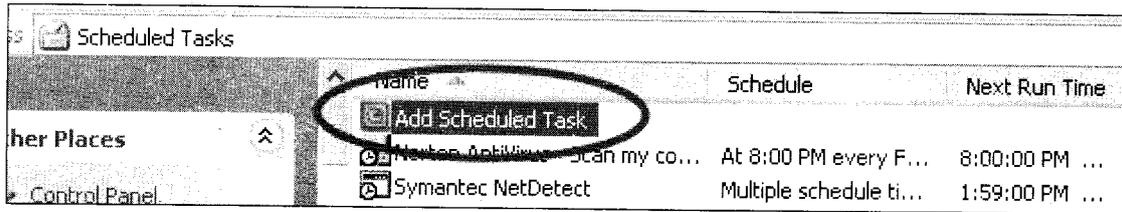
The Windows registry is a database which stores settings and options for the operating system for Microsoft Windows 32-bit versions, 64-bit versions and Windows Mobile. It contains information and settings for all the hardware, software, users, and preferences of the computer. Whenever a user makes changes to "Control Panel" settings, or file associations, system policies, or installed software, the changes are reflected and stored in the registry.

7.2.15 Scheduling Tasks

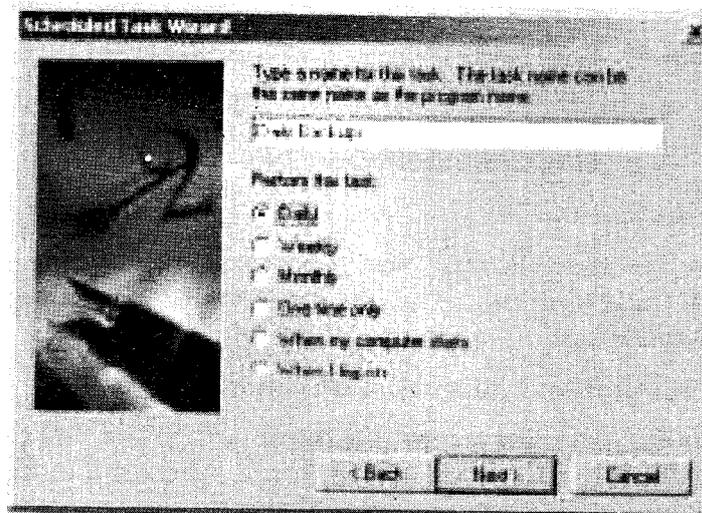
Adding a New Scheduled Task

1. Click on the My Computer icon located on the Desktop.
2. Then double-click on Control Panel to get to the Scheduled Tasks folder.
3. Double-click Add Scheduled Task.
4. Follow the instructions in the Add Scheduled Task wizard.
5. Select the Open advanced properties for this task for more set up options.

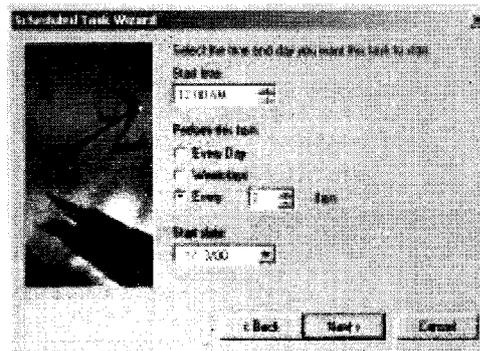
Add Task and Select Programme in the List of Programmes



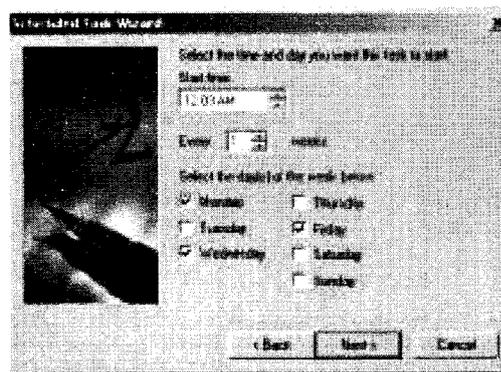
- Name the task in such a way that you can easily identify and determine what the task does
- Select a run schedule for the task and the tasks can be scheduled to run periodically as in whether daily, weekly, or monthly or only when a specific event occurs, such as when the computer starts or when the task's user logs on.
- Click Next to select a date and time to run the scheduled task.
- The next dialog box depends on when the task is scheduled to run.



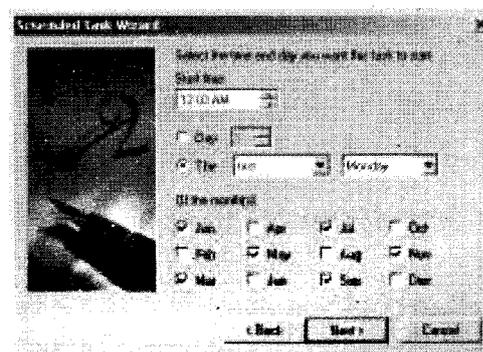
Naming the Task and Selecting a Run Schedule



Configuring a Daily Scheduled Task



Configuring a Weekly Scheduled Task



Configuring a Monthly Scheduled Task

After configuring a start date and time, click Next then type a username and password which can be used when running the scheduled task. This username must have appropriate permissions and privileges to run the scheduled task.

The final wizard dialog box provides a summary of the task scheduled.

Click Finish to complete the scheduling process. If an error occurs when you create the task, you'll see an error prompt. Click OK. The task should still be created. Afterward, in Explorer double-click the task to correct the problem in the related properties dialog box.

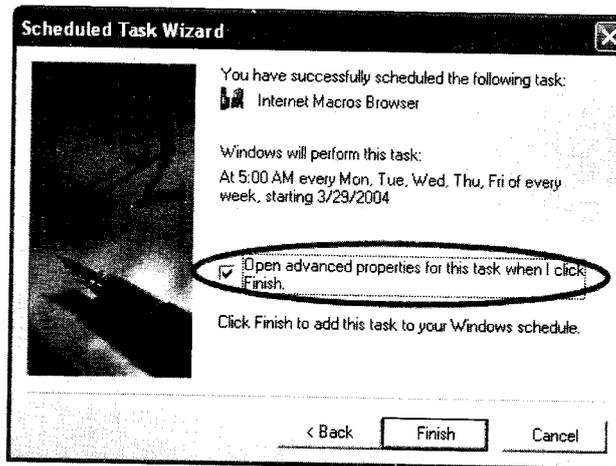
Modifying Existing Scheduled Task

Entries in the Scheduled Tasks folder show currently scheduled tasks.

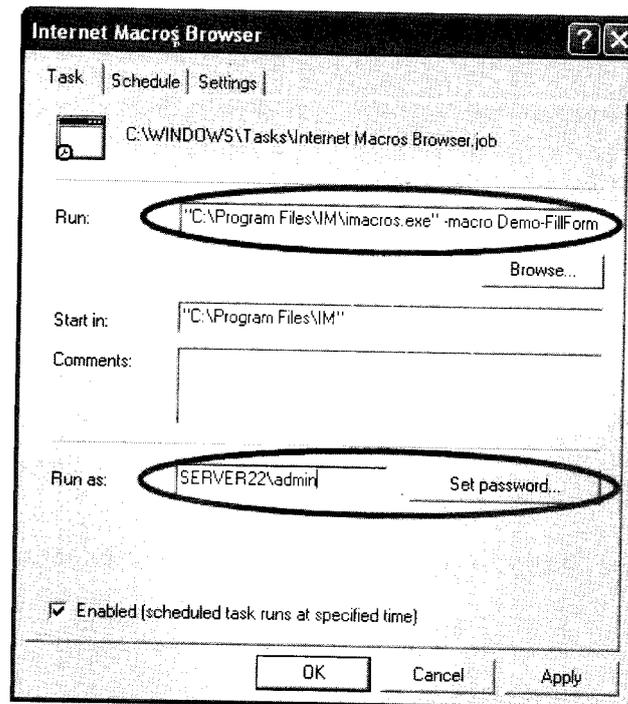
You can work with entries in the Scheduled Tasks folder by completing the following steps:

1. Double-click Add Scheduled Task to start the Task Scheduler Wizard.
2. Double-click an existing task entry to view or change its properties. You can set advanced options through the Settings tab.
3. Select a task entry and press Delete to delete the task.

7.2.16 Using the Advanced Menu



In the Advanced Options, Check the Executable Path



Check Your Progress

1. What is Windows XP Help?
2. Write the steps for removing a programme.

7.3 LET US SUM UP

One can run programmes through various ways by using the Start Menu, by using Windows Explorer, by using Search and running programmes from a document.

We can also configure in such a way that a programme starts automatically when we start the Windows 2000 professional.

We can run programmes minimized when we are simultaneously working with two or more programmes at the same time and switch between these programmes by clicking the programme button at the taskbar.

We can also work and run programmes using the run command and command prompt in Windows 2000 Professional. They can be accessed from the Start Menu itself.

Also Windows 2000 Professional allows the user to add and remove programmes according to our choice. If the programmes on the computer are found to be defective we can change or remove them as well as add new programmes which we need for our work.

Not only programmes we can add and remove windows components which had got installed during the Setup of the operating system.

Windows registry contains information and settings for all the hardware, software, users, and preferences of the computer. Whenever you make changes to "Control Panel" settings, or file associations, system policies, or installed software, the changes are reflected and stored in the registry.

Also one can schedule task which will run for duration according to our choice, say daily, weekly, monthly or one time. One can schedule one-time or recurring tasks to run automatically at any hour of the day or night using the Task Scheduler Wizard.

7.4 KEYWORDS

Start Menu: The menu that is brought up when one clicks on the Start button on the task bar.

Programmes: A computer programme (often simply called a programme) is an example of computer software which specifies what actions or computations the computer has to carry out.

Document: A file created using an application for example a text document using a word processing application.

Command Prompt: A screen symbol such as C:> that requests user input. Also called the MS-DOS prompt.

Registry: Windows registry contains information and settings for all the hardware, software, users, and preferences of the computer. Whenever you make changes to "Control Panel" settings, or file associations, system policies, or installed software, the changes are reflected and stored in the registry.

Scheduling Tasks: Scheduling one-time or recurring tasks to run automatically at any hour of the day or night.

7.5 QUESTIONS FOR DISCUSSION

1. Explain how will you run programme from the Start Menu also explain its reach with the explorer.
2. How will you add a new programme from a CD or a Floppy Disk?
3. What does the windows component wizard help you with?
4. How will you run programmes from a document?
5. *What is meant by Windows Registry?*
6. How will you modifying existing scheduled task? Give examples.
7. How can you configure a time bound scheduled task?
8. If one of the programmes on your computer is not working properly how will change or remove it?
9. If you don't have the administrator rights, can you add and remove windows component?
10. How would you use the run command to start a programme? Explain using one programme and try running it from the run command.
11. Explain how using the Task Scheduler service you can schedule one-time or recurring tasks to run automatically at any hour of the day or night.
12. How would you change a daily scheduled task to one which is weekly scheduled? Explain the steps.

Check Your Progress: Model Answers

1. Windows XP Help is your principal source of information for learning how to use Windows XP. Always available from the Start menu, Help describes how to perform a wide variety of tasks—from setting up a printer to connecting to the Internet. Help also contains a glossary, keyboard shortcuts, troubleshooters, an online version of this book, and links to Web-based resources.
2. Steps for removing a programme are defined as follows:
 - (i) Open Add/Remove Programmes in Control Panel.
 - (ii) Click *Change or Remove Programmes*, select the programme to be changed or removed.
 - (iii) Click the appropriate button.
 - (iv) To change a programme, click *Change/Remove* or *Change*.
 - (v) To remove a programme, click *Change/Remove* or *Remove*.

7.6 SUGGESTED READINGS

Jerry Honeycutt, *Introducing Microsoft Windows 2000 Professional*, Microsoft Pr (May 1999).

Sybex, Sybex Inc., *Windows 2000 Complete Sybex Books*; 1st edition (June 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional Resource Kit*, Microsoft Press; Bk&CD Rom edition (March 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional*, Microsoft Press; Package edition (July 2001).

LESSON

8

SETTINGS OF THE DESKTOP

CONTENTS

- 8.0 Aims and Objectives
- 8.1 Introduction
- 8.2 Opening Control Panel
 - 8.2.1 Making Windows Professional more Accessible
 - 8.2.2 Specifying Accessibility Options
 - 8.2.3 Using the Accessibility Accessories
 - 8.2.4 Setting up the Active Desktop
 - 8.2.5 Modifying the Display of Colours and Resolution
- 8.3 Customizing the Desktop Background
 - 8.3.1 Background
 - 8.3.2 Screen Saver
 - 8.3.3 Appearance
 - 8.3.4 Web
 - 8.3.5 Effect
 - 8.3.6 Settings
- 8.4 Adjusting Desktop Icons and Effects
 - 8.4.1 To Set or Change the look of Individual Desktop Items
 - 8.4.2 To Set or Change Visual effects in Windows 2000
 - 8.4.3 To Change Fonts displayed on your Desktop
- 8.5 Establishing the Regional Settings
 - 8.5.1 To Install Additional Languages
 - 8.5.2 To Add an Input Locale and Keyboard Layout
 - 8.5.3 To Switch to Another Input Locale
- 8.6 Adjusting the Date and Time
 - 8.6.1 To Change your Computer's Time and Time Zone
 - 8.6.2 Personalizing the Start Menu
 - 8.6.3 To Add a Shortcut to the Start menu or a Submenu
- 8.7 Let us Sum up
- 8.8 Keywords
- 8.9 Questions for Discussion
- 8.10 Suggested Readings

8.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss customizing your desktop
- Discuss using the control panel
- Discuss setting up the active desktop
- Discuss making windows 2000 professional more accessible
- Discuss specifying accessibility options, using the accessibility accessories
- Discuss enabling web content, establish regional settings, adjusting time and date etc
- Personalize the start menu

8.1 INTRODUCTION

This lesson will introduce to how you can set up Active desktop and make Windows 2000 more accessible, how you can specify accessory options and use the accessibility options. You will learn how to customize the desktop keyboard, mouse and customize the desktop which will enable you to display your favorite screen saver, display as well as manipulate the display of color and resolutions. You will also learn how to adjust your regional settings according to where you might be placed, adjust date and time accordingly as well as learn to personalize your Start Menu according to how you prefer it.

8.2 OPENING CONTROL PANEL

To open a Control Panel item, click Start, point to Settings, click Control Panel, and then double-click the appropriate icon.

8.2.1 Making Windows Professional more Accessible

The appearance and behavior of Windows can be changed to enhance accessibility for the vision-impaired, hearing-impaired, and mobility-impaired users without installing additional software or hardware.

To enhance accessibility Windows provides the following programmes:

1. The Magnifier helps in easier viewing by enlarging a portion of the screen.
2. Narrator by using text-to-speech technology enables one to read the contents of the screen aloud.
3. For people with limited mobility the On-Screen Keyboard provides the ability to type on-screen using a pointing device.
4. Utility Manager enables users with administrator-level access to check an Accessibility programme's status, start or stop an Accessibility programme, and designate to have the programme start when Windows starts.

8.2.2 Specifying Accessibility Options

One can use Accessibility Options in Control Panel to set up the ways in which the keyboard, display and mouse you want to use them.

The functions performed by the accessibility tools available in Accessibility Options are:

1. StickyKeys enables simultaneous keystrokes while pressing one key at a time.
2. FilterKeys adjusts the response of your keyboard.
3. ToggleKeys emits sounds when certain locking keys are pressed.
4. SoundSentry provides visual warnings for system sounds.
5. ShowSounds instructs programmes to display captions for programme speech and sounds.
6. High Contrast improves screen contrast with alternative colors and font sizes.
7. MouseKeys enables the keyboard to perform mouse functions.
8. SerialKeys allows the use of alternative input devices instead of a keyboard and mouse.

The Accessibility tools are aimed at providing a minimum level of functionality for users with special needs. Most users with disabilities will need utility programmes with higher functionality for daily use. The Accessibility wizard helps to set up the options and programmes according to individual needs.

8.2.3 Using the Accessibility Accessories

Configuring Windows for people who are blind or have low vision

1. Using Display in Control Panel, select larger fonts and icons, increase the size of screen elements by using a lower screen resolution, or change the size of windows and window borders.
2. Using Mouse in Control Panel, adjust mouse properties to display larger or more visible mouse pointers and control the speed and animation of the mouse pointer.
3. When using Windows-based programmes, change font sizes and colors, background color, and window size. In some programmes, you can magnify the elements that are displayed in the programme's window.
4. Using the Properties or Default dialog boxes in MS-DOS programmes, change font types, sizes, and colors, background color, and the size of the cursor and programme window.

The following tools are available with Windows.

- **Using High Contrast:** Specify that Windows 2000 use colors and fonts that are designed for easy reading.
- **Using Magnifier:** Magnify a portion of the screen to make it more easily readable.
- **Using Narrator:** Narrator is a text-to-speech programme that reads aloud the text that is displayed on the screen.
- **Using ToggleKeys:** ToggleKeys causes tones to sound when Caps Lock, Num Lock, and Scroll Lock are pressed.

Configuring Windows 2000 for people who are deaf or hard-of-hearing

People who are deaf or hard-of-hearing can configure Windows to use visual cues in place of sounds, or increase the volume level of programme and system sounds.

- **Use SoundSentry:** SoundSentry displays a visual warning, such as a blinking programme window, when the computer's built-in speaker makes a sound.

- **Use ShowSounds:** ShowSounds instructs programmes to provide visual cues, such as informative icons or text, for events that are normally only indicated by a sound.
- **Use Sound Schemes:** Use Sound Schemes to assign custom sounds to events. People who have difficulty hearing sounds within a certain frequency range can use sound schemes to adjust system and programme sounds to make them more audible.

Configuring Windows for people who have a mobility impairment

People who have motion-related disabilities can use Windows to configure their system to provide a more comfortable computing environment and help minimize the impact of mobility impairments on their work.

- Keyboard in Control Panel provides keyboard layouts for users of alternative keyboards. This is especially useful for those who type with one hand.
- Mouse in Control Panel configures the mouse for right- or left-handed users, adjusts double-click speed, pointer speed, and acceleration, and causes the mouse pointer to go directly to default buttons in dialog boxes.
- **Use FilterKeys:** Using FilterKeys, located in Accessibility Options in Control Panel, you can tell Windows 2000 to ignore brief or repeated keystrokes.
- **Use MouseKeys:** Using MouseKeys, located in Accessibility Options in Control Panel, you can control the pointer with the numeric keypad on your keyboard.
- **Use On-Screen Keyboard:** On-Screen Keyboard users can type using the pointing device.
- **Use SerialKeys:** SerialKeys, located in Accessibility Options in Control Panel, provides alternative access to keyboard and mouse features.
- **Use StickyKeys:** StickyKeys, located in Accessibility Options in Control Panel, provides access to the SHIFT, CTRL, ALT, or  keys by pressing one key at a time.

8.2.4 Setting up the Active Desktop

To turn on Active Desktop

There are three ways of doing it:

- (a) In Control Panel, double-click Folder Options, click the General tab, and then select the Enable Web content on my desktop check box in the Active Desktop menu.
- (b) Right-click a blank area on the desktop, point to Active Desktop, and then select the Show Web content check box.
- (c) In Control Panel, double-click Display, click the Web tab, and then select the Show Web Content on My Active Desktop check box.

To use Larger or Smaller Display Fonts

1. Open Display in Control Panel.
2. On the Settings tab, click Advanced.
3. On the General tab, in the Font Size list, click the font setting you want to use for system fonts.

8.2.5 Modifying the Display of Colours and Resolution

To change the number of colors displayed on a Monitor

1. Open Display in Control Panel.
2. On the Settings tab, if you are using multiple monitors, click the monitor icon that represents the monitor that you want to adjust.
3. In the Colors list, click a color setting.

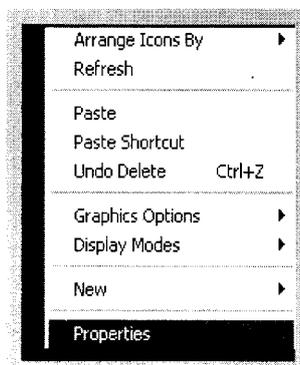
To change your Screen Resolution

1. Open Display in Control Panel.
2. On the Settings tab, under Screen area, drag the slider, and then click Apply.

8.3 CUSTOMIZING THE DESKTOP BACKGROUND

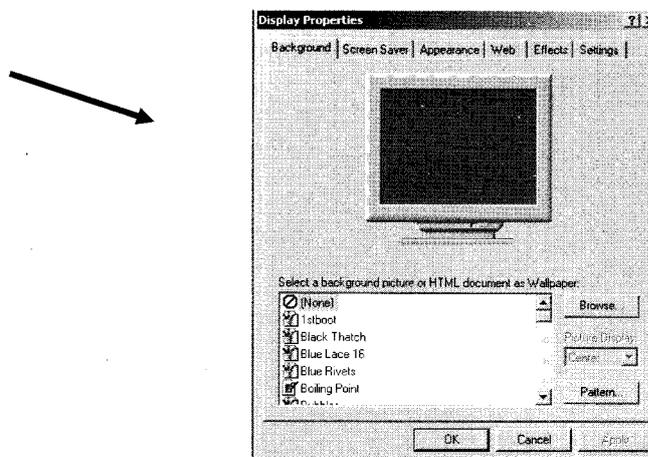
You can customize your desktop to your liking. Simply right click anywhere on the desktop, and scroll down to properties. A window will appear offering several options for changing the way things are displayed on your screen.

After clicking on the properties, we get a dialogue box as shown below:



8.3.1 Background

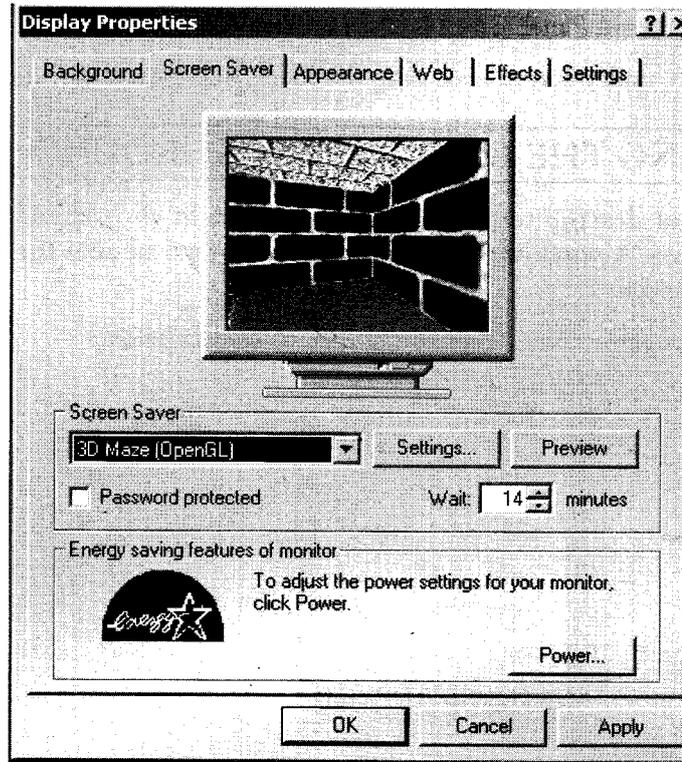
It allows you to select a background picture or html document as wallpaper.



8.3.2 Screen Saver

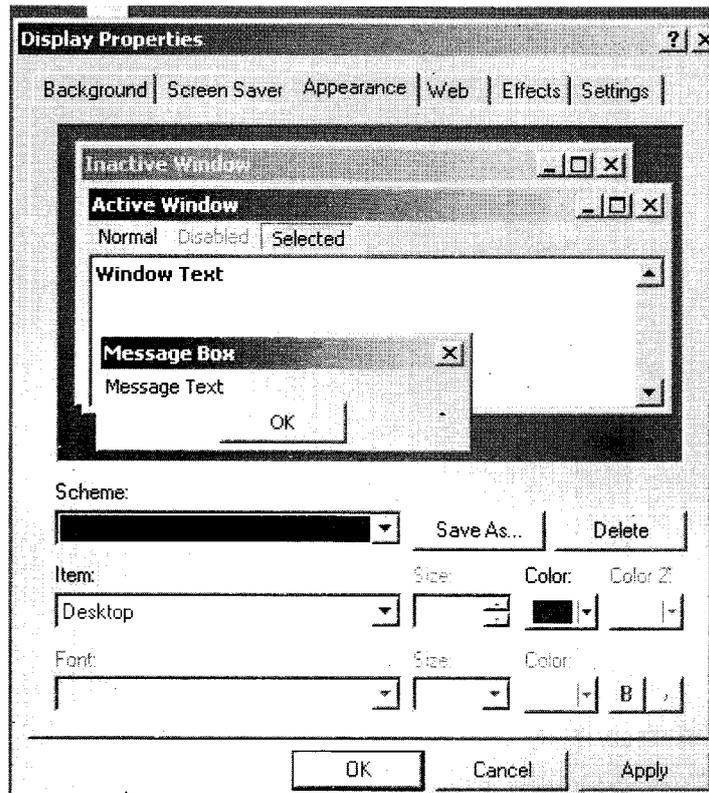
Choosing the Screen Saver

The screensaver has seen quite a few changes since they were first introduced. Originally they prevented images from being permanently burned into the coatings of monitor screens. Over time technology solved that problem and screensavers were next touted as being a security feature. They've become more an expression of individuality and creativity rather than serving a truly necessary function. The [Screen Saver] option consists of a drop down list, which displays the installed screensaver selections.

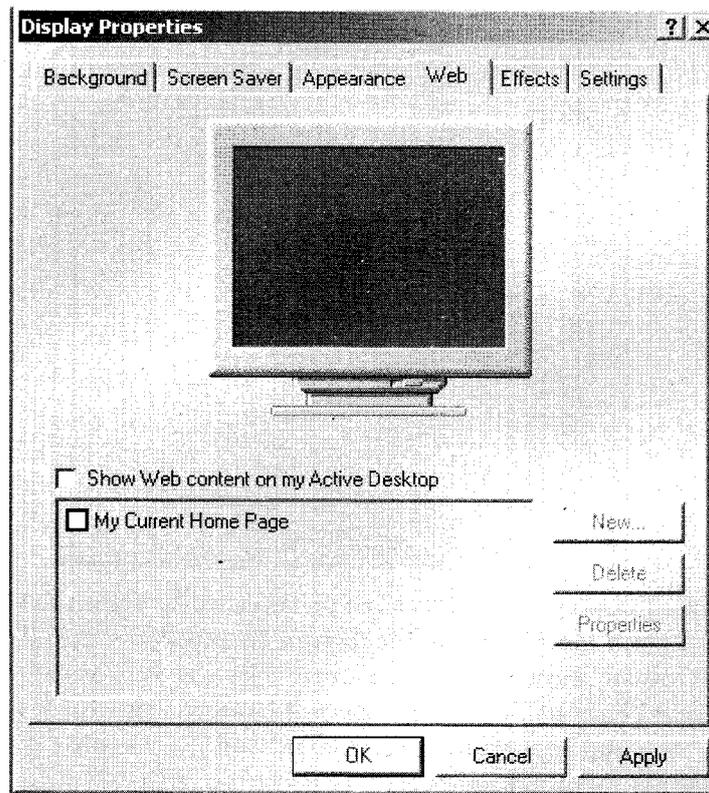


8.3.3 Appearance

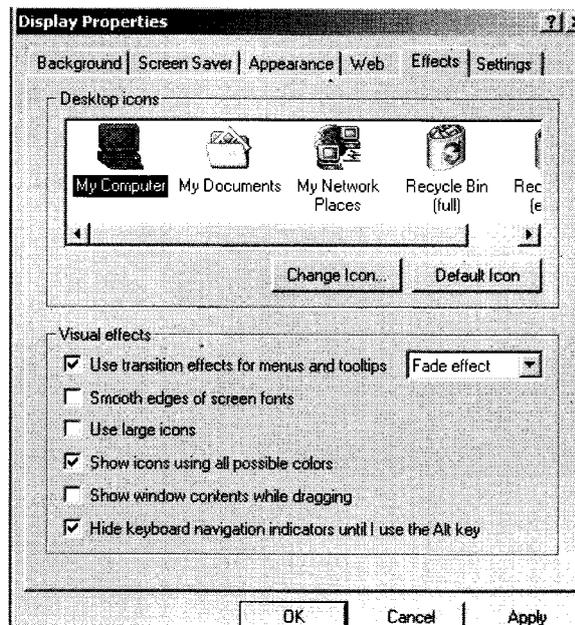
The [Appearance] dialog probably packs more potential customizations into one area than any other in Windows XP will be listed here also.



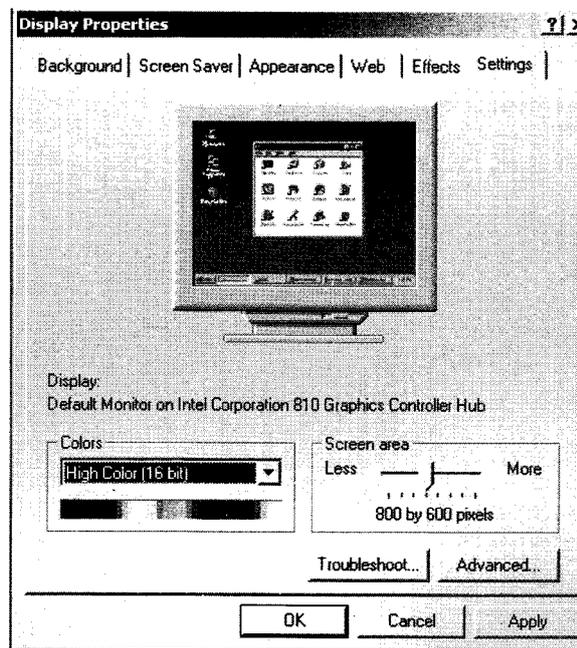
8.3.4 Web



8.3.5 Effect



8.3.6 Settings



When we are dealing with display options that can be impacted by screen resolution and color quality, first thing we do after a clean install is to set the [Screen Resolution] slider. The slider makes it easy to change it to whatever we are most comfortable using. Use the drop down box to select the [Color Quality] and click [Apply] button. The options we will have available for resolution and color quality are directly related to the installed monitor and graphics card. Just because we 'want' to run at 1600 × 1200 in 32-bit color doesn't mean our hardware will make it a reality. On the bright side, if we make a

selection that isn't supported by our hardware, Windows2000 gives us the option to revert to our old settings with no harm done. If there is a problem with the settings we have selected, click [Troubleshoot...] and the [Video Display Troubleshooter] will open. Use the radio buttons to work our way through the troubleshooter until a solution is found. The Troubleshoot tab controls [Hardware Acceleration] via a slider and a feature called [Enable Write combining] via a check box. If the display experiences any corruption this is the place to look. The default settings should suffice for most circumstances.

Enabling web contents on your desktop:

1. Right-click a blank area on the desktop, and then point to Active Desktop
2. Click New Desktop Item.
3. Follow the instructions on your screen.

8.4 ADJUSTING DESKTOP ICONS AND EFFECTS:

8.4.1 To Set or Change the Look of Individual Desktop Items

1. Open Display in Control Panel.
2. On the Appearance tab, in the Item list, click the element you want to change, such as Window, Menu, or Scrollbar, and then adjust the appropriate settings, such as color, font, or font size.

To customize a desktop pattern

1. Open Display in Control Panel
2. On the Background tab, click Pattern to open the Pattern dialog box.
3. In the Pattern list, click the desktop pattern you want to modify, and then click Edit Pattern.
4. Under Pattern, click the blocks to reverse the color and change the pattern.
5. Under Sample, you can see the pattern change with each click. Name, type a new name for your pattern. Otherwise, the selected pattern will be changed.
6. Click Add to add your new pattern to the Pattern list, and then click done.

8.4.2 To Set or Change Visual Effects in Windows 2000

1. Open Display in Control Panel
2. On the Effects tab, select:
 - (a) Use transition effects for menus and tooltips to enable animations such as fading and scrolling.
 - (b) Smooth edges of screen fonts to made text more readable.
 - (c) Use large icons to increase the size of the icons that represent files, folders, and shortcuts.
 - (d) Show icons using all possible colors to display desktop icons using all the colors supported by your display adapter.

- (e) Show window contents while dragging to display the entire contents of a window while you move it on your screen.
- (f) Hide keyboard navigation indicators until I use the Alt key to suppress the drawing of keyboard shortcuts and input focus indicators. These features are automatically activated when you start using the ALT, TAB, or arrow keys to navigate in Windows

8.4.3 To Change Fonts displayed on Your Desktop

1. Open Display in Control Panel.
2. On the Appearance tab, under Item, click the element that displays the font you want to adjust.
3. In Font, click a new font.

8.5 ESTABLISHING THE REGIONAL SETTINGS

8.5.1 To Install Additional Languages

1. Open Regional Options in Control Panel.
2. On the General tab, under Language settings for the system, select the check box next to the language group you want to install.

8.5.2 To Add an Input Locale and Keyboard Layout

1. Open Regional Options in Control Panel.
2. On the Input Locales tab, click Add.
3. In the Add Input Locale dialog box, click the input locale and keyboard layout or Input Method Editor (IME) you want to add.

8.5.3 To Switch to Another Input Locale

1. On the taskbar, click the indicator representing the current input locale, and then click the input locale you want to use.

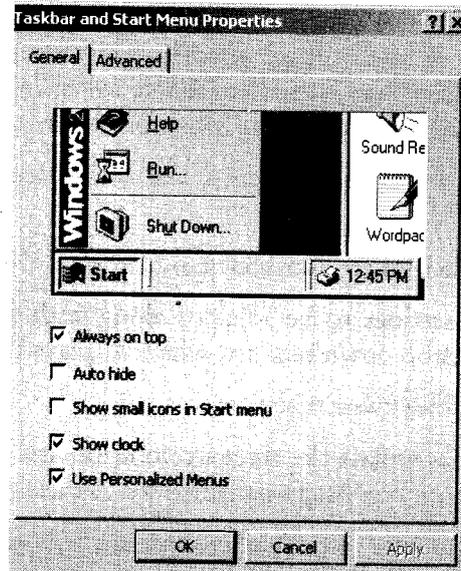
8.6 ADJUSTING THE DATE AND TIME

8.6.1 To Change Your Computer's Time and Time Zone

1. Open Date/Time in Control Panel.
2. On the Date & Time tab, select the item you want to change.
3. To change the hour, select the hour, and then click the arrows to increase or decrease the value.
4. To change the minutes, select the minutes, and then click the arrows to increase or decrease the value.
5. To change the seconds, select the seconds, and then click the arrows to increase or decrease the value.

6. To change the am/pm indicator, select it, and then click the arrows.
7. On the Time Zone tab, in the box above the map, click your current time zone.

8.6.2 Personalizing the Start Menu



One can add and remove items from the Start menu. It's more convenient for many users to put shortcuts on the Start menu for quick access to the files and programmes they use most often. Also if many people are using the same computer, each person can customize the computer without deleting another person's settings. Windows 2000 automatically saves the settings for each user and activates that user's settings when the user logs on.

8.6.3 To Add a Shortcut to the Start Menu or a Submenu

1. Click Start, point to Settings, and then click Taskbar & Start Menu.
2. Click the Advanced tab.
3. Click Add, and then follow the instructions in the Create Shortcut wizard.

Check Your Progress

1. Write the steps to change the number of colours displayed on a monitor.
2. Write the steps to change fonts displayed on your desktop

8.7 LET US SUM UP

The control panel holds mini application (applet) programmes for changing the system environment. Most changes are saved in the system registry.

Windows Professional makes computers more usable through a flexible, customizable user interface, alternative input and output methods, and better visibility of screen elements.

Date and time setting tab allows us to set the time and date, time zone tab allows us to set the time zone in which we live and the internet time tab automatically synchronize the computer with an internet time server.

One can personalize almost everything on the desktop with Active Desktop and use Active Desktop to add Web pages that contain active content to a desktop.

One can customize the desktop to one's liking. Simply right clicking anywhere on the desktop and scrolling down to properties. Various options are available for changing the way things are displayed on the screen. Themes, desktop, appearance, screen saver and settings.

A theme is a background plus a set of sounds, icons, and other elements to help one personalize the computer with one click.

The desktop tab gives the possible backgrounds that can be used.

The Screen saver allows power settings to be adjusted along with selection of the screen saver. The screen saver option consists of a drop down box list, which displays the installed screensaver selections.

Appearance tab adjusts the Windows color schemes.

The settings tab enables us to manipulate the screen resolution and color quality by using the screen resolution slider and the drop down box list from which we can use the color quality.

The Web tab allows a specific web page to be displayed all the time on the desktop.

The effects tab allows desktop icons to be changed.

The Settings tab allows screen size and colors to be changed.

The Start menu can be personalized and shortcuts to programmes can be added to make the menu for efficient One can change Start menu options by going to Settings, clicking the taskbar and start menu tab and then clicking the advanced tab.

To add a shortcut to the Start menu, in taskbar and start menu properties, click Add, and follow the instructions in the Create Shortcut wizard. To add Start menu options, drag and drop programme icons onto the start button.

8.8 KEYWORDS

Control Panel: A programme that comes with Windows that enables you to make settings for many Windows actions, such as changing network, keyboard, printer, and regional settings. Some programmes (including many video card drivers) may add sections to the control panel for you to use to configure that programme.

Accessibility Options: These are options for making the Windows 2000 Professional more accessible to users.

Screen Saver: It allows power settings to be adjusted along with selection of the screen saver. The screen saver option consists of a drop down box list, which displays the installed screensaver selections.

Customization: Making modification to suit individual needs.

Active Desktop: Starting with Internet Explorer IV, Microsoft uses what is called 'push technology' which can change the desktop into a webpage-like interface complete with hyperlinks to your system, network or internet resources.

8.9 QUESTIONS FOR DISCUSSION

1. How do you customize a desktop? Write briefly.
2. How do you select a screensaver?
3. How do you customize the desktop background?
4. What is meant by making Windows more accessible?
5. What are the various tabs of the accessibility options? How would you turn off the accessibility feature? Can you specify a time limit?
6. What is the active desktop? How would you turn on the active desktop?
7. What are the various tabs on the properties dialogue box when you right click on the desktop?

Check Your Progress: Model Answers

1. To change the number of colors displayed on a monitor
 - (i) Open Display in Control Panel.
 - (ii) On the Settings tab, if you are using multiple monitors, click the monitor icon that represents the monitor that you want to adjust.
 - (iii) In the Colors list, click a color setting.
2. To change fonts displayed on your desktop
 - (i) Open Display in Control Panel.
 - (ii) On the Appearance tab, under Item, click the element that displays the font you want to adjust.
 - (iii) In Font, click a new font

8.10 SUGGESTED READINGS

Jerry Honeycutt, *Introducing Microsoft Windows 2000 Professional*, Microsoft Pr (May 1999).

Sybex, Sybex Inc., *Windows 2000 Complete*, Sybex Books; 1st edition (June 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional Resource Kit*, Microsoft Press; Bk&CD Rom edition (March 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional*, Microsoft Press; Package edition (July 2001).

LESSON

9

WORKING WITH FILES AND FOLDERS

CONTENTS

- 9.0 Aims and Objectives
- 9.1 Introduction
- 9.2 My Computer/Using Explorer
 - 9.2.1 Windows Explorer
 - 9.2.2 Using Folders
 - 9.2.3 Opening Files and Folders
 - 9.2.4 Creating a Folder
 - 9.2.5 Creating a File
 - 9.2.6 Sharing Files and Folders
 - 9.2.7 Copying and Moving Files and Folders
 - 9.2.8 Renaming Files and Folders
 - 9.2.9 Deleting Files and Folders
 - 9.2.10 Recycle Bin
 - 9.2.11 Finding Files and Folders
 - 9.2.12 Keeping Files Current with Synchronization Manager
 - 9.2.13 Understanding and Using Folder Options
 - 9.2.14 Handling Floppy Disks
- 9.3 Managing Files and Folders
 - 9.3.1 Working with Frequently Used Files
 - 9.3.2 Using the Local Users and Groups Snap-in
- 9.4 Let us Sum up
- 9.5 Keywords
- 9.6 Questions for Discussion
- 9.7 Suggested Readings

9.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss windows explorer/my computer
- Discuss creating files and folders
- Discuss deleting files and folders
- Discuss copy a file to floppy
- Discuss managing files and folders

9.1 INTRODUCTION

If you prefer to see files in a hierarchical structure (similar to a family tree), you'll like using Windows Explorer. Instead of opening disks and folders in separate windows, you can browse through them in a single window. The left pane of the Windows Explorer window contains a list of your disks and folders, and the right pane displays the contents of the selected folder. You can use the View menu to change how the icons in the right pane appear.

In this lesson we will discuss working with files and folders such as creating files and folders, copy a file, managing files and folders, etc.

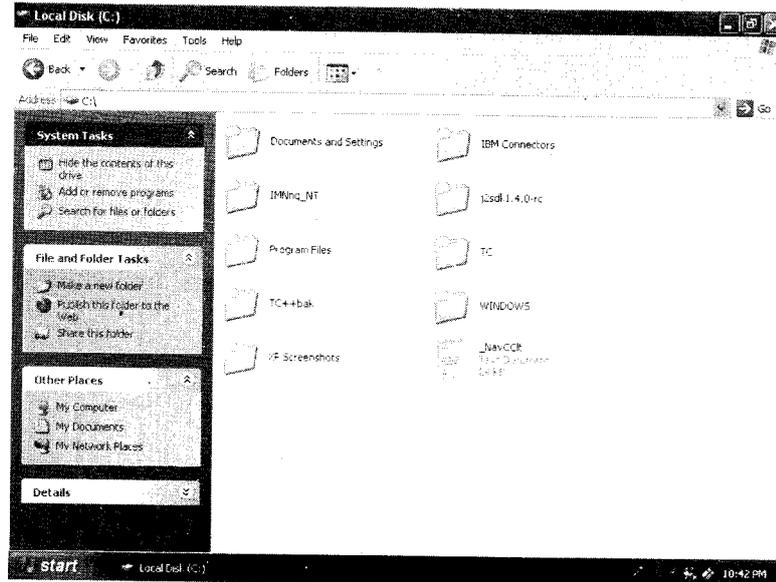
9.2 MY COMPUTER/USING EXPLORER

9.2.1 Windows Explorer

To use Windows Explorer to view the contents of your local (hard) disk:

1. Click the Start button, point to Programmes, point to Accessories, and then click Windows Explorer.
2. In the left pane, click the plus sign next to My Computer, then the plus sign next to your local disk.

The contents of your hard disk appear in the right pane.



9.2.2 Using Folders

Folders are used in Windows 98, Windows 2000, Windows XP, etc., to organize documents and programmes to suit our preferences. We can store these files (documents and programmes) in folders, and we can move, copy, rename, and even search for files and folders.

9.2.3 Opening Files and Folders

After we've located the file we want, we can double-click to open it.

To Open a File or Folder

1. On the desktop, double-click My Computer.
The My Computer window appears.
2. Double-click the drive that contains the file or folder you want to open.
3. Double-click the file or folder.

9.2.4 Creating a Folder

When we use a programme and save our work, or when we install a programme, we're creating files. We can store our files in many locations on the hard disk, a network drive, a floppy disk, and so on. To better organize our files, we can also store them in folders.

To Create a Folder

1. On the desktop, double-click My Computer.
The My Computer window appears.
2. Double-click the disk drive or folder in which you want to create a folder.
The drive or folder window appears.

3. On the File menu, point to New, and then click Folder.

Or

Right-click in the drive or folder window, point to New, and then click Folder.

4. Type a folder name, and then press ENTER.

The new folder appears in the location you selected.

Note File names in Windows 98 can be up to 255 characters, including spaces. However, file names cannot contain any of the following characters:

\ / : * ? “ < > |

9.2.5 Creating a File

Any programme or document that we write in the Windows environment is saved in any storage device in the form of a file.

9.2.6 Sharing Files and Folders

If we set up a Microsoft or Novell network client, we can share our documents with other people on the network. To use file and print sharing, we must first choose which of two types of access we want to give other users.

- Share-level control is the default access setting. It lets us require a password for each shared resource.
- User-level control lets us specify who has access to each shared resource, but it doesn't let us require a password.

To share a folder with share-level access control:

1. In My Computer, right-click the folder you want to share, and then click Sharing.
2. In the Properties dialog box, click the Sharing tab, and then click Shared As.
3. In Share Name, type a name for the folder.

In Comment, you can type a brief comment or a description of the folder.

4. In Access Type, click Read Only, Full, or Depends on Password.

Regardless of which type of access you select, you have the option of adding a password.

5. Type a password if you want to use one, and then click OK.
6. Retype the password, and then click OK.

The folder or printer icon changes to a folder or a printer with a hand, indicating that the item is now shared.

To Share a Folder with User-level Access Control

1. In My Computer, right-click the folder you want to share, and then click Sharing.
2. On the Sharing tab, click Shared As.
3. In Share Name, type a name for the folder.

In Comment, you can type a brief comment or a description of the folder.

4. Click Add.
5. In the Add Users dialog box, click the name(s) of the person(s) to whom you want to grant permissions.
You can scroll the list of users, or you can simply type the name and the list will scroll automatically. If you want to grant the same permissions to everyone connected to your network, leave The World selected.
6. Click the type of access permissions you want to give the selected user(s).
Read Only means the user has the ability to read, but not change, files.
Full Access means the user has the ability to read, delete, and change files.
Custom means the user has a combination of privileges that you specify.
7. When you're finished adding users and permissions, click OK.

9.2.7 Copying and Moving Files and Folders

When we create files and folders, we may want to copy or move them to another location. Unless we're an advanced user, we should avoid moving programme and system files.

To Copy or Move a File or Folder

1. In a window, select the file or folder you want to copy or move.
Note: You can select multiple items. To select nonadjacent items, hold down CTRL and click the items you want to select. To select adjacent items, hold down SHIFT while you select items. To select all of the items in a window, on the Edit menu, click Select All.
2. On the Edit menu, click Copy to copy the file, or click Cut to move the file.
3. Double-click the folder in which you want to place the file or folder.
4. On the Edit menu, click Paste.

The file appears in its new location.

9.2.8 Renaming Files and Folders

If we decide to change the name of a file or folder, we can quickly rename it.

To Rename a File or Folder

1. In a window, select the file or folder you want to rename.
2. On the **File** menu, click **Rename**.
3. Type a name, and then press ENTER

9.2.9 Deleting Files and Folders

Whenever you delete a file, it's temporarily moved to the Recycle Bin on your desktop. If you change your mind, you can restore the file. However, when you empty the Recycle Bin, all of the items in it are permanently deleted from your computer.

To Delete Files and Folders

1. On the desktop, double-click My Computer.
The My Computer window appears.
2. Select the file or folder you want to delete.
3. On the File menu, click Delete.
The Confirm File Delete dialog box appears.
4. Click Yes.
The file is moved to the Recycle Bin.

To Permanently Delete Files and Folders

1. On the desktop, double-click Recycle Bin.
The Recycle Bin opens.
2. On the File menu, click Empty Recycle Bin.

9.2.10 Recycle Bin

The Recycle Bin is a temporary storage place for deleted files. You can use it to retrieve files deleted in error. When you delete a file in Windows, it goes to the Recycle Bin. To delete the file permanently, you can empty the Recycle Bin

9.2.11 Finding Files and Folders***To Find a File or Folder***

1. Click Start, point to Find, and then click Files or Folders.
2. In Named, type all or part of the file name.
Enter a word or phrase in Containing text if you do not know the name of a file but know a distinctive word or phrase it contains.
If you want to specify the location to start the search, click Browse.
3. Click Find Now.

Note: If you want the search to be case-sensitive, click the Options menu and make sure a check mark appears next to Case Sensitive. Click to create the check mark; click again to clear it.

9.2.12 Keeping Files Current with Synchronization Manager***To Synchronize Files by Using a Disk***

1. Insert a disk into a disk drive on your main computer.
2. Copy files to My Briefcase.
3. Drag the My Briefcase icon to the disk.
The contents of My Briefcase are copied to the disk.

4. Insert the disk into a disk drive on your portable or laptop computer, and then edit the files in My Briefcase.
5. When you are ready to synchronize the files, reinsert the disk containing My Briefcase into a disk drive on your main computer, and then double-click My Briefcase.
6. On the Briefcase menu, click Update All.
Or, to update only some files, click the files you want to update, and then click Update Selection.

To Synchronize Files on Connected Computers

1. On your portable computer, copy files from shared folders on your main computer to My Briefcase.
2. Work on your files on your portable or laptop computer.
3. When you have finished working on the files, connect the two computers, and then double-click My Briefcase.
4. On the Briefcase menu, click Update All.
Or, to update only some files, click the files you want to update, and then click Update Selection.

Notes

- When you copy files from your main computer to My Briefcase, the two computers must be connected, either over a network or by a cable.
- When you work in your files, your computers do not need to be connected.

9.2.13 Understanding and Using Folder Options

The Folder Options dialog box has three tabs:

1. **General Tab:** It contains three styles to choose from, for folders. These are:
 - (i) *Web Style:* The computer looks and acts like the Web (e.g., single-click to open).
 - (ii) *Classic Style:* The computer defaults to Windows classic settings.
 - (iii) *Custom:* Based on settings the user chooses.
2. **View Tab:** It contains the following:
 - (i) Folder views
 - (a) Like Current Folder
 - (b) Reset All Folders
 - (ii) Advanced Settings
3. **File Types Tab:** It lists the various registered file types and provides for *addition, removal* and *editing* of a file type.

9.2.14 Handling Floppy Disks

Copying a Floppy Disk

To Make a Copy of a Disk

1. In My Computer or in the right pane of Windows Explorer, click the icon for the disk you want to copy.
2. On the File menu, click Copy Disk.
3. In Copy from, click the drive you want to copy from.
4. In Copy to, click the drive you want to copy to.
5. Click Start.

Notes

- You can use the same drive for both disks.
- The disks must be the same type.
- Any existing information on the disk you copy to will be deleted.

To copy a File or Folder to Floppy

1. If you are copying a file or folder to a floppy disk, insert the disk in the disk drive.
2. In My Computer or Windows Explorer, click the file or folder you want to copy.
3. On the File menu, point to Send To, and then click the drive you want to copy the file or folder to.

Notes

- To select a folder in the left pane of Windows Explorer, click the folder.
- Sending a file or folder to a disk sends a copy. The original file or folder remains in the original location.

Formatting a Floppy Disk

1. If you are formatting a floppy disk, insert the disk into its drive.
2. In My Computer or in the right pane of Windows Explorer, click the icon for the disk you want to format.
3. On the File menu, click Format.

Notes

- Formatting a disk removes all information from the disk.
- You cannot format a disk if it is open in My Computer or Windows Explorer.
- You cannot format a disk if files are open on that disk.

9.3 MANAGING FILES AND FOLDERS

File names in Windows 2000 can be up to 255 characters, including spaces, but can't contain any of the following characters: \ / : * ? " < > |

When you add a programme or use a programme and save your work, you create a file. For example, the Microsoft Word programme is a file, and every document you create with Word is also a file. You

can better organize your files by storing them in folders. For example, you may want to create a folder for each of your projects and keep files associated with the projects, such as documents and saved e-mails, in those folders. You can also move, rename, and delete files and folders.

9.3.1 Working with Frequently Used Files

For easy access to files and folders that you use frequently, you can create shortcuts to them. A shortcut doesn't change the location of a file or folder, nor is it a copy – it's a pointer you use to open the file or folder quickly. Deleting, moving, or renaming the shortcut doesn't affect the original item.

In Microsoft Windows XP Professional, you will find one of three different accounts in use on any given system.

- (a) **Local user accounts:** Local user accounts allow you to log on to the local system and access resources there.
- (b) **Domain users:** Domain user accounts allow you to log on to the domain the user account belongs to in order to access network resources. You may be able to access resources in other domains depending on how the trust relationships are defined or if any modifications have been made to them.
- (c) **Built-in user:** Built-in user accounts allow you to perform administrative tasks on the local system and sometimes they can access local or network resources, depending on their configuration on the network.

9.3.2 Using the Local Users and Groups Snap-in

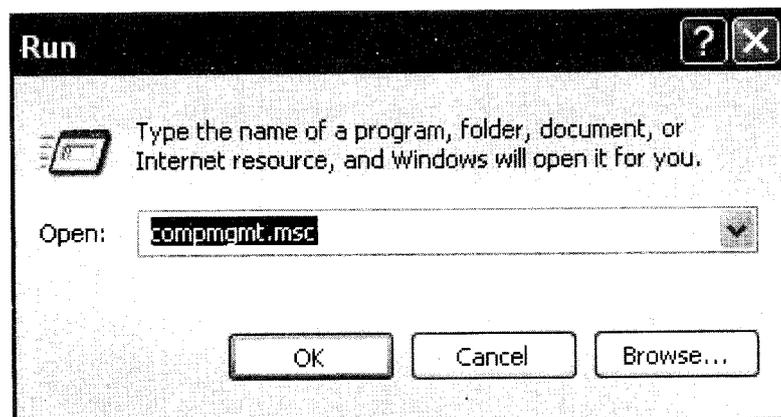
You would normally need to be a local administrator to perform most system configuration functions (even just taking a look at the current configuration settings) on a Windows XP Professional system, and in some cases, there may be a local policy set by some other administrator or if your system is in a Domain, a Domain policy setting, which may prevent you from performing some actions.

To manage local users and groups you can use the Local Users and Groups MMC and you can access this tool a number of different ways.

One way is to select Start, right-click My Computer, and then click Manage, which will open the Computer Management MMC. Under the System tools icon, click Local Users and Groups to open the Local Users and Groups MMC.



You can also type `compmgmt.msc` in the RUN box or from a command line to launch the Computer Management MMC.



Check Your Progress

1. Write the steps used to open file or folder.
2. Write the steps to permanently delete files and folders.

9.4 LET US SUM UP

When we use a programme and save our work or when we install a programme, we are creating files and these files are stored in many locations on the hard disk, a network drive, a floppy disk etc.

Folders are used to organize documents and programmes to suit our preferences.

Folders and files can be moved, copied, renamed and searched.

To open a file or folder, double click the icon My Computers, double click the drive that contains the file or folder and then double click on the file or folder.

To create a folder, one should double click My Computers on the desktop, double click the disk drive or folder in which you want to create a folder and point to New on the file menu and click folder and name it.

Any programme or document written in the Windows Environment is saved in any storage device in the form of a file.

To use a file and print sharing there are two types of access, which are share level control and user level control.

Share level control is the default access setting which requires a user password for each shared resource.

User level control does not require a password and lets us specify who has access to each shared resource.

Synchronization of files to keep them current can be done through two ways: synchronizing files using a disk, synchronizing by using connected computers.

The folder options dialog boxes has three tabs, which are general tab, view, and files tab.

The General tab contains three styles to choose from for folders, which are web style, classical style and custom.

The View tab contains the folder views and the advanced settings.

The Files tab lists the various registered file types and provides addition, removal and editing of a file type.

The whole floppy disk can be copied and files and folders can be sent to a disk.

Formatting a floppy disk removes all the information from the disk.

You cannot format a disk if it is open or files on the disk are open.

9.5 KEYWORDS

File: Any programme or document written in the Windows Environment is saved in any storage device in the form of a file.

Folders: These are used to organize documents and programmes to suit our preferences.

Desktop: Desktop is the main entrance to the resources stored on the computer and beyond. It is a folder on the hard disk located on the windows directory and can contain files, folders and shortcuts.

Web style: This style makes the computer look and act like the Web.

Classical Style: The computer defaults to Windows classic settings.

Custom: This style is based on settings the user does.

Synchronization: Synchronization of files is done to keep them current through two ways: synchronizing files using by using a disk, synchronizing by using connected computers.

Floppy Disk: It is a data storage device that is composed of a disk of thin, flexible ("floppy") magnetic storage medium encased in a square or rectangular or plastic shell. Formatting is the process of preparing a hard disk or other storage medium for use, including setting up an empty file system.

9.6 QUESTIONS FOR DISCUSSION

1. Create a file name Student on the desktop.
2. Create a folder named Trial on the desktop and put the file named Student inside it.
3. What are the two types of access that can be given to other users for file and print sharing?
4. Create a folder named Share and put some files in it which you want to share. Show how you will share this folder with the two types of access control.
5. What is a floppy disk? How would you send a file or folder to a floppy disk?
6. What does formatting a disk drive mean?
7. Create two files and a folder and put these two files inside the folder. How would you delete one of the files permanently?
8. What are the two ways of synchronizing files? How would you synchronize files using a disk?

Check Your Progress: Model Answers

3. To Open a File or Folder
 - (i) On the desktop, Double-click My Computer.
The My Computer window appears.
 - (ii) Double-click the drive that contains the file or folder you want to open.
 - (iii) Double-click the file or folder.
2. To Permanently Delete Files and Folders
 - (i) On the desktop, double-click Recycle Bin.
The Recycle Bin opens.
 - (ii) On the File menu, click Empty Recycle Bin.

9.7 SUGGESTED READINGS

Jerry Honeycutt, *Introducing Microsoft Windows 2000 Professional*, Microsoft Pr May 1999.

Sybex, *Windows 2000 Complete*, Sybex Books; 1st edition (June 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional Resource Kit*, Microsoft Press; Bk&CD Rom edition (March 15, 2000)

Microsoft Corporation, *Microsoft Windows 2000 Professional*, Microsoft Press; Package edition (July 2001)

LESSON

10

PRINTERS AND PRINTING

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10.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss printing overview
- Discuss installing printers
- Specify your default printer

10.1 INTRODUCTION

When you create a document or enter data into a spreadsheet, you may want to see what your work looks like in print. To do this, you must install a printer. The printer might be attached directly to your computer, or it may be a shared network printer located in a common copy room. Once installed, the printer will be listed in the Printers folder as well as in the Print dialog box of the programme you are using.

In this lesson we will discuss document printing, installing various printers, and specifying your default printer.

10.2 PRINTING OVERVIEW

A variety of settings and print options are available once the printer is installed on your computer. For example, you can share your printer with another user or set up a separator page so you can easily identify your document among other documents. You can also change options that specifically affect how a document is printed. For example, you can change the page layout from portrait to landscape or you can change the number of copies that are printed.

10.2.1 To Print a Document

1. Open the document you want to print.
2. On the File menu of the programme you are using, click Print.

Notes:

- In the Print dialog box you can see the number of documents waiting to print on any printer installed on your computer by right-clicking the printer in Select Printer and then clicking Open.
- If you are logged on to a Windows 2000 domain running Active Directory, you can click Find Printer to search for a printer on the network with the capabilities you want, such as high-speed or color printing. For more information on searching for a printer, see Related Topics.
- To store a document as a file rather than sending it to the printer, click the Print to file check box in the Print dialog box.
- For easy access to your printer, you can create a shortcut to it on the desktop. You can double-click the shortcut to open the print queue and view the documents waiting to print. You can print a document without opening it by dragging its icon to a printer in the Printers folder or to a shortcut on your desktop.
- While a document is printing, a printer icon appears next to the clock in the status area on the taskbar. When this icon disappears, it means that your document has finished printing.

10.2.2 Adding Printers

The printer icon will be added to your Printers folder.

1. If you could not install your printer using Plug and Play, or if the printer is attached to your computer with a serial (COM) port, then open Printers

2. Double-click Add Printer to start the Add Printer wizard, and then click Next.
3. Click Local printer, make sure that the Automatically detect my printer check box is cleared, and then click Next.
4. Follow the instructions on the screen to finish setting up the local printer by selecting the printer port, selecting the manufacturer and model of your printer, and typing a name for your printer.

When you are finished, the icon for the printer appears in your Printers folder.

10.2.3 Installing a Network Printer

1. Open Printers
2. Double-click Add Printer to start the Add Printer wizard, and then click Next.
3. Click Network printer, and then click Next.
4. Connect to the desired printer by:
 - ❖ Searching for it in the Active Directory
 - ❖ Typing its name using the following format, or clicking Next to locate the printer on the network: \\printserver_name\share_name
 - ❖ Typing its URL using the following format:
http://printserver_name/Printers/share_name/.printer
5. Follow the instructions on the screen to finish connecting to the network printer.

The icon for the printer appears in your Printers folder.

10.2.4 Installing a Local Printer

1. Connect the printer to the appropriate port on your computer according to the printer manufacturer's instructions.
2. Windows 2000 will automatically install most printers. However, for older printers, you may be required to provide additional information to complete the installation. Choose one of the following, depending on the type of printer you have.

10.2.5 Install a Parallel Port (LPT) Attached Printer

If your printer attaches to your computer with a parallel port (LPT port), connect the printer to your computer, and then open Printers Double-click Add Printer to start the Add Printer wizard, and then click Next. Click Local Printer, make sure the Automatically detect my printer check box is selected, and then click Next. Depending on the printer you are installing, a Found New Hardware message or the Found New Hardware wizard appears to notify you that the printer has been detected and that installation has begun. Follow the instructions on the screen to complete the printer installation.

Alternatively, after connecting your printer, you can start or restart your computer to allow Windows 2000 to automatically start the Found New Hardware wizard.

The printer icon will be added to your Printers folder.

10.2.6 Install a USB or IEEE 1394 Printer

If you install a universal serial bus (USB) or IEEE 1394 printer, Windows 2000 detects it and automatically starts the Found New Hardware wizard. You do not need to shut down or restart your computer. Simply follow the instructions on the screen to finish installing the printer. (You do not need to continue with the instructions below.)

The printer icon will be added to your Printers folder.

10.2.7 Install an Infrared Printer

If you install an infrared printer, Windows 2000 detects it and automatically installs it. You do not need to shut down or restart your computer. First, make sure that the infrared-enabled computer and the printer are turned on. Then, position the two infrared capable devices to within approximately 1 meter of each other to establish a wireless infrared connection. After several seconds the computer will recognize the printer, the printer icon will appear in the status area of the taskbar, and the appropriate drivers will be installed on the computer.

10.3 TO SPECIFY YOUR DEFAULT PRINTER

1. Open Printers
2. If you have more than one printer installed on your computer, right-click the printer you want to use as the default printer, and then click Set as Default Printer.

A check mark appears next to the printer icon in the Printers folder.

10.3.1 To Set Page Orientation

1. Open Printers
2. Right-click the printer you are using, and then click Printing Preferences.
3. On the Layout tab, under Orientation, click one of the following options:
 - (i) Portrait to print vertically on the page.
 - (ii) Landscape to print horizontally on the page.
 - (iii) Rotated Landscape to rotate the print 90 degrees counterclockwise on the page.

10.3.2 To Specify Paper Size

1. Open Printers
2. Right-click the printer you are using, and then click Printing Preferences.
3. Click Advanced, and under Paper/Output click Paper Size.
4. Click the paper size you want.

10.3.3 To Print on One or Both Sides of the Paper

1. Open Printers
2. Right-click the printer you are using, and then click Printing Preferences.

3. On the Layout tab, under Print on Both Sides (Duplex), click one of the following options:
 - (i) None to print on only one side of the paper.
 - (ii) Flip on Short Edge to print on both sides of the paper with pages that are bound on the top edge.
 - (iii) Flip on Long Edge to print on both sides of the paper with pages that are bound on the left edge.

A representation of your selection will appear in the display area of the dialog box.

10.3.4 To View Documents Waiting to Print

- Open Printers
- Double-click the printer for which you want to view the documents waiting to print.

10.3.5 To Pause or Resume Printing of a Document

1. Open Printers
2. Double-click the printer you are using, which opens the print queue.
3. Right-click the document for which you want to pause or resume printing.
4. Do one of the following:
 - (i) To pause printing, click Pause.
The document will not print until you resume printing.
 - (ii) To resume printing, click Resume.

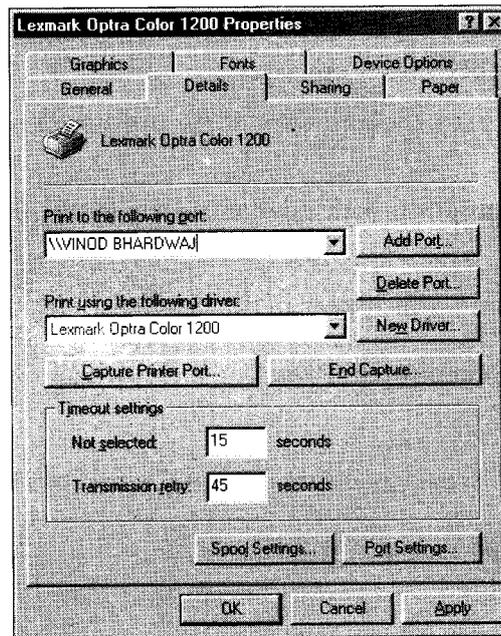
The document will begin printing. However, if higher priority documents are waiting to print, they will print first.

10.3.6 To Cancel Printing of a Document

1. Open Printers
2. Double-click the printer you are using, which opens the print queue.
3. Right-click the document you want to stop printing, and then click Cancel

10.3.7 General Printer Information

The General tab for all printers includes the printer name, location, and comments. You should use the Location and Comments textboxes to help users identify (and find) printers. Develop a companywide convention for these entries. As shown in the figure below, the Printer's Properties menu has got the tabs, like The General Tab, The Ports Tab, The Advanced Tab, The Services Tab, The Device Settings Tab, The Security Tab, and the Color Management Tab. Each tab is for a specific purpose, as indicated by its name.



Check Your Progress

1. Write the steps for setting page orientation.
2. Write the steps to install a local printer.

10.4 LET US SUM UP

One can add network printers by using the Add Printer wizard or Point and Print. Point and Print automatically downloads and installs required printer drivers on the client computer.

One can find a printer by entering the printer name (UNC), browsing the network, or typing a printer URL for printers with known locations or find printers by using Search for Printers or Active Directory.

One can add a local printer by using Plug and Play if supported by the printer or use the Add Printer wizard. Windows 2000 can be prompted to detect Plug and Play printers that use parallel connections using the Add Printer wizard.

Depending on the privileges of the user, implement security can be implemented for printers, establish times when the printer can be used, establish priority for users whose print jobs must print before everyone else's, and manage some or all of the print jobs that have been sent to a printer

One can print documents by clicking Print on the File menu of the programme.

Printer settings are configured by using Printing Preferences.

Print preferences are configured by using the Layout or Paper/Quality tabs.

Printer properties allow each user to set a unique set of persistent properties.

10.5 KEYWORDS

Printer: A computer printer is a computer peripheral device that produces a hard copy from data stored in a computer connected to it.

Network Printer: A printer available for use by workstations on a network. A network printer either has its own built-in network interface card, or it's connected to a printer on the network.

Application: An executable programme capable of performing a specialized function such as games, educational programmes, and communications software. Word processors, databases, and spreadsheets are also examples of an application.

Customization: Modification of packaged software to meet individual requirements.

Desktop: Desktop is the main entrance to the resources stored on the computer and beyond. It is a folder on the hard disk located on the windows directory and can contain files, folders and shortcuts.

10.6 QUESTIONS FOR DISCUSSION

1. How will you add a new printer?
2. Explain the steps in installing a network printer.
3. How would you print a document from the desktop?
4. How would you print a document from an application?
5. How will you set the page orientation and print on both sides of the paper?
6. How will you pause and resume printing of a document?
7. How would you customize the printer's properties?
8. How would you share printers over the network?
9. You set the default printer by clicking on
 - (a) Printing Preferences
 - (b) Default Printer
 - (c) Systems Application
 - (d) None of the above

Check Your Progress: Model Answers

1. To Set Page Orientation
 - (i) Open Printers
 - (ii) Right-click the printer you are using, and then click Printing Preferences.
 - (iii) On the Layout tab, under Orientation, click one of the following options:
 - (a) Portrait to print vertically on the page.
 - (b) Landscape to print horizontally on the page.
 - (c) Rotated Landscape to rotate the print 90 degrees counterclockwise on the page.

Contd...

2. Installing a Local Printer

- (i) Connect the printer to the appropriate port on your computer according to the printer manufacturer's instructions.
- (ii) Windows 2000 will automatically install most printers. However, for older printers, you may be required to provide additional information to complete the installation. Choose one of the following, depending on the type of printer you have.

10.7 SUGGESTED READINGS

Jerry Honeycutt, *Introducing Microsoft Windows 2000 Professional*, Microsoft Pr (May 1999).

Sybex, Sybex Inc., *Windows 2000 Complete Sybex Books*; 1st edition (June 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional Resource Kit*, Microsoft Press; Bk&CD Rom edition (March 15, 2000).

Microsoft Corporation, *Microsoft Windows 2000 Professional*, Microsoft Press; Package edition (July 2001).

LESSON

11

INSTALLING APPLICATION PROGRAMMES AND HARDWARE SYSTEM TOOLS

CONTENTS

- 11.0 Aims and Objectives
- 11.1 Introduction
- 11.2 Installing and Uninstalling a Window Based Application
 - 11.2.1 Uninstalling
- 11.3 Installing Hardware System Tools
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 - 11.3.4 How to Install Paint Shop Brushes
- 11.4 Let us Sum up
- 11.5 Keywords
- 11.6 Questions for Discussion
- 11.7 Suggested Readings

11.0 AIMS AND OBJECTIVES

After studying this lesson, you will be able to:

- Discuss installing application programmes
- Discuss installing hardware system tools such as scan disk, data compression option, paint brush, etc.

11.1 INTRODUCTION

This walkthrough demonstrates the process of creating an installer for a Windows-based application that starts Notepad. In this walkthrough, you will create the Windows-based application. You will then create an installer that sets up shortcuts and file associations, adds an entry to the registry, displays custom dialog boxes, and checks the version of Internet Explorer during installation.

Also we will discuss installing hardware system tools such as scan disk, data compression option, paint brush, etc.

11.2 INSTALLING AND UNINSTALLING A WINDOW BASED APPLICATION

When creating your own installers, some of these steps are not necessary. This walkthrough is intended to introduce you to some of the optional capabilities of deployment that you may find useful. To create a basic installer, complete the first four sets of procedures.

To create a Windows-based application

1. On the File menu, click New Project.
2. In the New Project dialog box, in the Project Types pane, select Visual Basic, and then click Windows Application in the Templates pane. In the Name box, type My Notepad.
3. Click OK to close the dialog box.
4. The project is added to Solution Explorer, and the Windows Forms Designer opens.
5. Select the All Windows Forms tab in the Toolbox and drag a Button control onto the form.
6. Double-click the Button control to add an event handler for the button. In the event handler, add the following code:

Copy

```
Shell("Notepad.exe", AppWinStyle.NormalFocus)
```

This will start Notepad.exe and give it focus.

7. On the Build menu, click Build My Notepad to build the application.

To add the Windows-based application to the installer

1. Select the My Notepad Installer project in Solution Explorer. In the File System Editor, right-click the Application Folder node.
3. On the Project menu, point to Add, and then click Project Output.
3. In the Add Project Output Group dialog box, select My Notepad from the Project list.
4. Select the Primary Output group from the list. In the Configuration box, select (Active). Click OK to close the dialog box.
5. On the Build menu, click Build My Notepad Installer.

11.2.1 Uninstalling

This step will test starting the application from a desktop shortcut and will also test uninstalling it.

To test the installation

1. Verify that the shortcut is installed on the desktop and that it correctly starts the My Notepad application.
2. Uninstall the application by using Add or Remove Programmes in Control Panel. In Add or Remove Programmes, select My Notepad, and then click the Remove button.

Note: To uninstall the application from your development computer, on the Project menu, click Uninstall.

3. The icon should be removed from the desktop and the installed application files and folders should be deleted from your computer.

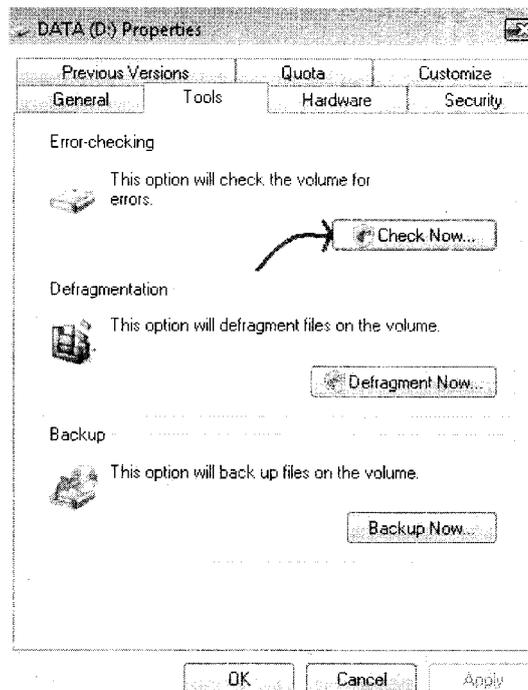
11.3 INSTALLING HARDWARE SYSTEM TOOLS

11.3.1 Scan Disk in Win XP

- Scan Disk needs exclusive access to a drive when it accomplishes. So, if one or more of the files are open on the drive that are required to be scanned, Scan Disk shows a prompt inquiring if you need to plan the drive check for the next time when you restart your computer.
- Scan Disk might be time consuming in scanning, relying on the number of files and folders, the size of the drive, disk performance, and available system resources, like processor and memory.
- Scan Disk might not properly report information in read-only mode.

How to Scan Disk in Win XP

- Press the Start button
- Select My Computer
- Under Hard Disk Drives, highlight the disk which you want to scan
- Open the File menu and choose Properties
- Open the Tools tab
- Click the Check Now button



11.3.2 Installing Data Compression Software

Data compression software locates data and diminishes the quantity of space that is used on the hard disk. These also create ZIP or RAR files that are simpler to handle and drive over the internet. These data compression software tools are usually known as archiving tools, as data is generally compacted during storage and archival. To install data compression software, follow the steps mentioned as below:

1. **Choose:** Start by selecting the data compression software of selection. There are ample to select from, ranging from ARJ, 7 ZIP, Advance Comp, Bzip2, File Roller, Gzip, P7zip, PNGOUT, Pngcrush, Zlib, Winrar, Winzip, and many more. Select your data compression cautiously, as each software will have some drawbacks and flaws. There are some assured compression software that will compress the files to a tiny file size, but which can negotiate the quality of the file when removed, or which may be very time consuming to process. This can be a very big disturbance when dealing out with huge file batches. Also, the objectives of data compression will matter when it comes to selecting which software to opt for. If you are using compression for archiving intentions, you need a software that will work fast over huge batches of files and which will keep your files protected and encrypted as well, but if you are using the compression software to move data over the internet, you will need the minimum file size for the fastest communication.
2. **Download:** After selecting the application, the subsequent step is to go the site. Most of the compression software is free, but you should ensure that you download these from respectable sources. Use licensed download websites like CNET that have confirmed virus and malware free downloads As much as possible. Sometimes, popular compression software is faked from unconfirmed sources, which are websites that enclose software that has been customized and which has been inserted with malware. Certainly, the best sources are the real websites from the manufacturers or authors of the data compression programme. In the main site, you will either find direct downloads or links to sites where you can download clean software. To download, click on the button on the site. It will then routinely download the file for you. If the browser confirms whether you have started the download, click yes to save the file on the computer.
3. **Install:** After the download has finished, you will require right clicking on the file, or double clicking it. It will then display a dialog box that will instruct you via the installation process. In Vista operating systems, you may want to have administration account use preferences to install the software. You can gain this status by logging on as the administrator in the computer's administration account.

With data compression software, you can handle your files simply for improved data storage and to free up your valuable hard disk space. You can also use these compression software tools to chop your files into minor sizes that are simpler to send over the internet.

11.3.3 How to Reinstall Defrag in Windows XP

Frequently defragmenting your hard drive is a simple method to keep it running effortlessly. Windows emerges out with a basic however effective defragmentation programme. That program may sometimes stop working, and Microsoft does not make it obtainable for download. Luckily, it is easy to fix up.

Things You'll Need:

- Windows XP, Windows 2000 or Windows 2003 installed on your computer

Instructions

1. Open "My Computer," right-click on a hard drive and go to "Properties." Navigate to the "Tools" tab.
2. Your Defrag is omitted and requires reinstalling if:
 - (a) the "Defragment Now..." button is missing or grayed-out, or
 - (b) when you click on it you get an error message reading,

"The Disk Defragmenter is not installed on your computer". To install it, double-click the "Add or Remove Programmes" icon in Control Panel, click the "Install/Uninstall" tab, and then follow the instructions on your screen. Skip to "Reinstalling Defrag."

Your Defrag is broken and requires repairing if: 1) you are capable to unlock the Defrag programme, but nothing takes place when you click "Analyze" or "Defragment," or 2) You receive the error message, "Windows cannot connect to the Disk Defragmenter engine." Skip to "Repairing Defrag."

Reinstalling Defrag

1. In your main hard drive, find the c:\Windows\Inf directory. If your system directory is not on your c: drive or not named Windows, find it by clicking on "Start," then "Run" and typing %Windir%\Inf in the box.
2. Find the file named dfrg.inf.
3. Right click the file and select "Install."

Repairing Defrag

1. Click "Start," then "Run," and run this command: regsvr32 dfrgsnap.dll
2. Click "Start," then "Run," and run this command: regsvr32 dfrgui.dll
3. Run Defrag

11.3.4 How to Install Paint Shop Brushes

Corel's Paint Shop Pro is a trendy image editing agenda. Similar to many graphic applications on the market today, Paint Shop Pro is extremely modifiable. You can bring in or set up custom brushes, textures and more into the programme. These tools can affix great flair to your images, and speed up your workflow, too. Installing brushes to Paint Shop Pro is fast and easy, and will assist you obtain the most out of Corel's software.

Instructions

1. Download brushes for Paint Shop Pro from online resources.
2. Unzip the brush file if it's a zipped file. Use WinZip or a similar programme. The unzipped file should have a .psp extension.
3. Open your Paint Shop Pro programme.
4. Choose the "File" menu. Select "Import" from the menu list, and then "Custom Brush." The Custom Brush dialogue box will open.

5. Click "Open." Pick the brush file you want to install from the list that appears. Click "Open" to close the dialogue box.
6. Click the brushes that you want to import from the list that appears in the Custom Brush dialogue box. Select "Add" when you're finished.
7. Press "OK."

Check Your Progress

1. Write the steps to add the Windows-based application to the installer.
2. Write the steps for repairing defrag.

11.4 LET US SUM UP

When creating your own installers, some of these steps are not necessary. This walkthrough is intended to introduce you to some of the optional capabilities of deployment that you may find useful. Scan Disk needs exclusive access to a drive when it accomplishes. So, if one or more of the files are open on the drive that are required to be scanned, Scan Disk shows a prompt inquiring if you need to plan the drive check for the next time when you restart your computer. Data compression software locates data and diminishes the quantity of space that is used on the hard disk. These also create ZIP or RAR files that are simpler to handle and drive over the internet. These data compression software tools are usually known as archiving tools, as data is generally compacted during storage and archival. Frequently defragmenting your hard drive is a simple method to keep it running effortlessly. Windows emerges out with a basic however effective defragmentation programme. That program may sometimes stop working, and Microsoft does not make it obtainable for download. Corel's Paint Shop Pro is a trendy image editing agenda. Similar to many graphic applications on the market today, Paint Shop Pro is extremely modifiable. You can bring in or set up custom brushes, textures and more into the program. These tools can affix great flair to your images, and speed up your workflow, too. Installing brushes to Paint Shop Pro is fast and easy, and will assist you obtain the most out of Corel's software.

11.5 KEYWORDS

Data Compression: Data compression software locates data and diminishes the quantity of space that is used on the hard disk.

Scan Disk: Scan Disk needs exclusive access to a drive when it accomplishes.

11.6 QUESTIONS FOR DISCUSSION

1. Discuss the process of installing window based application.
2. Discuss the steps used for testing the installation.
3. What is scan disk? What are steps for scanning disk in Win XP?
4. Discuss the steps for installing data compression software.
5. How is defragmenting disk installed?
6. Discuss the installation of paint brushes.

Check Your Progress: Model Answers

3. To add the Windows-based application to the installer:
 - (i) Select the My Notepad Installer project in Solution Explorer. In the File System Editor, right-click the Application Folder node.
 - (ii) On the Project menu, point to Add, and then click Project Output.
 - (iii) In the Add Project Output Group dialog box, select My Notepad from the Project list.
 - (iv) Select the Primary Output group from the list. In the Configuration box, select (Active). Click OK to close the dialog box.
 - (v) On the Build menu, click Build My Notepad Installer.
2. Repairing Defrag includes the following:
 - (i) Click "Start," then "Run," and run this command: `regsvr32 dfrgsnap.dll`
 - (ii) Click "Start," then "Run," and run this command: `regsvr32 dfrgui.dll`
 - (iii) Run Defrag

11.7 SUGGESTED READINGS

Peter Norton's, *Introduction to Computers*, 4th Ed. TMGH.

Ramesh Bangia, *Learning Corel Draw*, Khanna Book Publishing Co.P.Ltd.

Manoj Kumar, *Information Technology for O Level*, Excel Books.

Ashok Arora & Shifali Bansal, *Computer Fundamentals*, Excel Books.

Deepak Bharihoke, *Fundamentals of Information Technology*, Excel Books.