

“शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।”

-इन्दिरा गांधी



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“Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances.”

-Indira Gandhi



Indira Gandhi
National Open University
School of Continuing Education

BPR-005
Basic Computer
Literacy

Block

1

BASICS OF COMPUTER

UNIT 1

Introduction to Computers **5**

UNIT 2

Network **30**

UNIT 3

Operating System **54**

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INTRODUCTION TO THE COURSE BPR-005

The Course on 'Basic Computer Literacy' is designed to introduce a beginner to various aspects of a computer system. The objective of this course is to cover basics of a computer system and some of its common applications. For a beginner, it is very important to know what makes a device called computer system. How a computer is able to perform complex operations and how it manages vast amount of data? There ought to be clarity on various components of the computer system in terms of hardware and software; and aspects of the operating system (OS) which is responsible for internal synchronization of its various components and scheduling of various tasks. What terminology makes our computer connect to our friends sitting miles apart? A Computer system can be equipped with various applications programs to do specific tasks – whether to write a letter or memo, do accounting calculations or make a graphic-rich presentation. Besides there are several more advanced applications that can be facilitated by computer systems.

We are in an era of global networking. Distances are no more a limitation to get in touch with people at different geographical locations. This has become possible through various communication and networking tools. The advent of internet has been a game-changer. It is worthwhile to know its evolution, its various developments and the use of various new technologies. Computers can now be seen in every office and many homes for performing varied functions in different areas.

This course is divided into three blocks dealing with 'basics of computer', 'basic applications of computers' and 'further applications' Each block is further divided into different units which capture the overall objective of familiarizing the learner with several basic concepts and usable system information.

Block-1 has three units intended to familiarize learners with a computer, an operating system and networks. Its units deal with the main components of a computer system, its internal structure and working along with various primary and secondary devices. This Block also covers basic components of computer network, hardware and networking devices, and the operating system that controls all the resources of a computer system.

Block-2 on 'Basic Applications of Computers' covers basic building blocks of Microsoft office, a very important office tool, primarily featuring Microsoft Word, Microsoft Excel and Microsoft PowerPoint. It explains different tools available in these applications and the use of these tools according to our specific need for example: MS-Word in drafting letters and preparing reports, MS-Excel in creating a spread sheet, MS-PowerPoint in preparing presentations.

Block-3 covers Evolution and development of Internet, various terminologies and component associated with it. It explains the use of computer in areas of payroll handling and accounts management which have an important role in organizations that have to grapple with several complexities and large numbers.

After going through this course you will be a better informed person about the world of computers.

BLOCK 1: BASICS OF COMPUTER

Block Introduction

'Basics of Computers' is the first block of Course-5 about 'Basic Computer literacy'. It covers all the basic components of computers and networks. This block has three units intended to familiarize learners with computer, its operating system and networks. **Unit 1** on 'Introduction to Computers' deals with the main component of a computer system i.e. input, output, storage and CPU. It also discusses about the internal structure and working of the various components of a computer system along with various primary and secondary devices. **Unit 2** covers basic Network components. It provides a brief overview of the broad and fast growing networking field. The learners are also introduced to the various concepts of data communications technology. The unit discusses how this technology is combined with computer technology to form computer networks. Besides, there is also discussion on main transmission channel for providing efficient network services. Finally we will also discuss some hardware and networking devices. **Unit 3** covers the computer Operating System (OS) - an important part of every computer system that controls all the resources of a computer system: memory, I/O devices, CPU and other resources. This unit shall cover the services provided by an OS and its functions. At the end we will provide you one example of an operating system to facilitate your understanding. We hope that you will enjoy going through this block.

UNIT 1 . INTRODUCTION TO COMPUTERS

Structure

- 1.0 Objectives
- 1.1 Introduction
- 1.2 What is Computer?
- 1.3 Characteristics of Computer
- 1.4 Functional components of Computer
- 1.5 Hardware and Software
- 1.6 Input and Output Devices
 - 1.6.1 Input Devices
 - 1.6.2 Output Devices
- 1.7 Memory system of a Computer
 - 1.7.1 Primary Storage
 - 1.7.2 Secondary Storage
- 1.8 Let Us Sum Up
- 1.9 References and Suggested Readings
- 1.10 Check Your Progress - Possible Solutions/Answers

1.0 OBJECTIVES

After going through the unit, you will be able to:

- define a computer;
- identify characteristics of a computer;
- identify the role of computer;
- understand basic Functional Units of a computer system;
- understand the meaning of Arithmetic Logical Unit, Control Unit and Central Processing Unit;
- differentiate between input devices and output devices;
- define computer memory;
- differentiate between primary memory and secondary memory; and
- differentiate between primary storage and secondary storage units.

1.1 INTRODUCTION

Let us begin with the word 'compute'. It means 'to calculate'. We all are familiar with calculations in our day to day life. We apply mathematical operations like addition, subtraction, multiplication, etc. and many other formulae for calculations. Simple calculations take less time. But, complex calculations take much longer time. Another factor of significance is accuracy in calculations. The idea to develop a machine which can perform this type of arithmetic calculation faster and with full

accuracy was explored and this gave birth to a device or machine called ‘**computer**’.

In this unit we are mainly concerned about main component of a computer system i.e. input, output, storage and CPU. We also saw that the storage units are basically of two types – primary and secondary. With this knowledge, we are going to discuss more about the internal structure and working of the various components of a computer system. We will also describe various primary and secondary devices.

1.2 WHAT IS A COMPUTER?

The word “computer” comes from the word “compute” which means to calculate. So a computer is basically a computing device that can perform calculations at enormous speed. As an electronic device a computer can perform a variety of operations in accordance with a set of instruction called **program**.

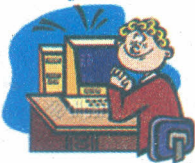
Computers can access and process data millions of times faster than a human can. A computer can store data and information in its memory, process them and produce the desired results. A computer can be used for different tasks such as playing games, movies and songs, making railway reservation, weather forecasting, error detection etc. A computer is used essentially as a **data processor**. The term data and information are frequently used. Let us define these terms so that you can understand the difference between the two.

Data - Data in computer terminology means raw facts and figures. Data are processed to form information.

Information - It means what we get after processing data (meaningful data).

Figure 1.1 shows different parts of a modern computer. Besides the mother board (Figure 1.2) it has a monitor, speaker, keyboard, mouse etc. The Figure 1.2 shows the detailed layout of the motherboard which has slots for placing CPU, RAM, and Buses etc.

Did you know?



Charles Babbage is considered to be the Father of modern digital computer

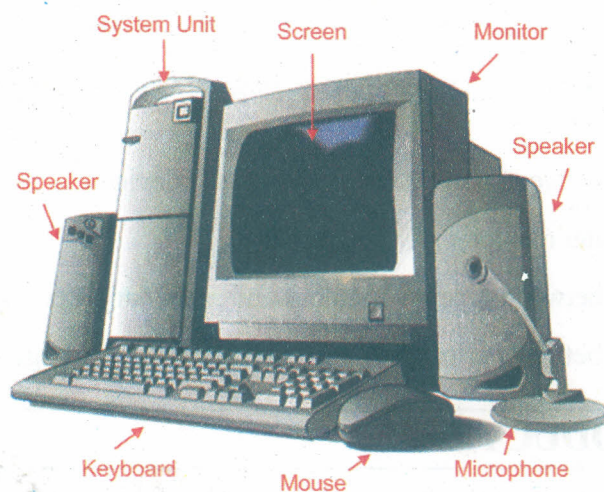


Figure 1.1: Computer and its parts

Source: course.fed.cuhk.edu.hk/s040643/EDD5169H/Stude...

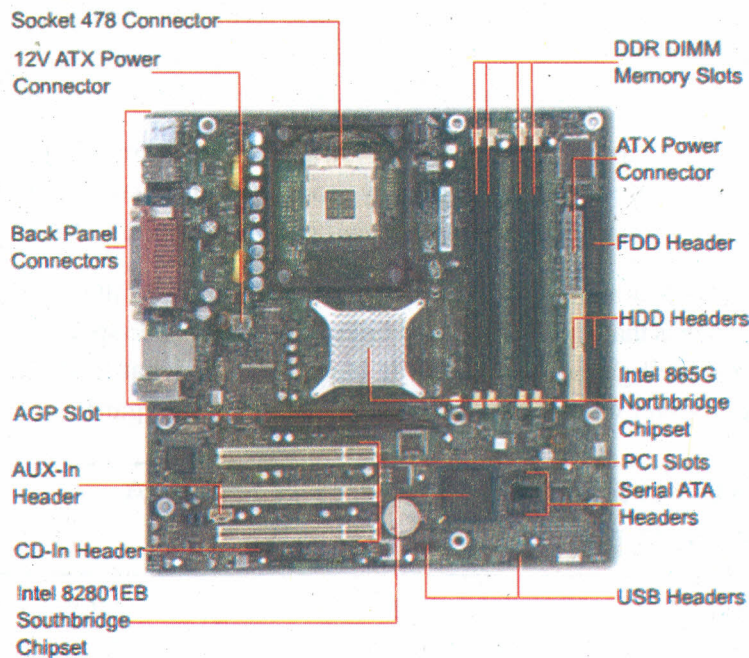


Figure 1.2: Internal parts of computer

Source: www.techiwarehouse.com/cat/13/Motherboard

1.3 CHARACTERISTICS OF COMPUTER

The increasing popularity of computer has proved that it is a very powerful and useful tool. The powerful and usefulness of this popular tool are mainly due to its characteristics as follows:

Automatic: A machine is said to be automatic if it works by itself without human intervention. Computers are automatic machines because once a job is started, they carry on until the job is finished, normally without human assistance. However, computers being machines cannot start by themselves. They cannot go out and find their own problem and solution. They have to be instructed.

Speed: A computer is a very fast device. It can perform tasks in a few seconds the amount of work that a human being can do in an entire year. While talking about the speed of a computer, we do not talk in terms of seconds or even milliseconds. In the world of computers, speeds are in microseconds, nanoseconds and even picoseconds.

Accuracy: In addition to being very fast, computers are more accurate. The accuracy of a computer is consistently high and the degree of a particular computer depends upon its design. But for a particular computer, each and every calculation is performed with the same accuracy.

Diligence: Unlike human beings, a computer is free from monotony, tiredness, lack of concentration etc and hence can work for hours together without creating any error and without get tired.

Versatility: Versatility is one of the most useful things about the computer. Computers can perform various jobs efficiently and repetitively. One moment, it is preparing the results of particular examination, the next moment it is busy preparing bills, and in between, it may be doing type work.

Power of Remembering: A computer can store and recall any amount of information because of its secondary storage capability. Every piece of information can be retained as long as desired by the user and can be recalled as and when required.

Storage: Computer has an in-built memory where it can store a large amount of data. You can also store data in secondary storage devices such as pen drives , which can be kept outside your computer and can be carried to other computers.

No IQ: Computer is not a magical device. It can perform tasks that a human being can. The difference is that it performs these tasks with unthinkable speed and accuracy. It possesses no intelligence of its own. It has to be told what to do and in what sequence. A computer cannot take its own decision in this regard.

1.4 FUNCTIONAL COMPONENTS OF A COMPUTER

A computer as shown in Figure 1.3 performs basically five major operations or functions irrespective of its size and make. These are 1) it accepts data and instructions by way of input, 2) it stores data in memory, 3) it processes data as required by the user, 4) it gives results in the form of output, and 5) it controls all operations inside a computer.

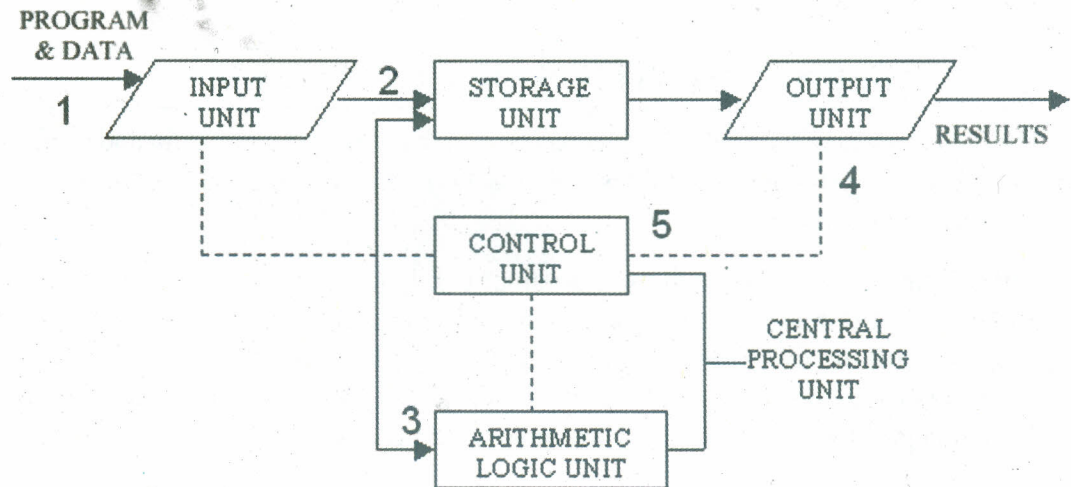


Figure 1.3: Basic structure of computer

Source: www.nos.org/htm/funda2.htm

The computer system is divided into four units. They are:

- Input Unit
- Output Unit
- Central Processing Unit (CPU)
- Storage/Memory

Input Units: This is the process of entering data and programs in to the computer system. You should know that computer is an electronic machine like any other machine which takes as inputs raw data and performs some processing giving out processed data. Therefore, the input unit takes data from us to the computer in an organized manner for processing.

Output Units: This is the process of producing results from the data for getting useful information. Similarly the output produced by the computer after processing must also be kept somewhere inside the computer before being given to you in human readable form. Again the output is also stored inside the computer for further processing.

Arithmetic Logical Unit (ALU): After you enter data through the input device it is stored in the primary storage unit. The actual processing of the data and instruction are performed by Arithmetic Logical Unit. The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison. Data is transferred to ALU from storage unit when required. After processing, the output is returned back to storage unit for further processing or getting stored.

Control Unit (CU): The next component of computer is the Control Unit, which acts like the supervisor seeing that things are done in proper fashion. The control unit determines the sequence in which computer programs and instructions are executed. Things like processing of programs stored in the main memory, interpretation of the instructions and issuing of signals for other units of the computer to execute them. It also acts as a switch board operator when several users access the computer simultaneously. Thereby, it coordinates the activities of a computer's peripheral equipment as they perform the input and output.

Central Processing Unit (CPU) The ALU and the CU of a computer system are jointly known as the central processing unit. You may call CPU as the brain of any computer system. It is just like brain that takes all major decisions, makes all sorts of calculations and directs different parts of the computer functions by activating and controlling the operations.

CPU is also known as brain of a computer

Storage Unit: The data and instructions that are entered into the computer system through input units have to be stored inside the computer before the actual processing starts. Similarly the result produced by the computer after processing must also be kept somewhere inside the computer system before being passed on to the output units. The storage unit of all computers is comprised of the following two types of storage:

- Primary Storage
- Secondary Storage

Primary storage: The primary storage, also called main memory, is used to hold piece of program instructions and data, intermediate results of processing, and recently produced output of processing of the job. The information is presented electronically in the main memory chip and remains in the memory, the central processing unit can access it directly at a very high speed.

Secondary Storage: The secondary storage, also called auxiliary storage, is used to take care of the limitation of the primary memory. It is used to supplement the limited storage capacity and volatile characteristics of primary storage. The secondary memories are much cheaper than primary memory and can retain information even when the computer is switched off or reset. Programs are stored on disk as files and must be loaded into main memory before they can be executed by the CPU.

Did you know?



Check Your Progress I

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) What is computer? Why it is also known as data processor?

.....
.....
.....
.....
.....

2) Differentiate between data and information.

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.....
.....

3) List out the main components of a computer.

.....
.....
.....
.....
.....

1.5 HARDWARE AND SOFTWARE

Now let us turn to hardware and software. A computer system consists of hardware and software for its proper functioning. A computer system is combination of both hardware and software. Without any of this we can't run computer system properly. So, both are necessary to have on a computer system to work properly.

Hardware: It represents the physical components of a computer i.e. the components you can see and touch. Input devices, output devices, CPU, hard disk etc. are example of hardware as shown in Figure 1.4.

Software: It represents the set of programs that support the operation of a computer system and make the hardware run. Software can be classified into three categories.

- Operating System (OS)
- Language Processors
- Application software

First two are the System software.

Operating system: An operating system is a program which acts as an interface between a user and hardware. An operating system is an important component which controls all hardware and software components of the computer system.



Figure 1.4: Computer Hardware components

Source: www.3dmultimedia.com/help/windows/intro_eng.htm

The operating systems perform the following functions:

- Provides the instructions to prepare user interface.
- Load necessary programs.
- Manage the way information is stored and retrieved from disks.
- Coordinate with hardware devices.

There are various types of operating systems eg. Single user OS, Multi-user OS, Batch processing OS, Multiprocessing OS etc. The topics will be discussed in a separate unit.

Language Processor: language processors are used to convert high level language to the machine understandable binary format. The language processors are:

- Assembler
- Interpreter
- compiler

Assembler: This language processor converts the program written in assembly language into machine language.

Interpreter: This language processor converts high level languages like C, C++, Java etc. into machine language by converting and executing it line by line. It is much easier to write a program in a high level language than in assembly or machine languages.

Compiler: It also converts a High level language program into machine language but, converts the entire program in one go, and reports all the errors of the program along with the line number.

Application Software: Application software is the set of programs necessary to carry out operations for a specified application. These are programs written by programmers to enable computer to perform a specific task such as inventory control, accounting, railway reservation, billing etc.

1.6 INPUT AND OUTPUT DEVICES

A computer always requires communicating with the external environment for taking input and producing some kinds of output. When you work with a computer you feed your data and instructions through some devices to the computer. These devices are called Input devices. Similarly computer after processing gives output through other devices called Output devices.

For a particular application one form of device is more desirable compared to others. We will discuss various types of I/O devices that are used for different types of applications. They are also known as peripheral devices because they surround the CPU and make a communication between a computer and the outer world.

1.6.1 Input Devices

Input devices are necessary to convert our information or data into a form which can be understood by the computer. A good input device should provide timely, accurate and useful data to the main memory of the computer for processing. A wide range of input devices is available today that can be broadly classified into the following categories:

- Keyboard
- Mouse
- Data scanning devices

Keyboard: - This is the standard input device attached to all computers. They allow data entry into a computer system by pressing a set of keys, which are neatly mounted in a keyboard connected to the computer system. Keyboard devices can be classified into two types - **general purpose keyboards** and **special purpose keyboards** (shown in Figure 1.5). General purpose keyboard are standard keyboards used with most computer systems. They are called general purpose because that have enough keys to make them useful for any type of application. The layout of keyboard is just like the traditional typewriter of the type QWERTY (It is the most used modern-day **keyboard layout on English-language computer and typewriter keyboards**). It also contains some extra command keys and function keys. It contains a total of 101 to 104 keys. You have to press correct combination of keys to input data. The computer can recognize the electrical signals corresponding to the correct key combination and processing is done accordingly.

As shown in Figure 1.5, function keys, control keys, alt keys, break keys, enter keys are having some significance in keyboard. The function keys labeled F1 through F12 may have a variety of different uses or no use at all. Depending on the installed operating system and the software program currently open will change how each of these keys operate.

F1 - Almost always used as the help key, almost every program will open the help screen when this key is pressed.

F2 - In Windows commonly used to rename a highlighted icon or file.

- F3 - Often opens a search feature for many programs including Microsoft Windows.
- F4 - Open find window.
- F5 - In all modern **Internet browsers** pressing F5 will **refresh** or reload the page or document window.
- F6 - Move the cursor to the **Address bar** in **Internet Explorer** and **Mozilla Firefox**.
- F7 - Commonly used to spell check and grammar check a document in Microsoft programs such as Microsoft Word, Outlook, etc.
- F8 - Function key used to enter the Windows startup menu, commonly used to get into Windows **Safe Mode**.
- F9 - Opens the Measurements toolbar in Quark 5.0.
- F10 - In Microsoft, Windows activates the **menu bar** of an open application.
- F11 - Full-screen mode in all modern Internet browsers.
- F12 - Open the Save as window in Microsoft Word.

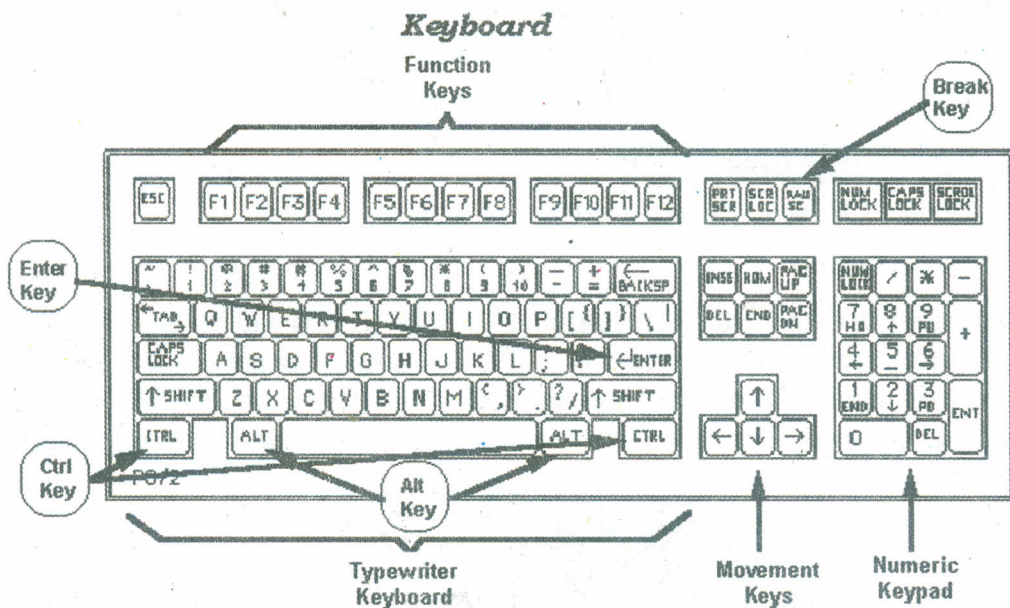


Figure 1.5: Keyboard

Source: www.iupui.edu/.../tutorials/win_95_intro.html

Mouse: - Mouse (Shown in Figure 1.6) is an input device that is used with your personal computer. It rolls on a small ball and has two or three buttons on the top. When you roll the mouse across a flat surface the screen sensors the mouse in the direction of mouse movement. The cursor moves very fast with mouse giving you more freedom to work in any direction. It is easier and faster to move through a mouse compared to movement keys.

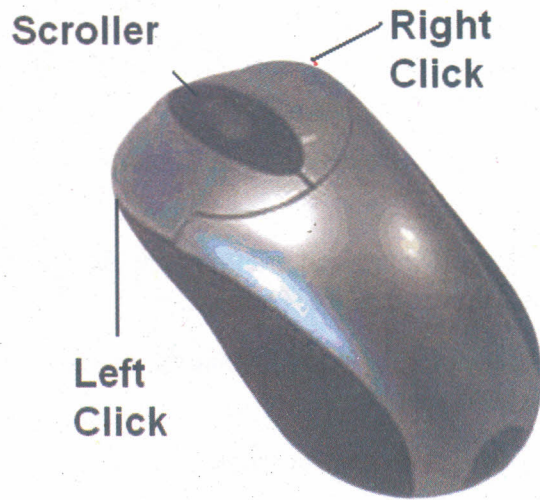


Figure 1.6: Mouse

Source: closedstacks.wordpress.com/.../19/do-you-c-pod/

Scanner: Text can be fed only through a keyboard. If we want to input a picture the keyboard cannot do that. Scanner is an optical device that can input any graphical matter and display it back. The common optical scanner devices are:

- Magnetic Ink Character Recognition (MICR)
- Optical Mark Reader (OMR)
- Optical Character Reader (OCR).
- Image Scanner

Magnetic Ink Character Recognition (MICR): - This is widely used by banks to process large volumes of cheques and drafts. Cheques are put inside the MICR (shown in Figure 1.7). As they enter the reading unit the cheques pass through the magnetic field which causes the read head to recognise the character of the cheques.



Figure 1.7: MICR

Optical Mark Reader (OMR): This is used when students have appeared in objective type tests and they had to mark their answer by darkening a square or circular space by pencil. These answer sheets are directly fed to a computer for grading using OMR (shown in Figure 1.8).

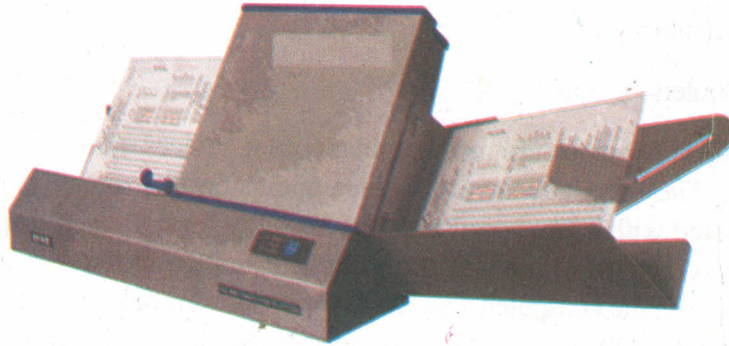


Figure 1.8: OMR

Source: www.supplierlist.com/manufacture-Education.htm

Optical Character Recognition (OCR): - This device supports the direct reading of any printed character. Suppose you have a set of hand-written characters on a piece of paper. You put it inside the scanner of a computer. This pattern is compared with a set of patterns stored inside the computer. Whichever pattern is matched is called a character read. Patterns that cannot be identified are rejected. OCRs are expensive though better than MICR.

Image Scanner: An image scanner (shown in Figure 1.9) is an input device that translates paper documents into an electronic format that can be stored in a computer. The input documents may be typed text, pictures, graphics, or even handwritten material. The copy of a document stored in a computer in this manner will never deteriorate in quality or become yellow with age and can be displayed and printed whenever required. Image scanner comes in various shapes and sizes. The two commonly used types are **Flat Bed Scanner** and **Hand Held Scanner**.



Figure 1.9: Image Scanner

1.6.2 Output Devices

An output device is an electromechanical device that accepts data from a computer and translates them into a form suitable for use by the outside world. A wide range of output devices is available today that can be broadly classified into the following categories:

- Monitors
- Printers

Monitors: Monitors are most popular output devices used for producing soft copy output. They produce the output on a television like screen. A monitor is usually associated with a key board and together they form a video display terminal. The keyboard is used to input to the computer and the monitor is used to display the output from the computer. The two basic types of monitors used today are **cathode ray tube (CRT)** and **flat panel**. A monitor has its own box which is separated from the main computer system and is connected to the computer by cable. In some systems it is compact with the system unit. It can be **color** (as shown in Figure 1.10) or **monochrome**.

Try your self



List out all the latest input and output devices available in the market.



Figure 1.10: Color Monitor

Source: <http://www.safecomputingtips.com/images/ergonomic-monitor.jpg>

Printers: It is an important output device which can be used to get a printed copy of the processed text or result on paper. There are different types of printers that are designed for different types of applications. Depending on their speed and approach of printing, printers are classified as **impact** and **non-impact** printers. Impact printers use the familiar typewriter approach of hammering a typeface against the paper and inked ribbon. **Dot-matrix printers** (as shown in Figure 1.11) and **drum printers** are of this type. Non-impact printers do not hit or impact a ribbon to print. They use electro-static chemicals and ink-jet technologies. **Laser printers** and **Ink-jet printers** are of this type; they can produce color printing and elaborate graphics.

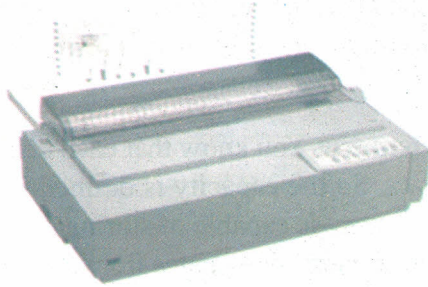


Figure 1.11: Dot Matrix Printer

Source: http://www.superwarehouse.com/images/products/tally_la36w.jpg

1.7 MEMORY SYSTEM OF A COMPUTER

There are two kinds of computer memory: *primary* and *secondary*. Primary memory is accessible directly by the processing unit. RAM is an example of primary memory. As soon as the computer is switched off the contents of the primary memory is lost. You can store and retrieve data much faster with primary memory compared to secondary memory. Secondary memory such as floppy disks, magnetic disk, etc., is located outside the computer. Primary memory is more expensive than secondary memory. Because of this the size of primary memory is less than that of secondary memory. We will discuss about secondary memory later on.

Computer memory is used to store two things: i) instructions to execute a program and ii) data. When the computer is doing any job, the data that have to be processed are stored in the primary memory. This data may come from an input device like keyboard or from a secondary storage device like a floppy disk.

As program or the set of instructions is kept in primary memory, the computer is able to follow instantly the set of instructions. But inside the computer, the steps followed are quite different from what we see on the monitor or screen. In computer's memory both programs and data are stored in the binary form. You have already been introduced with decimal number system that is the numbers 1 to 9 and 0. The binary system has only two values 0 and 1. These are called *bits*. As human beings we all understand decimal system but the computer can only understand binary system. It is because a large number of integrated circuits inside the computer can be considered as switches, which can be made ON, or OFF. If a switch is ON it is considered 1 and if it is OFF it is 0. A number of switches in different states will give you a message like this: 110101....10. So the computer takes input in the form of 0 and 1 and gives output in the form 0 and 1 only.

1.7.1 Primary Storage

The primary memory as you know in the computer is in the form of IC's (Integrated Circuits). These circuits are called Random Access Memory (RAM). Each of RAM's location stores one **byte** of information. (One **byte** is equal to **8 bits**). A bit is an acronym for binary digit, which stands for one binary piece of information. This can be either 0 or 1. The Primary or internal storage section is made up of several small storage locations (ICs) called cells. Each of these cells can store a fixed number of bits called **word length**.

Each cell has a unique number assigned to it called the address of the cell and it is used to identify the cells. The address starts at 0 and goes up to (N-1). You should know that the memory is like a large cabinet containing as many drawers as there are addresses on memory. Each drawer contains a word and the address is written on outside of the drawer.

Capacity of Primary Memory: You know that each cell of memory contains one character or 1 byte of data. So the capacity is defined in terms of byte or words. Thus 64 kilobyte (KB) memory is capable of storing $64 \times 1024 = 32,768$ bytes. (1 kilobyte is 1024 bytes). A memory size ranges from few kilobytes in small systems to several thousand kilobytes in large mainframe and super computer. In your personal computer you will find memory capacity in the range of 128MB, 256 MB, 512 MB (MB = Million bytes) and even 1GB or 2 GB (GB = Giga bytes).

The following terms related to memory of a computer are discussed below:

Random Access Memory (RAM): The primary storage is referred to as random access memory (RAM) because it is possible to randomly select and use any location of the memory directly to store and retrieve data. It takes same time to any address of the memory as the first address. It is also called read/write memory. The storage of data and instructions inside the primary storage is temporary. It disappears from RAM as soon as the power to the computer is switched off. The memories, which lose their content on failure of power supply, are known as **volatile** memories. So now we can say that RAM is volatile memory.

Read Only Memory (ROM): There is another memory in computer, which is called Read Only Memory (ROM). Again it is the ICs inside the PC that form the ROM. The storage of program and data in the ROM is permanent. The ROM stores some standard processing programs supplied by the manufacturers to operate the personal computer. The ROM can only be read by the CPU but it cannot be changed. The basic input/output program is stored in the ROM that examines and initializes various equipment attached to the PC when the switch is made ON. The memories, which do not lose their content on failure of power supply, are known as **non-volatile** memories. ROM is non-volatile memory.

PROM There is another type of primary memory in computer, which is called Programmable Read Only Memory (PROM). You know that it is not possible to modify or erase programs stored in ROM, but it is possible for you to store your program in PROM chip. Once the programs are written, they cannot be changed and remain intact even if power is switched off. Therefore programs or instructions written in PROM or ROM cannot be erased or changed.

EPROM: This stands for Erasable Programmable Read Only Memory, which overcomes the problem of PROM & ROM. EPROM chip can be programmed time and again by erasing the information stored earlier in it. Once programmed, an EPROM can be erased by exposing it to strong **ultraviolet** light. When the EPROM is in use information can only be read.

Cache Memory: The speed of CPU is extremely high compared to the access time of main memory. Therefore, the performance of CPU decreases due to the slow speed of main memory. To decrease the mismatch in operating speed, a small memory chip is attached between CPU and Main memory whose access time is very close to the processing speed of CPU. It is called Cache memory. Cache memories are accessed much faster than conventional RAM. It is used to store programs or data currently being executed or temporary data frequently used by the CPU. So

each memory makes main memory to be faster and larger than it really is. It is also very expensive to have bigger size of cache memory and its size is normally kept small.

Registers: The CPU processes data and instructions with high speed; there is also movement of data between various units of computer. It is necessary to transfer the processed data with high speed. So the computer uses a number of special memory units called **registers**. They are not part of the main memory but they store data or information temporarily and pass it on as directed by the control unit.

1.7.2 Secondary Storage

You are now clear that the operating speed of primary memory or main memory should be as fast as possible to cope up with the CPU speed. These high-speed storage devices are very expensive and hence the cost per bit of storage is also very high. Again the storage capacity of the main memory is also very limited. Often it is necessary to store hundreds of millions of bytes of data for the CPU to process. Therefore additional memory is required in all the computer systems. This memory is called **auxiliary memory** or **secondary storage**.

In this type of memory the cost per bit of storage is low. However, the operating speed is slower than that of the primary storage. Huge volume of data are stored here on permanent basis and transferred to the primary storage as and when required. Most widely used secondary storage devices are:

- Magnetic Tapes
- Magnetic Disks
- Optical Disks

Magnetic Tapes: Magnetic Tape is one of the oldest forms of secondary storage device. It is one of the most popular storage medium for large data that are sequentially accessed and processed. Magnetic tapes are used for large computers like mainframe computers where large volume of data is stored for a longer time. In PC also you can use tapes in the form of cassettes. The cost of storing data in tapes is inexpensive. Tapes consist of magnetic materials that store data permanently. It can be 12.5 mm to 25 mm wide plastic film-type and 500 meter to 1200 meter long which is coated with magnetic material. The deck is connected to the central processor and information is fed into or read from the tape through the processor. It is similar to cassette tape recorder.

Types of Magnetic Tapes:

- 1/2 – inch tape reel
- 1/2 – inch tape cartridge
- 1/4 streamer tape
- 4-mm digital audio tape(DAT)

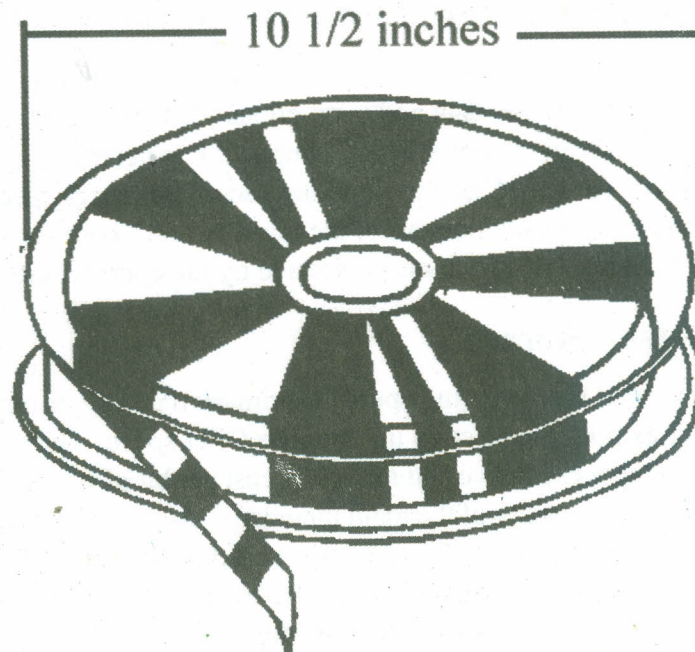


Figure 1.12: Magnetic Tape

Source: www.nos.org/htm/funda2.htm

Advantages of Magnetic Tapes:

- **Compact:** A 10-inch diameter reel of tape is 2400 feet long and is able to hold 800, 1600 or 6250 characters in each inch of its length. The maximum capacity of such tape is 180 million characters. Thus data are stored much more compactly on tape.
- **Economical:** The cost of storing characters is very less as compared to other storage devices.
- **Fast:** Copying of data is easier and fast.
- **Long term Storage and Re-usability:** Magnetic tapes can be used for long term storage and a tape can be used repeatedly with out loss of data.

Disadvantage of Magnetic Tapes:

- Due to their Sequential access nature, they are not suitable for storage of those data that frequently require to be accessed randomly.
- They must be stored in a dust free environment because dust can cause tape-reading errors.
- They should be properly labeled so that some useful data is not erased by mistake

Magnetic Disks: Magnetic Disks are the most popular medium for direct access secondary storage. Because of their random access capability, they are the most popular online secondary storage devices. A magnetic disk is a thin, circular plate/platter made of metal or plastic that is usually coated on both sides with a manetizable recording material such as iron oxide. Data are recorded on the disk in the form of tiny invisible magnetized and non magnetized spots on the coated surface of the disk. A standard binary code, usually 8 bit EBCDIC, is used for recording data. Like, magnetic tapes, magnetic disks can also be erased and reused indefinitely. Old data

are automatically erased as new data are recorded in the same area. However, the information stored can be read many times without affecting the stored data.

For data recording, the surface of a disk is divided into a number of invisible concentric circles called **tracks** (as shown in Figure 1.13). The tracks are numbered consecutively from outermost to innermost starting from zero. Each track is further subdivided into sectors. The disk surface is also divided into invisible pie shaped segments. Thus if there are eight such pie shaped segments, each track will get divided into 8 parts, and each of these 8 portions of a track is called a **sector** (as shown in Figure 13). A sector typically contains 512 bytes. A sector is the smallest unit with which any disk can work.

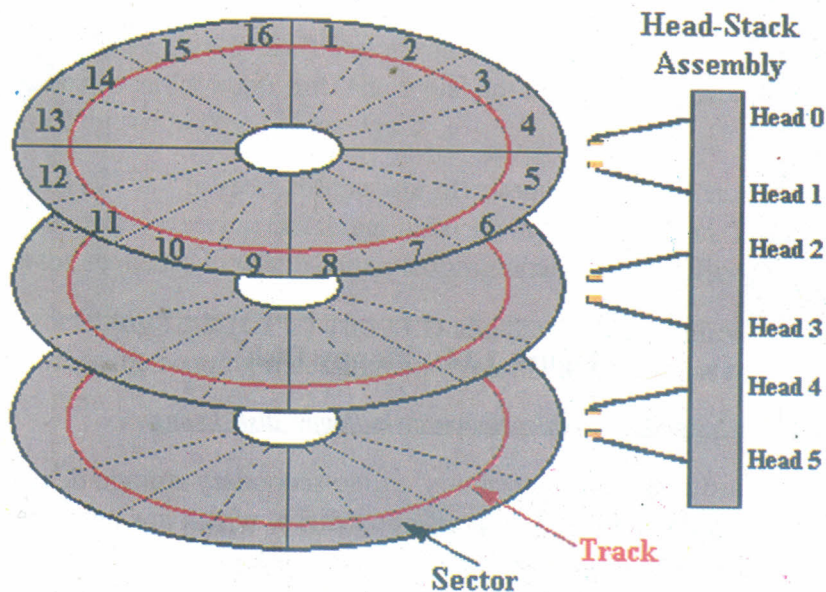


Figure 1.13: A magnetic Disk organization

Source: www.dataclinic.co.uk/data-recovery/hard-disk...

Types of Magnetic Disks:

- Floppy Disks
- Hard Disks

Floppy Disks: A floppy disk (as shown in Figure 1.14) is a round, flat piece of flexible plastic coated with magnetic oxide. It is encased in a square plastic or vinyl jacket cover. The jacket gives handling protection to the disk surface. Floppy disks are so called because they are made of flexible plastic plates which can bend not hard plates. They are also known as floppies or diskettes. They are 5.25 inch or 3.5 inch in diameter. They come in single or double density and recorded on one or both surface of the diskette. The capacity of a 5.25-inch floppy is 1.2 mega bytes whereas for 3.5 inch floppy it is 1.44 mega bytes. It is cheaper than any other storage devices and is portable. The floppy is a low cost device particularly suitable for personal computer system. The floppy is now getting replaced by a pen drive which is much more convenient to carry.

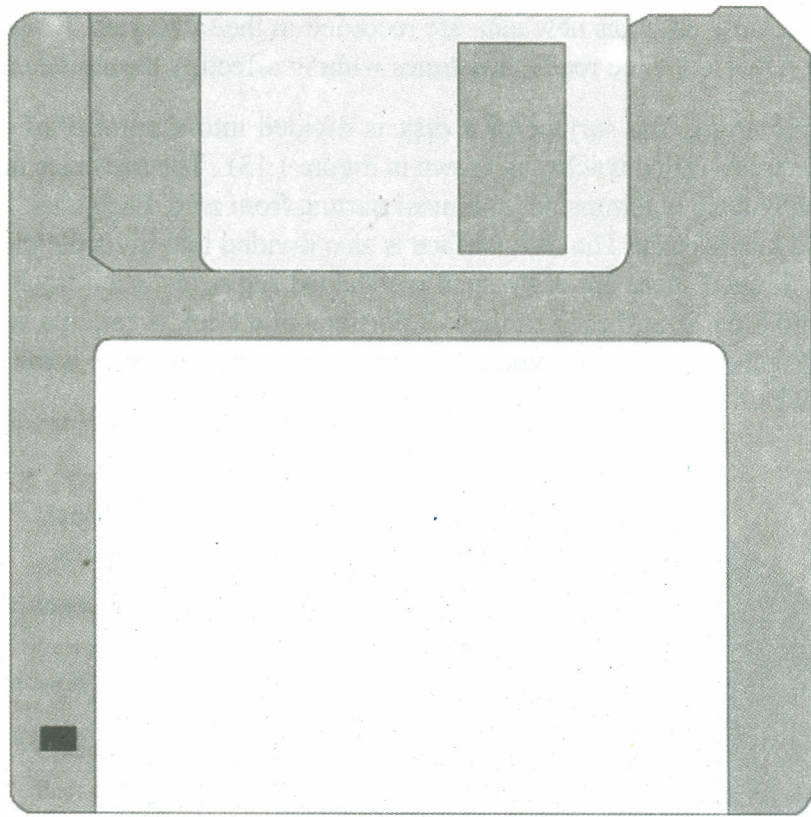


Figure 1.14: Floppy Disk

Source: http://www.wpclipart.com/computer/disks/floppy_disk_lg.png

Hard disks: Hard disks are the primary online secondary storage device for the most computer systems today. Unlike floppy disks, which are made of flexible plastic, hard disks are made of rigid metal. The hard disk platter comes in many sizes ranging from 1 to 14-inch diameter. Depending on how they are packaged, hard disks are normally categorized into the following three types:

- Zip/Bernoulli Disks
- Disk Packs
- Winchester Disks

Advantages of Magnetic Disks:

- Magnetic disks support direct access of data.
- Data transfer rate is higher than magnetic tapes.
- Floppy disk and zip disk are compact, light in weight and also easily portable from one place to another.

Disadvantages of Magnetic Disks:

- Some types of magnetic disks are not easily portable.
- They must be stored in a dust free environment.
- It is more difficult to maintain security of information stored in magnetic disks which is used as shared.

Optical Disks: With every new application and software there is greater demand for memory capacity. It is the necessity to store large volume of data that has led to the development of optical disk storage medium. An optical disk storage system

consists of a rotating disk which is coated with a thin metal or some other material that is highly reflective. Laser beam technology is used for recording/ reading of data on the disk. Due to the laser beam technology, optical disks are also known as **laser disks or optical laser disks** (as shown in Figure 1.15). Optical disks can be divided into the following categories:

- Compact Disk/Read Only Memory (CD-ROM)
- Write Once, Read Many (WORM)



Figure 1.15: Optical Disks

Source: electronics.howstuffworks.com/.../printable

Compact Disk/ Read Only Memory (CD-ROM): CD-ROM disks are made of reflective metals. CD-ROM is written during the process of manufacturing by high power *laser beam*. Here the storage density is very high, storage cost is very low and access time is relatively fast. Each disk is approximately 4 1/2 inches in diameter and can hold over 600 MB of data. As the CD-ROM can be read only we cannot write or make changes into the data contained in it.

Write Once, Read Many (WORM): The inconvenience that we can not write anything in to a CD-ROM is avoided in WORM. A WORM allows the user to write data permanently on to the disk. Once the data is written it can never be erased without physically damaging the disk. Here data can be recorded from keyboard, video scanner, OCR equipment and other devices. The advantage of WORM is that it can store vast amount of data amounting to gigabytes (10^9 bytes). Any document in a WORM can be accessed very fast, say less than 30 seconds.

Advantages of Optical Disks:

- Due to compact size and light weight, optical disks are easy to handle, store and port from one place to another.
- Optical disk drives do not have any mechanical read/write heads to rub against or crash into the disk surface.
- The use of a single spiral track makes optical disks an ideal storage medium for reading large blocks of sequential data, such as music.

Disadvantages of Optical Disks:

- It is a read only storage medium. Data once recorded, cannot be deleted.
- The data access speed for optical disks is slower than magnetic disks.

Pen Drive: A pen drive (as shown in Figure 1.16) is also known as USB flash drive. It consists of **flash memory** for **data storage** and integrated with a **USB** (Universal Serial Bus) **1.1** or **2.0** Interface. The pen drives are removable and rewritable. It is much smaller and lighter than a **floppy disk**, hard disk and optical disk. . Pen drives support faster data transfer and can store more data than a much larger **optical disc**. The pen drive supported by modern operating systems such as **Windows**, **Mac OS X**, **Linux**, and other **Unix-like** systems. Most pen drives derive their power from the **USB** connection, and do not require a battery.



Figure 1.16: Pen Drive

Source: www.momentumgroup.in/productlist.asp?id=25

Check Your Progress II

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) **What is cache memory? How it is different from a primary memory?**

.....
.....
.....
.....
.....
.....

2) **What is an input device? Name some commonly known input devices.**

.....
.....
.....
.....

3) Draw a block diagram to illustrate the basic organization of computer system and explain the function of various units.

A large rectangular area enclosed by a solid black border, containing numerous horizontal dotted lines for writing. The lines are spaced evenly and cover most of the page's width and height, providing a template for drawing a block diagram and explaining the function of various units.

1.8 LET US SUM UP

Let us recapitulate what we have learned in this unit:

- A computer is an electronic device that can perform a variety of tasks according to the given instructions.
- A computer works as a data processor that processes data to form information.
- Data are raw facts that may not convey meaning.
- Information is meaningful data.
- A computer undergoes input-process-output cycle.
- Input carries out the input phase, CPU carries out the process phase and output carries out the output phase.
- The CPU consists of two components: Control Unit (CU) and Arithmetic Logic Unit (ALU).
- Hardware represents the physical components of a computer
- Software represents the set of programs that govern the computer system.
- Software is broadly classified into three categories: Operating system, Language processor and Application software.
- The input-output devices provide the means of communication between the computer and outer world. They are also known as peripheral devices.
- An input device is an electromechanical device that accepts data from the outside world and translates them into a form that computer can interpret.
- An output device is an electromechanical device that accepts data from a computer and translates them into a form that suitable for outside world.
- Keyboard devices are the most commonly used input devices today. They allow data entry into a computer system by pressing a set of keys, which are neatly mounted on a keyboard connected to the computer system.
- Scanners are input devices used for direct data entry into the computer system from source documents
- The most common scanners are: OCR, OMR, MICR and image scanner.
- Monitors are the most popular output device used for producing soft copy output.
- The two types of monitors are CRT and flat panel.
- Printers are the most commonly used output devices today for producing hard copy output.
- The primary storage of a computer system has limited capacity and is volatile.
- The secondary storage of a computer system is nonvolatile and has low cost per bit stored.
- Magnetic tape is the most popular sequential access storage device.

- The four commonly used types of magnetic tapes are ½-inch tape reel, ½-inch tape cartridge, 1/4-inch streamer tape and 4 mm DAT.
- Magnetic disk is the most popular direct access storage device.
- All types of magnetic disks can be classified into two types - floppy disk and hard disk.
- An optical disk storage system consists of a rotating disk, which is coated with a thin metal or some other material that is highly reflective.
- The two most popular types of disk are CD-ROM and WORM.
- A table is a collection of records and a record is a set of related fields.
- The database window provides a graphical interface for designing or opening database objects.
- A table in MS-Access can be created by design view, table wizard or by entering data in the datasheet view.
- Each field of table has number of field properties.

1.9 REFERENCES AND SUGGESTED READINGS

- Foundations of Computing, “Sinha and Sinha,” BPB Publications.
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- www.momentumgroup.in/productlist.asp?id=25

1.10 CHECK YOUR PROGRESS – POSSIBLE SOLUTIONS/ANSWERS

Check Your Progress I

- 1) Computer is a computing device that can perform calculation at enormous speed. A Computer is an electronic device that can perform a variety of operations in accordance with a set of instruction called **program**.

A computer can store data and information in its memory, process them and produce the desired results. So, computer is also called a **data processor**.

- 2) Data in computer terminology means raw facts and figures. Data are processed to form information. Information means what we get after processing data (meaningful data).
- 3) The computer system has four parts. They are:
 - Input Unit
 - Output Unit
 - Central Processing Unit (CPU)
 - Storage

Check Your Progress II

- 1) Cache memory is a small memory chip attached between CPU and Main memory whose access time is very close to the processing speed of CPU. Cache memories are accessed much faster than conventional RAM. It is used to store programs or data currently being executed or temporary data frequently used by the CPU. So each memory makes main memory to be faster and larger than it really is.
- 2) Input devices are necessary to convert our information or data in to a form which can be understood by the computer. A good input device should provide timely, accurate and useful data to the main memory of the computer for processing. A wide range of input devices is available today that can be broadly classified into the following categories:
 - Keyboard
 - Mouse
 - Data scanning devices
- 3) A computer, as shown in Figure performs basically five major operations or functions irrespective of its size and make. These are 1) it accepts data or instructions by way of input, 2) it stores data, 3) it can process data as required by the user, 4) it gives results in the form of output, and 5) it controls all operations inside a computer.

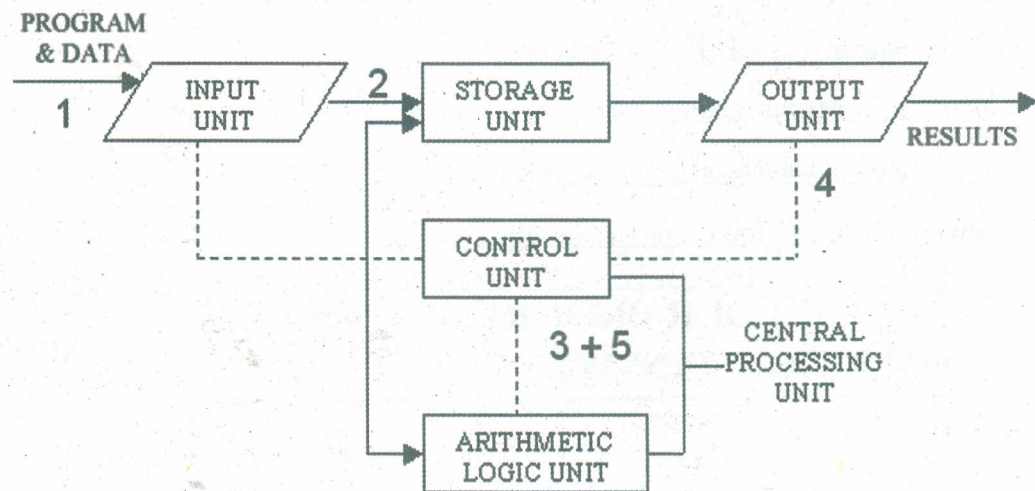


Figure: Basic structure of computer

The computer system is divided into four units. They are:

- Input Unit
- Output Unit
- Central Processing Unit (CPU)
- Storage

Input Units: This is the process of entering data and programs in to the computer system.

Output Units: This is the process of producing results from the data for getting useful information.

Arithmetic Logical Unit (ALU): After you enter data through the input device it is stored in the primary storage unit. The actual processing of the data and instruction are performed by Arithmetic Logical Unit.

Control Unit (CU): The next component of computer is the Control Unit, which acts like the supervisor seeing that things are done in proper fashion. The control unit determines the sequence in which computer programs and instructions are executed.

Central Processing Unit (CPU) The ALU and the CU of a computer system are jointly known as the central processing unit. You may call CPU as the brain of any computer system.

Lab Exercise:

Note: a) Write your answers in the space provided at the end of this unit.

b) For practical purpose attend practical lab.

- 1) Differentiates all the input and output devices with appropriate diagram.
- 2) Explain all the types of memories used in general computer.

Space provided for practical work

UNIT 2 NETWORK

Structure

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Networks
- 2.3 Advantages of Networks
- 2.4 Disadvantages of Networks
- 2.5 Types of Networks
 - 2.5.1 LAN (Local Area Network)
 - 2.5.2 MAN (Metropolitan Area Network)
 - 2.5.3 WAN (Wide Area Network)
 - 2.5.4 Comparison among different type of Networks
- 2.6 Network Architecture
 - 2.6.1 Client/Server Architecture
 - 2.6.2 Peer-to-Peer Architecture
 - 2.6.3 Comparison between client/server and peer-to-peer Architecture
- 2.7 Network Topology
 - 2.7.1 Bus Topology
 - 2.7.2 Ring Topology
 - 2.7.3 Star Topology
 - 2.7.4 Hybrid Topology
- 2.8 Transmission Media and its characteristics
 - 2.8.1 Twisted Pair Cable
 - 2.8.2 Co-Axial cable
 - 2.8.3 Optical Fiber
 - 2.8.4 Wireless Medium
- 2.9 Network Devices/Hardwares
- 2.10 Protocol
- 2.11 Let Us Sum Up
- 2.12 References and Suggested Readings
- 2.13 Check Your Progress – Possible Solutions/Answers

2.0 OBJECTIVES

After going through the unit, you will be able to:

- understand the basic concept of networks;
- describe different types of networks;
- differentiate different topologies used;
- understand the concept of transmission medium;

- differentiate different types of network devices;
- understand where we can use network devices;
- understand the basic concept of protocol and types of protocol; and
- understand Novell NetWare, ATM, APRANET, Internet concept, FUNDAMENTALS.

2.1 INTRODUCTION

This unit provides a brief overview of the broad and fast growing networking field. It started quietly and has grown to involve everything we do on a daily basis: on-line booking of railway or airlines ticket, on-line submission of examination forms, reading online newspaper, chatting with your remote friends, watching live matches on your computer, sending e-mail and greetings. In these entire activities only one thing is common i.e. networking. Internet is one such example of networking.

In this unit we introduce the various concepts of data communications technology and discuss how this technology is combined with computer technology to form computer networks. In this unit we discussed main transmission channel for providing efficient network services. We also discussed main architecture and topologies to support internet. Finally we discussed some hardware and networking devices.

2.2 NETWORKS

A computer network is basically interconnection of two or more than two independent systems (computers) together in order to:

- Share hardware and software resources (Files, printer, hard disk, modem)
- Allow communication among computers.
- Increase productivity (by sharing of data).
- Share Application software like Ms Word, PowerPoint, Excel, Winzip etc.

Computer networks are collection of computers and peripheral devices that are interconnected by telephone lines and other high speed communication links. Every computer connected to the network is said to be on the network. The technical term for a computer that is on the network is a **node**.

When a computer is turned on and is able to access the network, the computer is said to be **on-line**. When the computer is unable to access the network, it is **off-line**. A computer could be off-line for several reasons. It could be turned off, it could be broken, the cable that connects it to the network could be unplugged etc.

Internet is a network of networks, by joining multiple computer networks together with transmission media.

Examples:

A computer network can be two computers connected together and communicate with each other as shown in a Figure 2.1.

Did you know?





Figure 2.1: Two interconnected computers.

A computer network usually consists of more than two computers (Figure 2.2) connected by interconnecting devices.

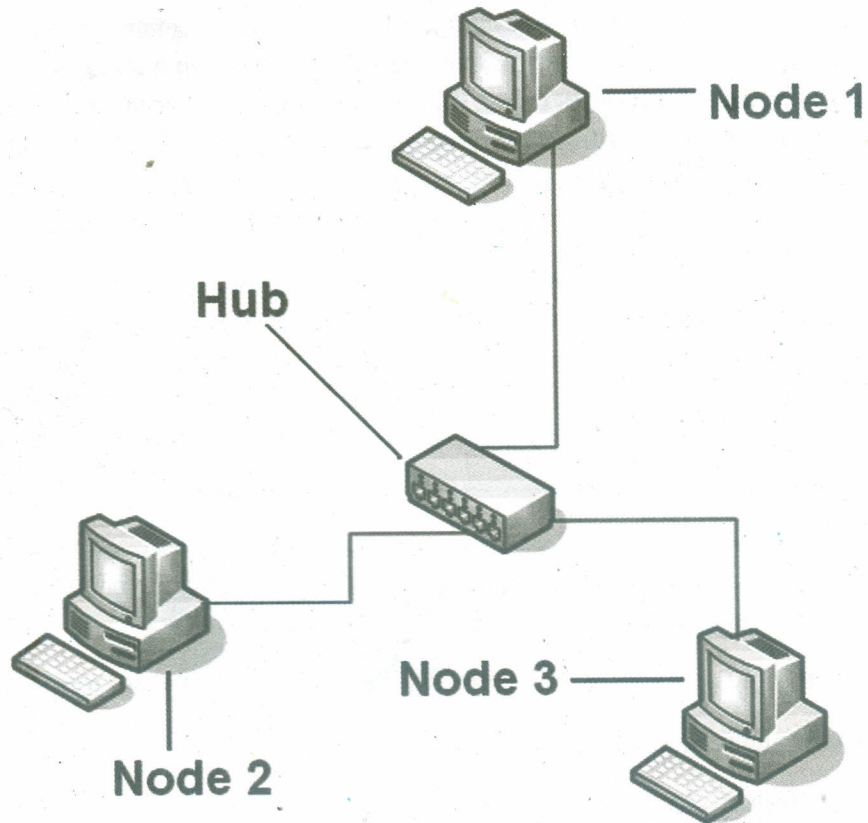


Figure 2.2: Interconnection of more than two computers.

Computer networks are generally classified according to their structure and the area they are localized in as.

Local Area Networks (LAN): The network that covers a relatively small area like in a single building or campus is known as LAN. Today every organization is having this kind of a network.

Metropolitan Area Network (MAN): The network that covers larger area like a city or town is known as MAN.

Wide Area Network (WAN): The network covers a large geographical area and covers different cities, states and even countries..

The additional characteristics that are used in connection with categorization of networks are protocol, topology and architecture.

Protocol: they define a common set of rules which are used by computers on the networks for the purpose of data transfer.

Topology: topology is the arrangement of computer system in a network for the purpose of connectivity. It will be discussed in section 4.7.

Architecture: Networks can be broadly classified into two ways

- Peer-to-peer
- Client/server

It will be discussed in section 4.6.

WAN is basically a combination of several LAN's connected through networks.



2.3 ADVANTAGES OF NETWORKS

Sharing files: Networks permit you to share information with other computers on the network. You can share files in two ways. First is direct way, in which you send the file from your computer to your friend's computer directly. The second way is to send your file to an intermediate machine where your friend can pick it up later.

Sharing resources: Networks allow you to share your devices with other computers on the networks. The devices are basically printer, hard disk, floppy disk, CD-ROM, modem etc. A network allows users to share resources with others on the network. This can be hardware-related like a printer or a disk, or it can be software-related like a database or programs. **System administrator** can configure or install new software on network computers remotely

Sharing Programs: You can put programs that everyone wants to use on a shared disk, rather than keep it separately on each person's computer. For Example, if you have ten computer users who all use MS-Word, you could store ten copies of it – one on each computer- or you could store just one copy on a shared disk of a particular machine. It is also called a server machine.

Backups: As all data is stored on the server, backing up critical data becomes simpler.

Communication Modes: The biggest benefit of networks comes in the form of better communication modes through electronic mail, messenger, groups, blogs etc. Through electronic mail, you can send messages safely to any part of the world where a network exists. It has become more popular mode of communication. Through messenger you can chat or gives instant messages to anyone in a network. Blogs (as shown in Figure 2.3) and groups are used as to express your ideas and thoughts online.

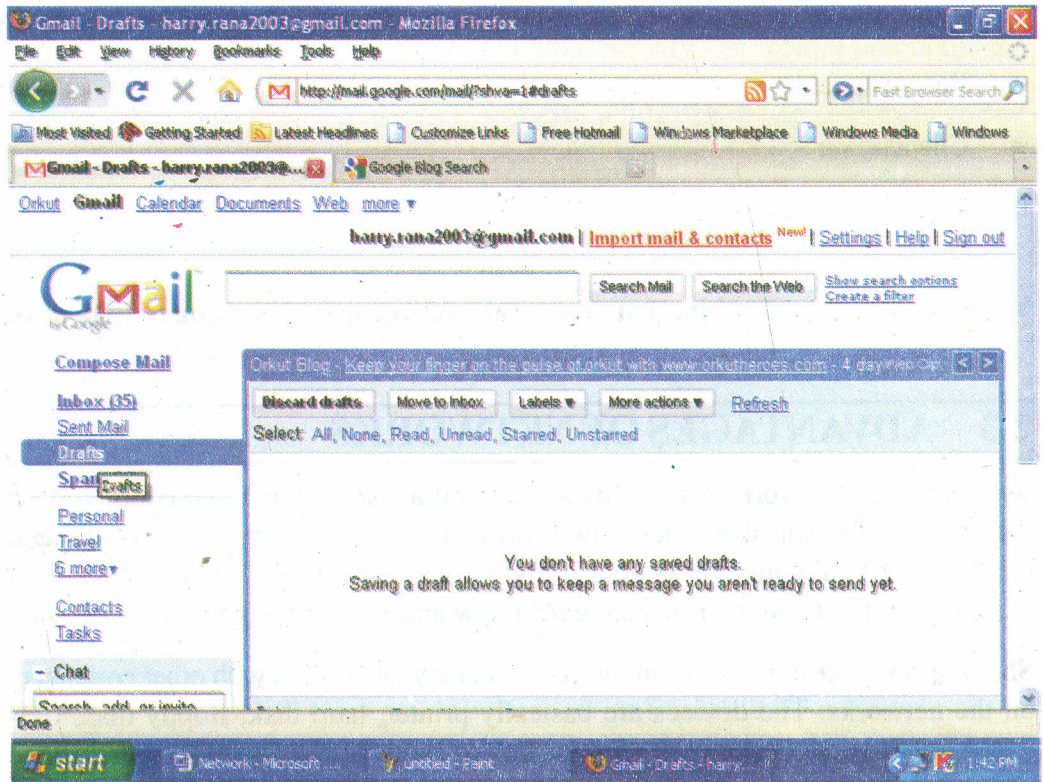


Figure 2.3: G-mail (mail service)

Did you know?



FTP is a File Transfer Protocol, from which you can transfer your file from one computer to another.

2.4 DISADVANTAGES OF NETWORKS

There are also some drawbacks of such systems.

Crashes: That is the main disadvantage of server based network. When a server crashes, work gets interrupted as all network resources are lost, unless proper precautions are taken to ensure regular back up of data.

Data security: Data security was not a problem in a standalone machine because no one else shared its resources except the owner of the machine. As all the resources are joined together in a network, it is possible for an unauthorized person to access private and important information if network security is weak or poorly implemented

Privacy: privacy is also a prime concern when all the computers are connected with a server. System administrator and the person who has authorization to access network may be in a position to read your personal E-mails, files etc.

2.5 TYPES OF NETWORKS

Computer Networks are mostly classified on the basis of geographical area that the network covers, the topology used, the transmission media used and the architecture used.

Based on the geographical area covered the networks may be classified into three categories:

2.5.1 LAN (Local Area Network)

Local area Network (Figure 2.4) is a computer network that covers a relatively small area. It can be a single building or groups of buildings within a campus. Computers on LAN are generally connected by Ethernet cables.

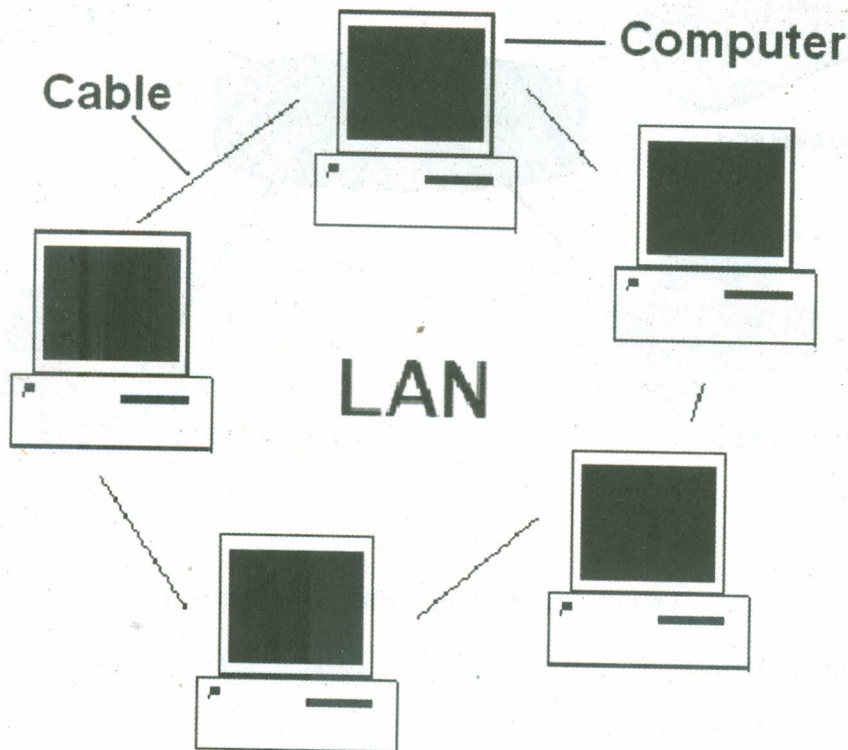


Figure 2.4: Computers are connected through LAN.

Source: wally.cs.iupui.edu/n241-new/webMag/index.htm

Characteristics of a LAN are:

- Covers a small area like, within 5 to 10 Kms.
- High speed of the order of 10Mbps/100Mbps/1000 Mbps.
- Low error rates.
- Data and hardware sharing between multiple users are easy.
- Most of the equipment used in LAN are inexpensive.

2.5.2 MAN (Metropolitan Area Network):

MAN (as shown in Figure 2.5) is a computer network designed for a town or city. In terms of geographic area MAN covers a larger area than LANs, but smaller area than WANs. Optical fiber communication or wireless infrastructure like WiMAX is recently being used to link nodes in a MAN. It can span upto 50 Kms.

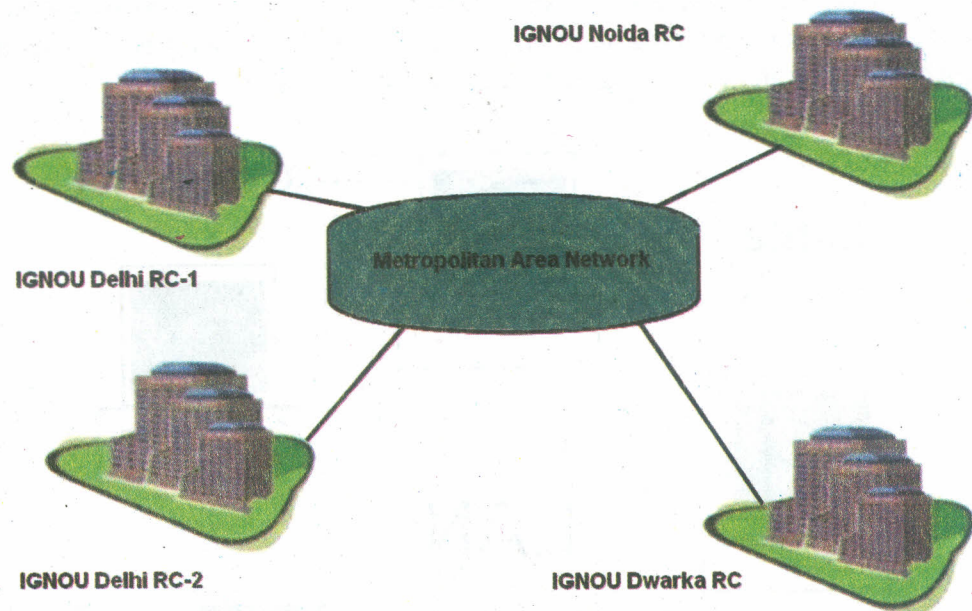


Figure 2.5: Metropolitan Area Network.

Source: <http://tkjguokil.blogspot.com/2010/01/asal-usul-komputer-sejarah-komputer.html>

Characteristics of a MAN are:

- Covers larger area than a LAN and can range from 10 km to 50 km.
- Slower than LAN and traditionally faster than a WAN. But this differentiation is now diminishing.
- Operating speed is 1.5 to 150 Mbps (older MANs). Now it's 155 Mbps – 6 Gbps.

2.5.3 WAN (Wide Area Network):

WAN (as shown in Figure 2.6) is a computer network that covers a relatively large geographical area. Typically a WAN consists of several LANs. They can connect across cities, states or even countries. We use leased lines, telephone lines or satellites as transmission media. Routers are used to switch and route information among different kinds of networks.

Characteristics of a WAN are:

- WAN covers large geographical area and can range from 100 km to 1000 km.
- Usually the speed is much slower than LAN speed.
- Currently the speed varies from 155 Mbps to 40 Gbps.
- The network is interconnected through devices like routers and gateways.

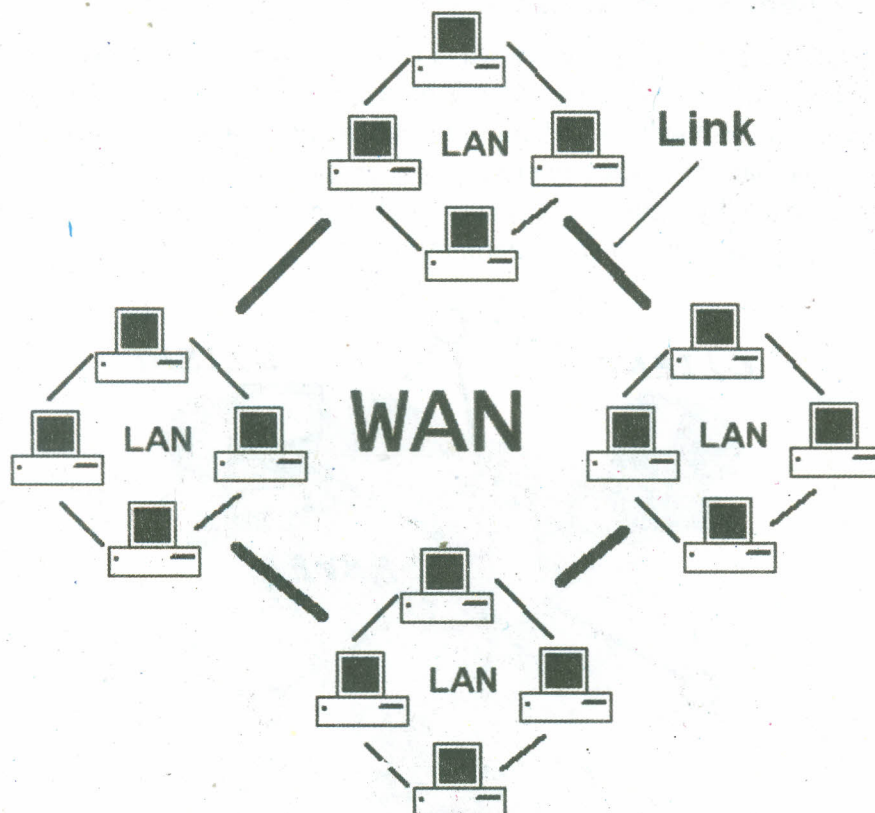


Figure 2.6: Wide Area Network.

Source: wally.cs.iupui.edu/n241-new/webMag/index.html

The following table gives a comparison between LAN, MAN and WAN.

2.5.4 Comparison amongst different type of Networks

NETWORK	SIZE	TRANSMISSION MEDIA	MAXIMUM DISTANCE	SPEED
LAN	Confined to buildings or campus	Cable used	Covers up to 10 km	10/100/1000M bps
MAN	Confined to city or town	Optical fiber and other digital medium	Covers the area of city or town	Range varies from 155Mbps -6Gbps
WAN	Larger than MAN	Telephone lines, radio waves, leased lines or satellite	Covers a number of cities or countries	Varys from 155Mbps-40Gbps

2.6 NETWORK ARCHITECTURE

Depending on the architecture used in the Networks it can be classified into two categories, they are:

2.6.1 Client/Server Architecture

The Client/Server Architecture as shown in Figure 2.7 is one in which several clients are connected with a server. The client is basically a machine and the server is the machine which responds to a client with information. Whenever a client needs resources and data, it sends a request to the server which is managed to respond to a request made by a client. The server handles multiple clients at a time. That's why servers should be high speed computers.

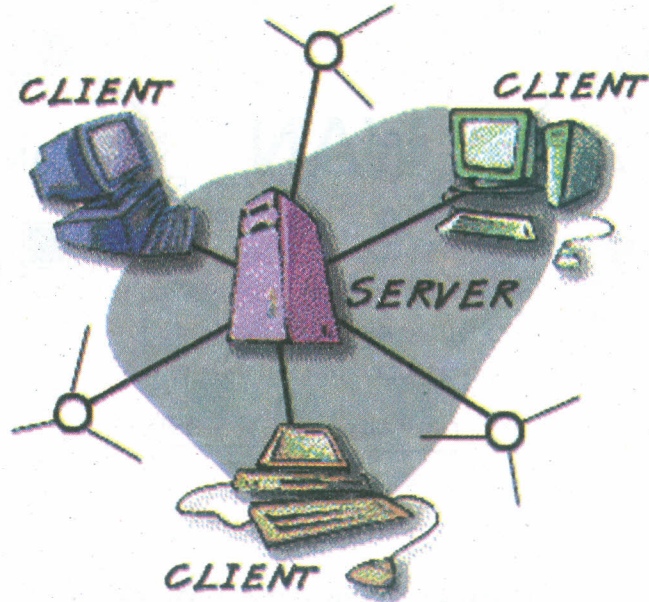


Figure 2.7: Client/Server Architecture

Source: www.filetransferplanet.com/tag/ws_ftp/

2.6.2 Peer-to-Peer Architecture

In peer-to-peer architecture (Figure 2.8) all computers have equal responsibilities and capabilities. Here each computer in that network acts as both a client and a server. There is no existence of a central server. Data and resources are distributed throughout the network, and an individual user can access as well as share these data and resources. A Peer-to-Peer network is also known as a **distributed network**.

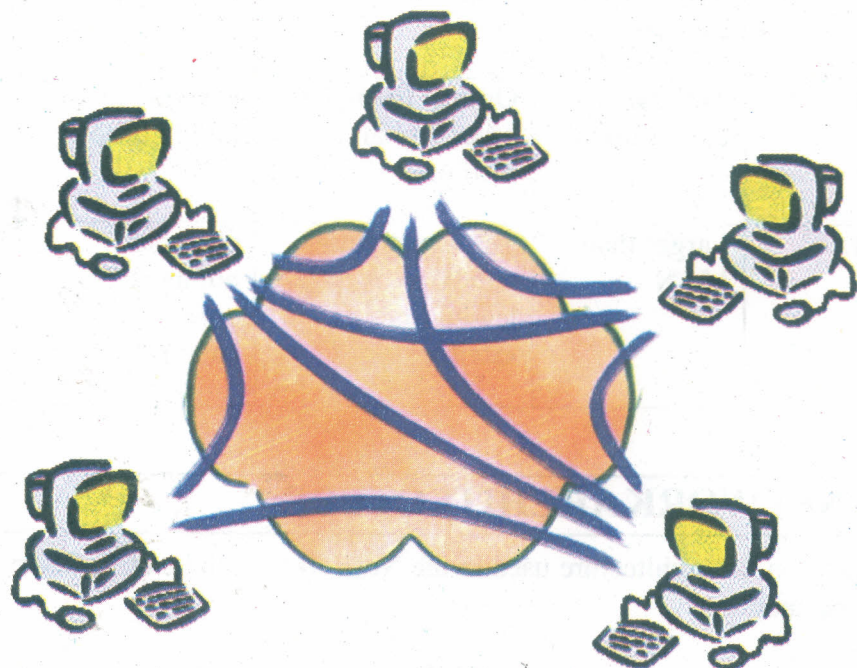


Figure 2.8: Peer-to-Peer Architecture

Source: www.cs.virginia.edu/~mngroup/hypercast/

The following table makes a comparison:

2.6.3 Comparison between Client/Server and Peer-to-Peer Architecture

Client/Server	Peer-to-Peer
1. It is a centralized or server based network.	1. It is a distributed network.
2. Only a server is capable of responding to request for data and resources.	2. Each computer has equal right and responsibility.
3. These networks are more expensive as compared to Peer-to-Peer networks.	3. These networks are simpler and less expensive.
4. Only specific computers are dedicated to serve others.	4. Data and resources are distributed throughout the networks and each user can share it.

Try your self



Which Network architecture is secure in terms of data security?

2.7 NETWORK TOPOLOGY

Topology refers to the physical structure or shape of a network. It is a layout of connected devices on network. Network topology is used to determine how nodes are connected together and how do they communicate with others. Topology is either **physical** or **logical**.

Most common network topologies are:

- Bus topology
- Star topology
- Ring topology
- Mesh topology
- Tree topology

The basic parameters that are considered while selecting a physical topology are:

- Ease of installation
- Ease of reconfiguration
- Ease of troubleshooting

2.7.1 Bus Topology

The popular topology for network is linear. This consists of a single length of a cable also called a backbone onto which the various nodes are attached. Therefore it is called multipoint. The topology is used in traditional data communication network where the host at one end of the bus communicates with several nodes attached along its length. The data can be transmitted in both directions and at the end they

have terminators at either end. As signal travels along the length of a cable, it gets weaker due to transformation of a signal into heat. For this reason there is a limit on the number of nodes a bus can support.

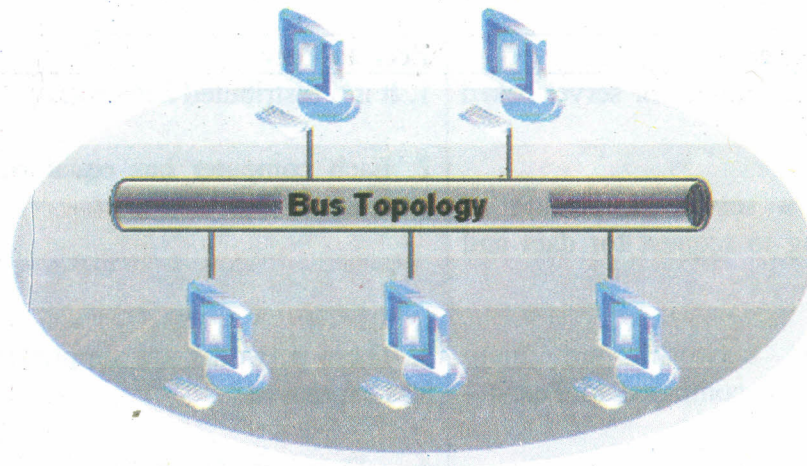


Figure 2.9: Bus Topology

Source: www.edrawsoft.com/Network-Topologies.php

Advantages:

- Installation is cheap and easy as compared to other topologies.
- Short cable length and simple wiring because only the backbone cable is passed through all machines whereas in Star topology, number of cables depends upon the number of nodes.
- Easily extendable.

Disadvantages:

- Fault detection is difficult.
- Fault isolation is difficult.
- The performances decrease in case of a large number of computers beyond a certain limit.

2.7.2 Ring Topology

The Ring topology is also known as circular topology. In Ring topology, each node is connected to two and only two neighboring nodes. Data is accepted from one of the neighboring node and passed on to another neighboring node. Data travels in one direction only, from a node to another node around the ring. A ring is relatively easy to install and reconfigure compared to bus topology because it is linked to only its two neighbor nodes. It needs to move only two connections for adding and deleting nodes. However, movement of traffic in only one direction is serious drawback of the topology. In such situation a break in the ring can disturb the entire network, which can be overcome by a switch capable of closing off the breaks using a dual ring.

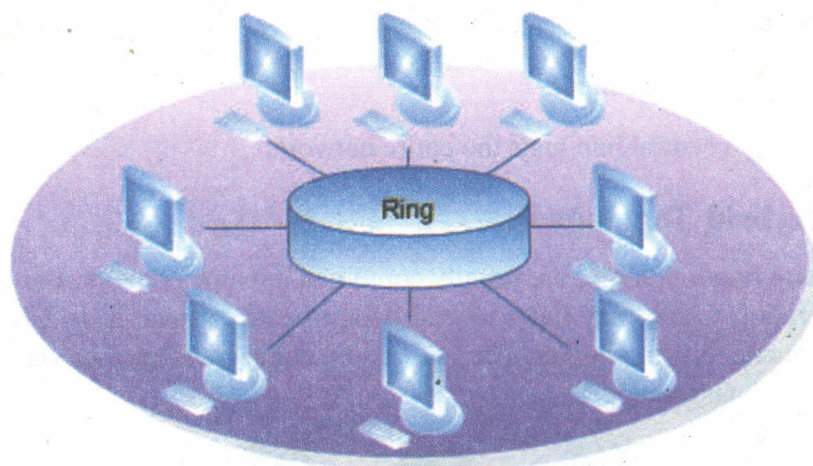


Figure 2.10: Ring Topology

Source: www.edrawsoft.com/Network-Topologies.php

Advantages:

- Less cabling is required.
- Easy to install and modify the network.

Disadvantages:

- Node failure causes network failure.
- Adding or removing computers disturb the entire network.

2.7.3 Star topology

This topology consists of a central hub to which all other nodes are connected by a single path. A single hub is sufficient for a small network, however a large network requires multiple hubs. But it increases hardware and cabling cost.

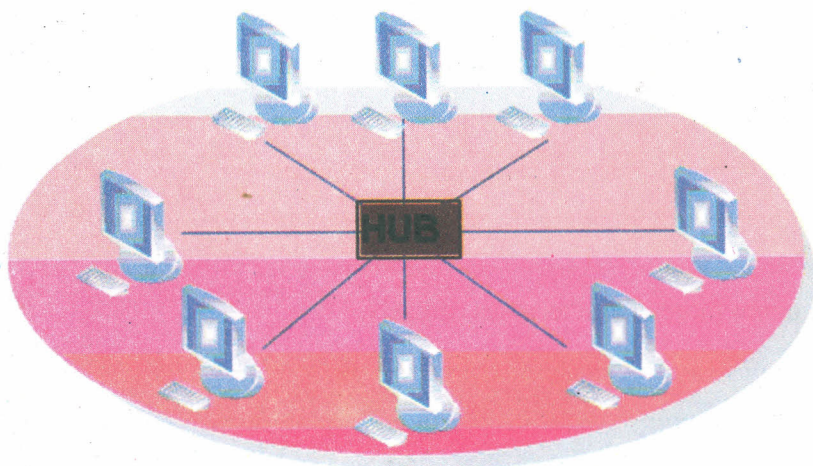


Figure 2.11: Star Topology

Source: www.edrawsoft.com/Network-Topologies.php

Advantages:

- Installation and configuration of network is easy.
- Modification and expansion of network is easy.
- Finding fault is easy.

Disadvantages

- More cabling is required.
- Failure of a central hub halts the entire network.

2.7.4 Hybrid Topology

Star, bus and ring topologies are usually combined into one network. For example an organization which may have several departments can decide to have a ring topology in one, bus in another. The two can be connected together via a central controller in a star topology.

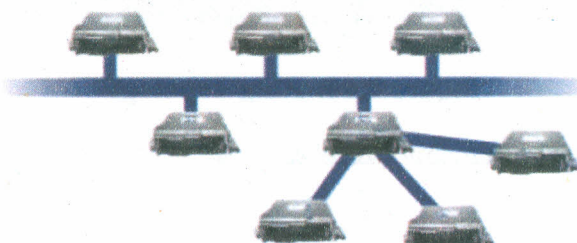


Figure 2.12: Hybrid Topology

Source: zone.ni.com/devzone/cda/tut/p/id/3352

Check Your Progress I

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) What is a Network? Write down the different types of Networks.

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2) Write down three characteristics of LAN.

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3) Distinguish between LAN and WAN.

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2.8 TRANSMISSION MEDIA AND ITS CHARACTERISTICS

Various transmission media can be used for transmission of information from one place to another place. Each one has its own bandwidth, delay, cost and ease of installation and maintenance. The basic type of transmission media are:

- Twisted Pair
- Coaxial Cable
- Optical fiber
- Wireless Medium

The basic parameters that are considered while selecting a transmission media are:

- Cost
- Bandwidth (Capacity)
- Delay
- Installation & maintenance

2.8.1 Twisted Pair Cable

The oldest and most common transmission media is the twisted pair. A twisted pair consists of two insulated copper wires about 1mm thick wrapped together in a double helix. Twisted pair can be used as either analog or digital transmission. The bandwidth depends on the thickness of the wire and distanced traveled. The twisted pair can be classified in two types:

- UTP (Unshielded Twisted Pair)
- STP (Shielded Twisted Pair)

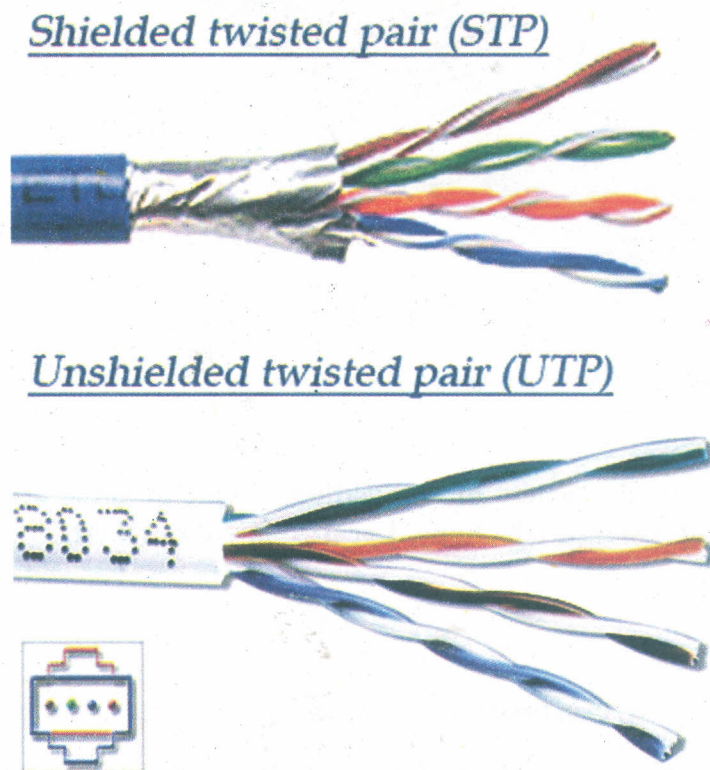


Figure 2.13: Types of Twisted Pair cable

Source: hubpages.com/hub/computernetworkingcable

Advantages:

- It is easy to install and simple.
- Adequate performance and lowest cost per meter.

Disadvantages:

- High attenuation.
- Low bandwidth capabilities make it unsuitable for broadband application.

Did you know?



Twisted Pair cable is generally used for telephone communication because it can run several Kms without amplification, but for longer distance, repeaters are needed.

2.8.2 Co-Axial Cable

It carries signals of higher frequency range compared to twisted pair cable. This type of cable consists of solid copper wire as a core, surrounded by an insulating cover. The insulator is covered by a cylindrical conductor. The shielding of the coaxial cable gives good bandwidth as well as noise immunity. The bandwidth depends on cable length. Co-Axial cable can be used over longer distances and support more nodes.

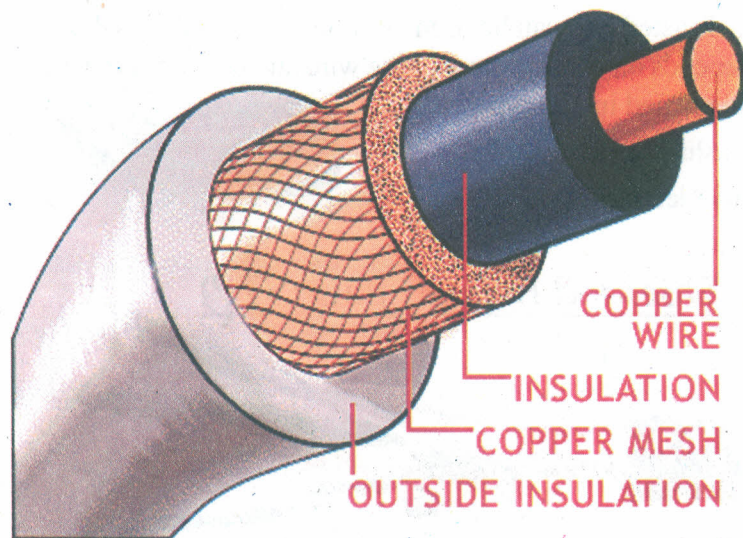


Figure 2.14: Co-Axial cable

Source: www.petervaldivia.com/technology/networks/typ..

Did you know?



It is used in a wide variety of applications. Some of these are Television network, Long distance telephone, Local Area Network etc.

Advantages:

- Less attenuation than twisted pair because of shielding.
- Higher transfer rate than twisted pair.

Disadvantages:

- Expensive as compared to twisted pair.

2.8.3 Optical Fiber

Optical fiber consists of thin strands of silicon glass or glass like material which are able to carry light signals from one place to another, and is coated with a refractive surface. The light sources used are LEDs or laser diodes. The signals are converted before being sent. An optical fiber transmission system has three main components: the light, transmission medium and the detector.

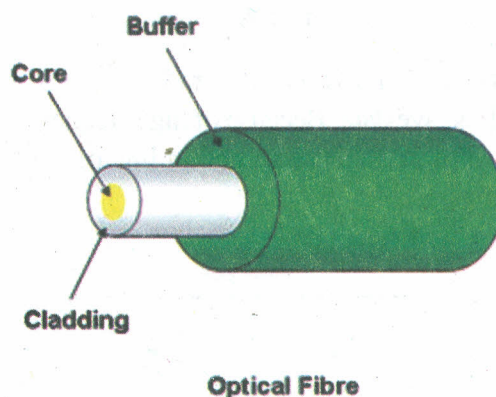


Figure 2.15: Optical Fiber

Source: www.oakmead-electrical.co.uk/web/fibre%20intr...

Advantages:

There are three major advantages of fiber optics cable over twisted pair and coaxial cable: Noise resistance, less signal attenuation and higher bandwidth.

Noise resistance: Fiber optics uses light rather than electricity. External light, the only possible interference is blocked from the channel by the outer jacket. That is why fiber optic cable supports better noise resistance than other mediums.

Less signal attenuation: Fiber optic transmission distance is significantly greater than that of the other guided medium. A signal can run for miles without requiring regeneration/amplifiers.

Higher bandwidth: Fiber optic cable supports very high bandwidth transmission than twisted pair and coaxial cable.

Disadvantages:

The major disadvantages of the fiber optics are:

- It is costly.
- Difficult to join.
- Expensive to install.

2.8.4 Wireless Medium

Wireless transmission is also called **unbounded media**. There are no physical connectors between the two devices. Mostly the transmission is sent through the atmosphere, but sometime it can be just across a room. For long distance communication wireless transmission is widely used as an alternative to coaxial cable.

The three main types of wireless Media are:

- Radio Wave
- Microwave
- Infrared ray

Radio transmission: The radio portion of the electromagnetic spectrum extends from 10 KHz to 1GHz. Within this range there are numerous bands of frequencies that are designed for specific purposes. Radio waves are easy to generate, can travel long distances, and penetrate buildings easily. So they are widely used for communication, both indoors and outdoors.

Microwave transmission: Microwave is a radio system, which uses very high frequencies to send and receive data. Because of high frequencies, microwave stations are located at a distance of 30 Kms apart and in line of sight. Microwaves do not get pass through buildings.

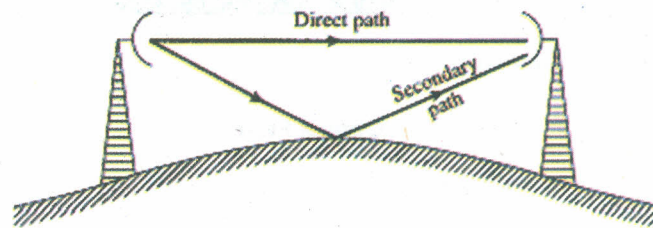


Figure 2.16: Microwave Transmission

Source: zone.ni.com/devzone/cda/ph/p/id/61

Infrared Transmission: this is used for short-range communication. The remote control used on televisions and VCR's all uses infrared communication.

Try your self



Find out all such applications or devices where we can use wireless communication?

2.9 NETWORK DEVICES/ HARDWARES

Networks devices play an important role to connect computers world wide. Without these devices we can't connect computers for communication. The most common network devices are:

- Repeater
- Hub
- Bridge
- Router

Repeater: Repeater (as shown in Figure 2.17) is used to connect together two or more cables of any media type. A Repeater is a device which regenerates signals. A repeater receives a signal and, before it becomes too weak and corrupted, regenerates the original signal. A repeater does not connect two LANs but it connects two segments of same LAN.

Did you know?



A repeater is a regenerator, not an amplifier.

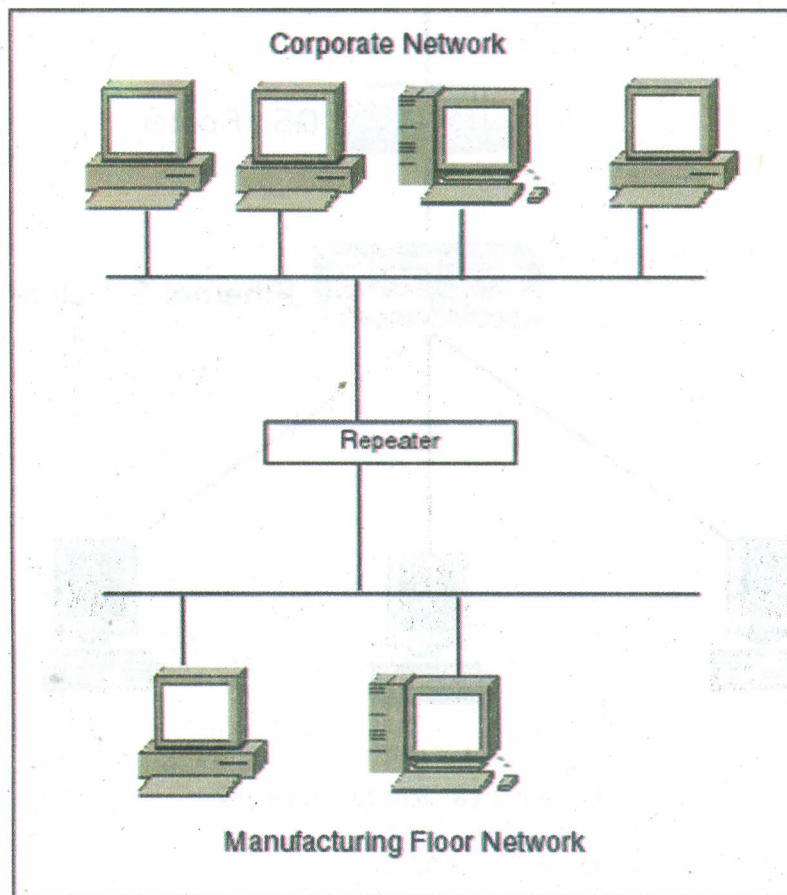


Figure 2.17: Repeater network

Source: http://www.oreillynet.com/pub/a/network/2001/03/16/net_2nd_lang.html

Hub: A hub is a multi-port repeater. It is normally used to create connections between nodes in star topology.

Bridge: The function of a bridge is to connect separate networks together. Bridges connect different network types or networks of the same type.

Router: A device that works like a bridge but can handle different protocols. If the destination to a router is unknown it sends the traffic to another router which knows the destination.

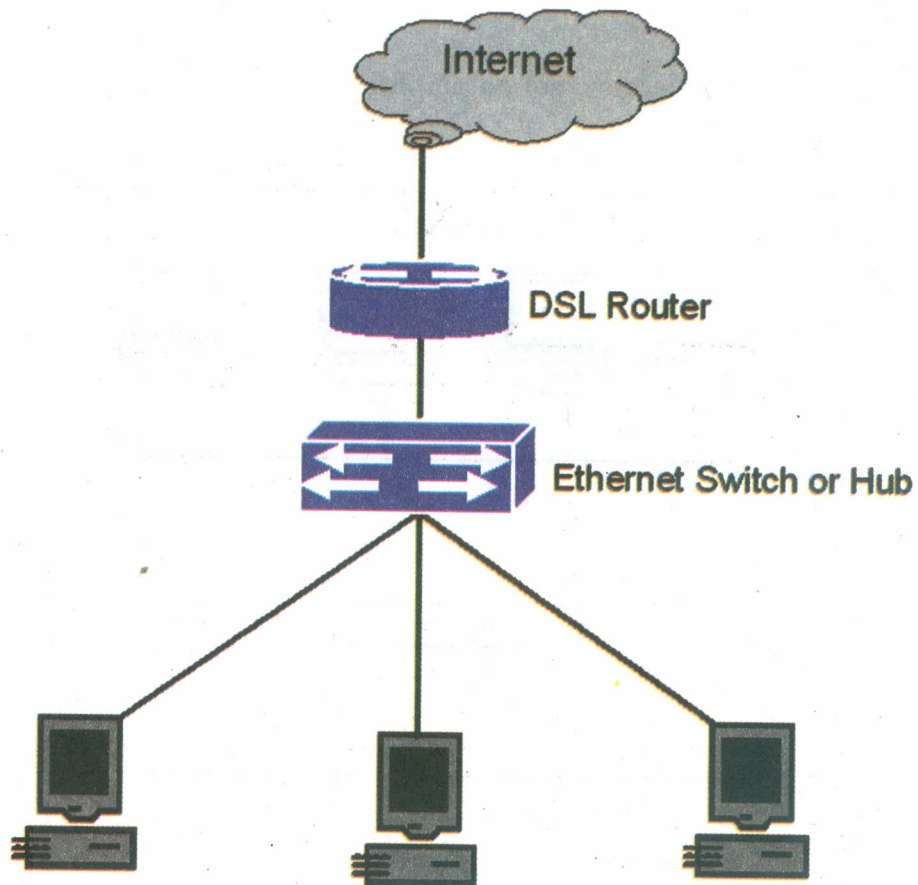


Figure 2.18: Router network

Source: linksysroutersetup.org/linksys-dsl-router/

Did you know?



A router differs from a bridge in a way that former uses logical address and the later uses physical address.

Gateway: A gateway is a device that connects dissimilar networks. A gateway operates at the highest layer of network.

2.10 PROTOCOL

A protocol means the rules that are applicable for a network. Protocol defines standardized formats for data packets, technique for detecting and correcting errors and so on. There are different types of protocol in network eg.:

- FTP
- Telnet
- SMTP
- TCP
- IP
- HTTP
- GOPHER
- UDP

Check Your Progress II

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) Write down advantages and disadvantages of twisted pair cable.

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2) Define different types of network devices used.

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3) Define protocol? Write down important protocols used in networks.

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4) Write down the advantages and disadvantages of optical fiber.

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2.11 LET US SUM UP

Let us recapitulate what we have learned so far:

- A network is a collection of interlinked computers by means of communication.
- The networks facilitate resource sharing, file sharing, program sharing, fast communication, back ups.
- A special computer that facilitates sharing of data, software and hardware resources is called server.
- On the basis of geographical area, networks can be classified into LAN, MAN, WAN.
- On the basis of network architecture networks can be classified as : client/ server and Peer-to-Peer.
- The pattern of interconnection of nodes in a network is called topology.
- Most popular topologies are bus, ring, star, mesh and tree.
- A network can have any of these communication Media: twisted pair, co-axial cable, optical fiber and wireless medium.
- The most popular hardware devices to connect your computer to internet are router, repeater, bridge, gateway etc.
- A protocol is a set of standardized rules for data packets, technique for detecting and correcting errors.

2.12 REFERENCES AND SUGGESTED READINGS

- Foundations of Computing, “Sinha and Sinha,” BPB Publications.
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- zone.ni.com/devzone/cda/ph/p/id/61
- http://www.oreillynet.com/pub/a/network/2001/03/16/net_2nd_lang.html
- linksysroutersetup.org/linksys-dsl-router/

2.13 CHECK YOUR PROGRESS-POSSIBLE SOLUTIONS/ANSWERS

Check Your Progress I

- 1) A computer network is basically interconnection of two or more than two independent systems (computers) together to share hardware and software resources, allow communication, share application software etc. Computer networks are generally classified according to their structure and the area they are localized in as.
 - **Local Area Networks (LAN):**
 - **Metropolitan Area Network (MAN):**
 - **Wide Area Network (WAN):**
- 2) The following characteristics of a LAN are:
 - Covers a small area like, with in 5 to 10 Kms.
 - Higher speed ranging from 10Mbps to 100Mbps.
 - Low error rates.
 - Data and hardware sharing between multiple users are easy.
 - Most of the equipment used in LAN are inexpensive.
- 3) The difference between LAN and WAN are:

LAN	WAN
Confined to buildings or campus	Larger than MAN
Covers up to 10 km	Covers a number of cities or countries
Range vary from 1-10Mbps	Vary from 1.5Mbps-2.4Gbps

Check Your Progress II

- 1) The following advantages and disadvantages are:

Advantages of a twisted pair cable are:

- It is easy to install and simple.
- Adequate performance and lowest cost per meter.

Disadvantages of a twisted pair cable are:

- High attenuation.
- Low bandwidth capabilities make it unsuitable for broadband application.

- 2) The most common network devices are:

- Repeater
- Hub
- Bridge
- Router

Repeater: A Repeater is a device which regenerates signals.

Hub: A hub is a multi-port repeater.

Bridge: The function of a bridge is to connect separate networks together.

Router: A device that works like a bridge but can handle different protocols.

Gateway: A gateway is a device that connects dissimilar networks.

- 3) A protocol means the rules that are applicable for a network. Protocol defines standardized formats for data packets, technique for detecting and correcting errors and so on. There are different types of protocol in network : FTP, Telnet, TCP, IP, HTTP, GOPHER etc.
- 4) There are three major advantages of fiber optic cable over twisted pair and coaxial cable: Noise resistance, less signal attenuation and higher bandwidth.

Noise resistance: Fiber optics uses light rather than electricity. External light, the only possible interference is blocked from the channel by the outer jacket. That is why fiber optic cable supports better noise resistance than other mediums.

Less signal attenuation: Fiber optic transmission distance is significantly greater than of the other guided medium. A signal can run for miles without requiring regeneration/amplifies.

Higher bandwidth: Fiber optic cable supports very high bandwidth transmission than twisted pair and coaxial cable.

The major disadvantages of the fiber optics are:

- It is costly.
- Difficult to join.
- Expensive to install.

Lab Exercise;

Note: a) Write your answers in the space provided at the end of this unit.

b) For practical purpose attend practical lab.

- 1) Differentiate all types of communication media and define all the layers of that particular media.

Space Provided for Practical Work

UNIT 3 OPERATING SYSTEM

Structure

- 3.0 Objectives
- 3.1 Introduction
- 3.2 What is an Operating System?
- 3.3 Types of Services
- 3.4 Functions of an Operating System
 - 3.4.1 Example of an Operating System
- 3.5 Desktop of a Computer
- 3.6 Shut down My Computer
- 3.7 Restart My Computer
- 3.8 Standby Mode
- 3.9 Start a Program
- 3.10 Windows Explorer
- 3.11 Finding Files and Folders
- 3.12 Playing Games
- 3.13 Changing Date and/or Time
- 3.14 Installing a New Printer
- 3.15 Desktop Shortcut
- 3.16 Changing Wallpaper
- 3.17 Changing Screensaver
- 3.18 Disk Drives
- 3.19 Creating Folders
- 3.20 Window
- 3.21 Icon
- 3.22 Menu
- 3.23 Cut, Copy and Paste
- 3.24 Let Us Sum Up
- 3.25 References and Suggested Readings
- 3.26 Check Your Progress – Possible Solutions/Answers

3.0 OBJECTIVES

After going through the unit, you will be able to:

- Define operating system;
- Explain functionality of an operating System;

- Use Windows XP properly;
- Install printers, change your desktop wallpaper and screensavers, you can change date/time setup and many more;
- Differentiate between desktop and window;
- Understand the use of windows explorer;
- Store information in the drives and move anytime to another drives;
- Use folders and how it will be created and renamed;
- Make shortcuts for every useful program, folders, documents etc.;
- Understand the use of standby mode; and
- Restart or shutdown your computer.FUNDAMENTALS.

3.1 INTRODUCTION

An Operating is a program or software which acts as an interface between a user and the computer hardware. An operating system is an important part of every computer systems. Its purpose is to support an environment for running a program in a user friendly manner. The primary goal of an operating system is to control all the resources of a computer system: memory, I/O devices, CPU and other resources. In this unit we will talk about services provided by an OS and its functions. We will also discuss one example of an operating system at the end. In this unit we will explain some components of the operating system with some examples such as menu, icon, disk, screen saver and so on.

3.2 WHAT IS AN OPERATING SYSTEM?

An operating system is an important component of a computer system which controls all other components of the computer system. Major components of Computer System are (Figure 3.1):

- The Hardware (memory, I/O, CPU)
- The Operating system
- The Application Program
- The users

Hardware provides the basic computing resources, the application program defines the tasks or problems to be solved by computer resources under the control of an operating system.

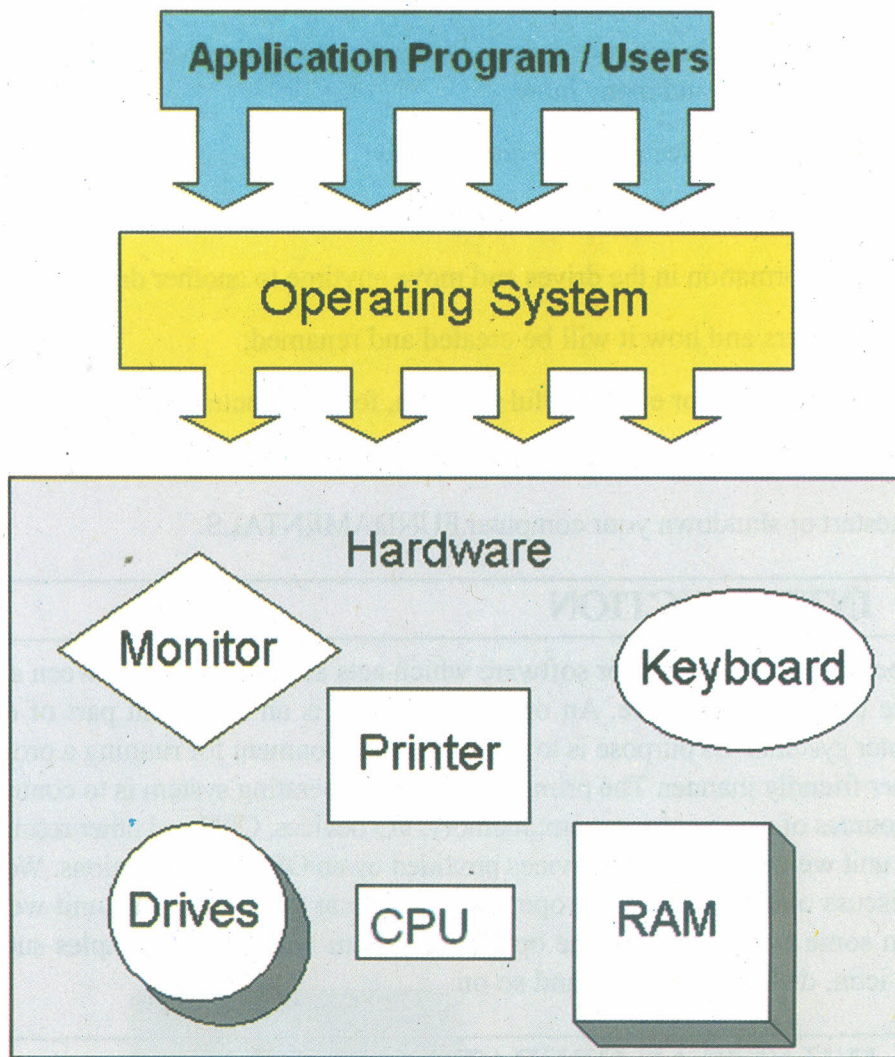


Figure 3.1: Components of a computer system.

Source: www.karbosguide.com/hardware/module6c1.htm

Users have different applications to run on a system. Someone might be requiring database, others might need a text editor or spreadsheet package, someone else might need a browser for surfing the net. But to run these software resources you require a user friendly environment which is supported by an operating system.

We can view an operating system as a *Resource Allocator*. The operating system acts as the manager of these resources and allocates them to specific programs and users as necessary for their tasks thus maintaining the efficiency of a computer.

Another view of an operating system is as a *Control Program*. A control program is responsible for the execution of user programs in an efficient and proper way so as to prevent errors and improper use of the computer.

3.3 TYPES OF SERVICES

An operating system provides certain services to programs and to the users of the programs. Some common services provided by an operating system are:

- Program Execution
- Handling Input/Output Operations
- Manipulation of File System

- Error Detection and Handling
- Resource Allocation
- Information and Resource Protection

All these services are ensured by the functions provided by an operating system. The functions offered by operating systems differ from one operating system to another, but all of them provide some basic essential services.

3.4 FUNCTIONS OF AN OPERATING SYSTEM

Major Operating System functions are:

- Process Management
- Memory Management
- File Management
- Device Management

Process Management: A process is a program in execution. During execution, a process needs certain resources such as CPU time, memory space, files and I/O devices. A computer performs a number of processes at a time., The process management module of an operating system takes care of the creation and deletion of processes, scheduling of various system resources to different processes requesting them and providing mechanisms synchronization and communication among processes to maintain accuracy of its output.

Memory Management: To execute a program, it must be loaded, together with the data, in the main memory. To improve CPU utilization and to provide better response time to its user, a computer system normally keeps several programs in main memory. The memory management module of an operating system takes care of the allocation and deallocation of memory space to the various programs in need of this resource.

File Management: All computer systems are used for storage, retrieval and sharing of information. A computer normally stores such information in units called files. Processes can read information from files and can create new files for storing newly generated information. Information stored in files is made persistent by storing them on a secondary storage media. Files provide a natural and easy means of information sharing.

Device Management: A computer system normally consists of several I/O devices such as monitor, hard disk, printer etc. The device management module of an operating system takes care of controlling the entire computer's I/O devices. It keeps track of I/O requests from processes, issues commands to the I/O devices, and ensures correct data transmission.

3.4.1 Examples of an Operating System:

There are lots of operating systems used in today's computer world and all come from different vendors. Most operating systems are proprietary (i.e. ownership with a particular vendor) for example Windows, Macintosh etc. But the trend is towards public domain software – which can be downloaded freely. Its ownership doesn't lie with a particular vendor. Linux is one such example.

Few examples of operating system are:

- Windows
- Unix
- Linux
- Macintosh

Now we are going to familiarize you with Window XP as an operating system and explain its features.

Windows XP: It was introduced in 2001 by Microsoft. Microsoft called the release of Windows XP as its most important product since Windows 95. Along with a redesigned look and feel of the user interface, the new operating system is built on the Windows 2000 kernel, giving the user a more stable and reliable environment than previous versions of Windows. Windows XP comes in two versions, Home and Professional. Whereas the Professional Edition focuses on reliability and security, the Home Edition includes extensive digital photography, digital music, digital video, home networking and communications features.

System requirements: System requirements for Windows XP Home and Professional editions are as follows:

System	Minimum	Recommended
Processor	233 MHz	300 MHz or higher
Memory	64 MB RAM	128 MB RAM or higher
Video adapter and monitor	Super VGA (800 x 600) or higher resolution	
Hard drive disk free space	1.5 GB or higher	
Drives	CD-ROM Drive or DVD Drive	

Did you know?



Most of the users are using Windows version of operating system worldwide.

Check Your Progress I

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) What is an operating system? Write down few examples of an operating system?

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2) What are the functions of an operating system?

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3) What are the system requirements for Window XP?

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3.5 DESKTOP OF A COMPUTER

When you start your computer, the first thing you see is the desktop. The desktop is your work area. The desktop contains taskbar, shortcut, program, icons, start button, active windows etc as you can see in Figure 3.2.

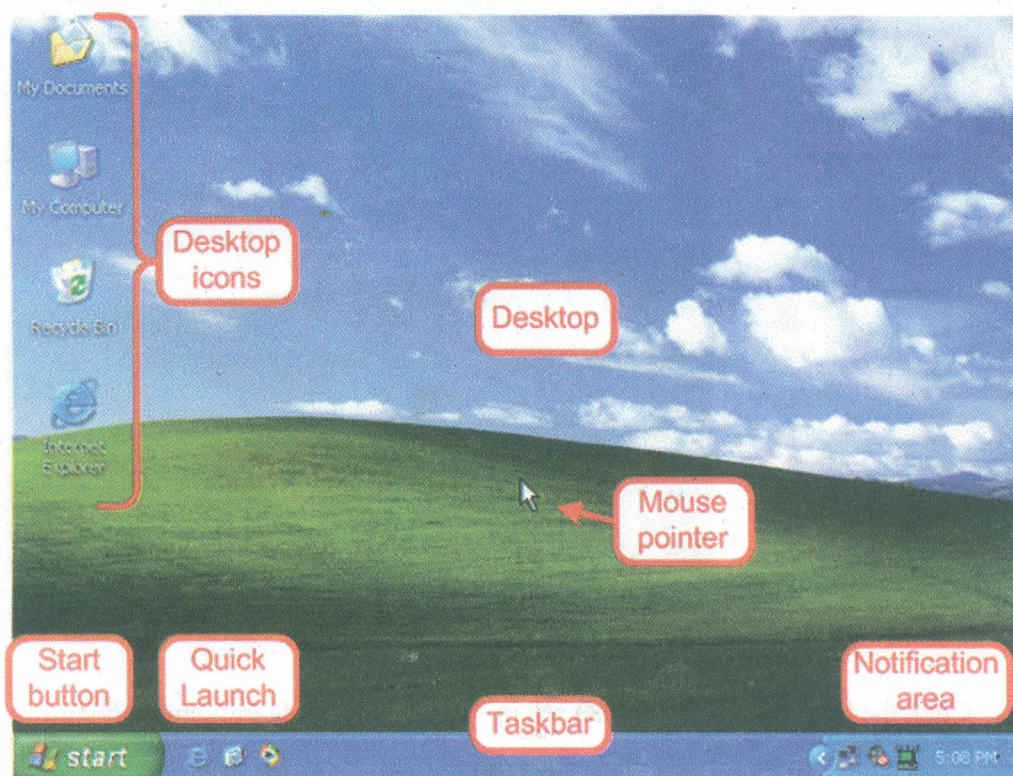


Figure 3.2: Desktop

Taskbar: By default, the taskbar is located on the bottom edge of the desktop. You can click the taskbar and drag it to other locations. The start button, active program buttons, icons for quick access to programs, and the current time are located on the taskbar.

My Computer: The My Computer icon provides access to the resources on your computer. You can access your drives and other peripherals by clicking on the My Computer icon.

Internet Explorer: The Internet Explorer icon launches the Internet Explorer browser.

The Recycle Bin: When you delete an object, Windows XP sends it to the Recycle Bin. You can restore objects that are located in the Recycle Bin or you can permanently delete them.

Shortcut icon: Icons with an arrow in the lower left corner are shortcut icons. Click the icon for quick access to the object they represent (program, document, printer, and so on).

Program, folder, and document icons: Program, folder, and document icons do not have an arrow in the lower left corner. They represent the actual object and provide direct access to the object.

3.6 SHUT DOWN MY COMPUTER

To shut down your computer:

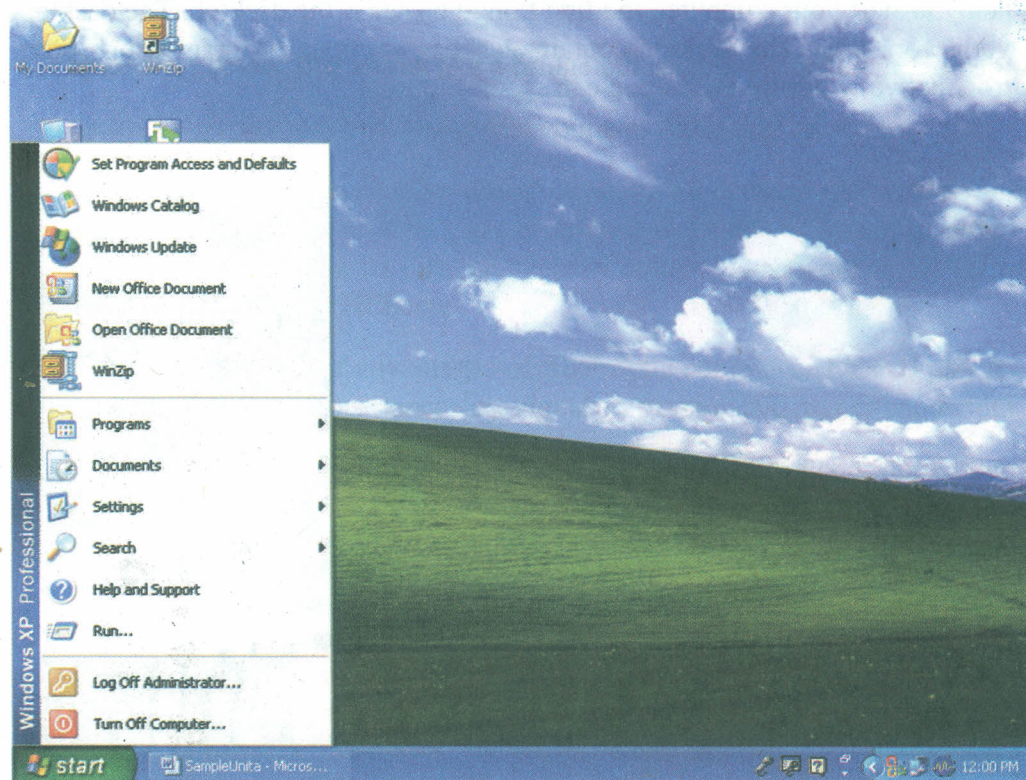


Figure 3.3: Desktop showing start button options.

1. Click the Start button as you can see in Figure 3.3. The Start menu will appear.
2. Click Turn Off Computer. The Turn Off Computer dialog box will appear.
3. Click the Turn Off icon. Your computer will shut down.

3.7 RESTART MY COMPUTER

You may need to shut down and restart your computer after installing a new program or if your system becomes unstable. To shut down and immediately restart your computer:

1. Click the Start button. The Start menu will appear.
2. Click Turn Off Computer as you can see in Figure 3.4. The Turn Off Computer dialog box will appear.
3. Click the Restart icon. Your computer will restart.



Figure 3.4: Desktop showing three buttons for shut down, stand by, restart respectively.

3.8 STANDBY MODE

When your computer is in the Standby mode, your computer consumes less electricity, but is ready for immediate use. However, if the computer loses electrical power while in the standby mode, any information you have not saved will be lost.

How do I put my computer in Standby mode?

To put your computer in Standby mode:

1. Click the Start button. The Start menu will appear.
2. Click Turn Off Computer. The Turn Off Computer dialog box will appear.
3. Click the Stand By icon.

3.9 START A PROGRAM

To start a program:

1. Click the Start button, located in the lower left corner of your screen.

2. Highlight Programs. The Program menu will appear.
3. Move to the Program menu and highlight the program you want to start.
4. Click the program name to start the program.

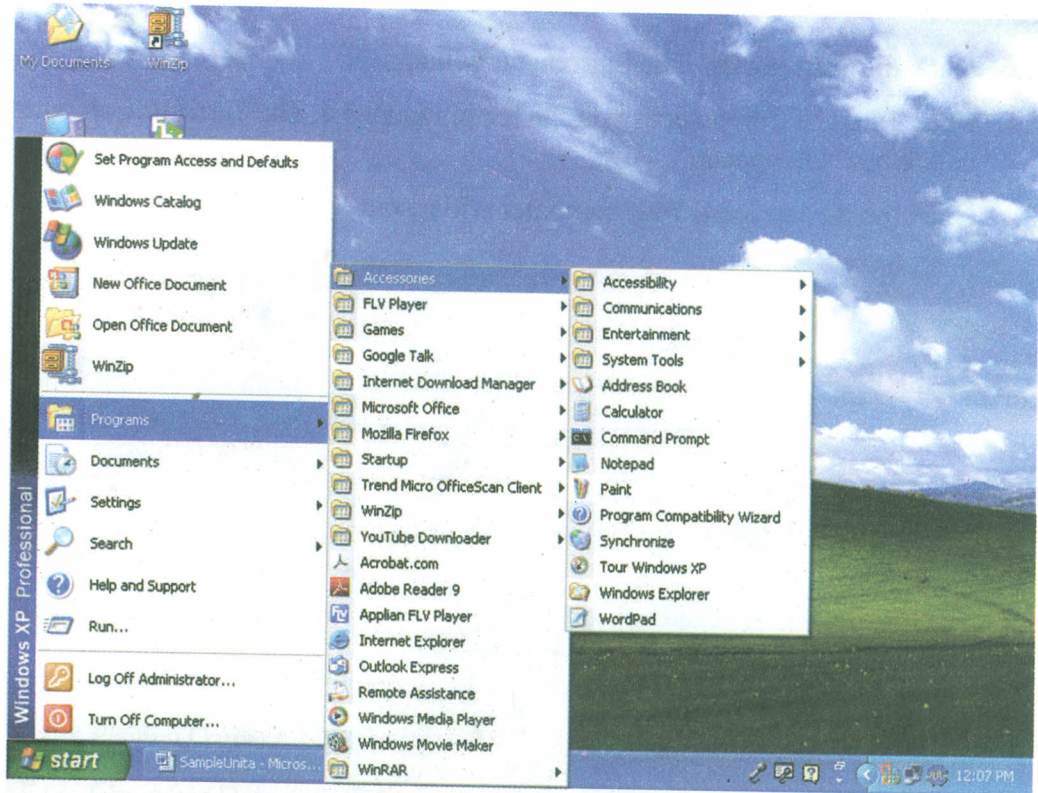


Figure 3.5: Desktop showing Program selection.

3.10 WINDOWS EXPLORER

Windows Explorer is a place where you can view the drives on your computer and manipulate the folders and files. Using Windows Explorer, you can cut, copy, paste, rename, and delete folders and files.

How do I Open Windows Explorer?

To open Windows Explorer:

1. Click the Start button, located in the lower left corner of your screen.
2. Highlight programs.
3. Highlight Accessories.
4. Click Windows Explorer.

Alternatively, you can open Windows Explorer by holding down the Windows key and typing e (Windows-e).

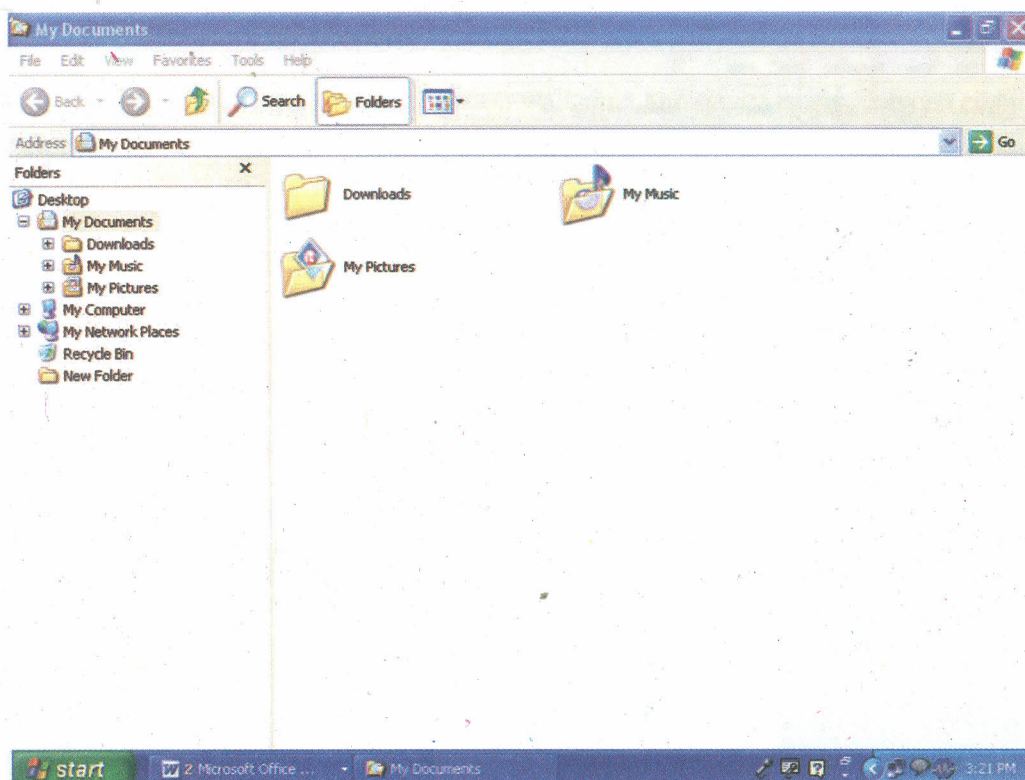


Figure 3.6: Windows Explorer.

Windows XP separates the window into two panes. If you click an object in the left pane, the contents of the object display in the right pane. Click Desktop and the contents of the Desktop folder display on the right. Click My Computer and your computer resources display on the right. To see the contents of a drive, click the drive. To see the contents of a folder, click the icon for the folder in the left pane.

3.11 FINDING FILES AND FOLDERS

Windows XP enables you to quickly locate files and folders on your drives. The search option provides you with four search options: Pictures, music, or video; Documents; All files and folders; and Computers and people as you can see in Figure 3.7. To quickly find a file or folder:

1. Click the Start button. The Start menu will appear.
2. Highlight Search.
3. Click Files or Folders. The search results dialog box will open.

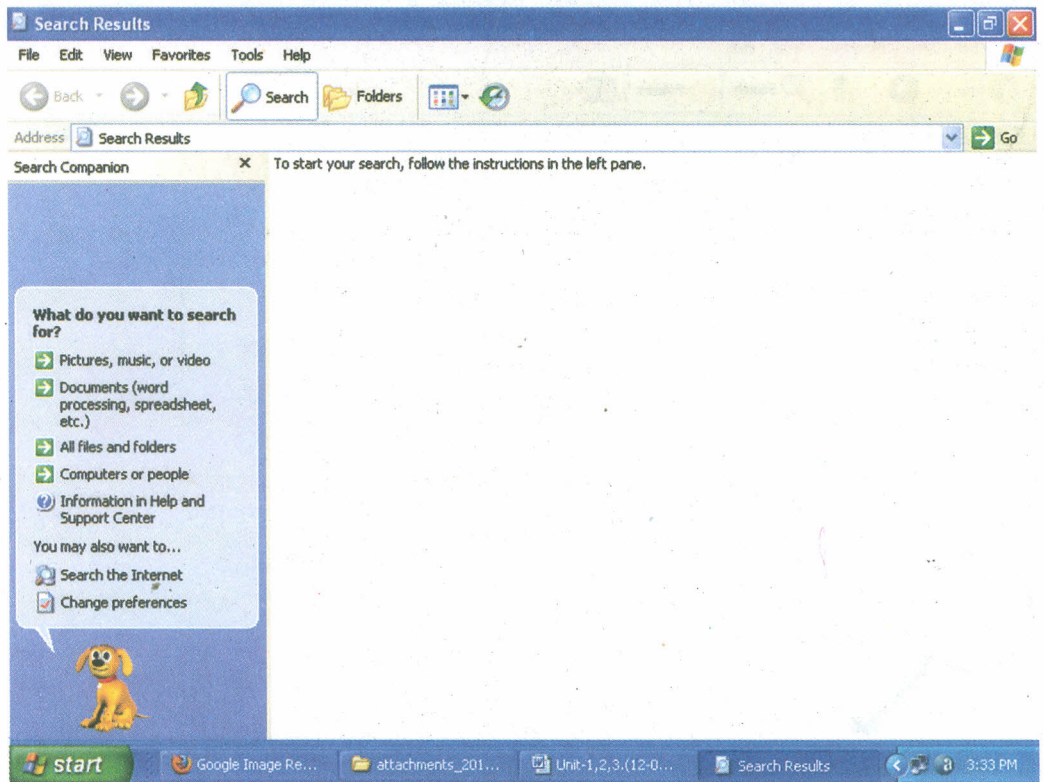


Figure 3.7: Search Window

4. Choose an option.
5. Enter your search criteria. Use the table that follows to help you.
6. Click search. The results of your search will appear in the right pane.

3.12 PLAYING GAMES

Several games are included with Windows XP. To access the games:

1. Click the Start button, which is located in the lower left corner of the screen. The Start menu will appear.
2. Highlight Programs. A submenu will appear.
3. Click Games. Another submenu will appear.
4. Click the game you want to play.

Try your self



Search out files with extension .doc in your computer by using search wizard.

3.13 CHANGING DATE AND/OR TIME

To change the date and/or time:

1. Click the Start button, which is located in the lower left corner of the screen. The Start menu will appear.
2. Highlight Settings. A submenu will appear.

3. Click Control Panel. The Control Panel will open.
4. Click Date/Time. The Date/Time Properties dialog box will appear.

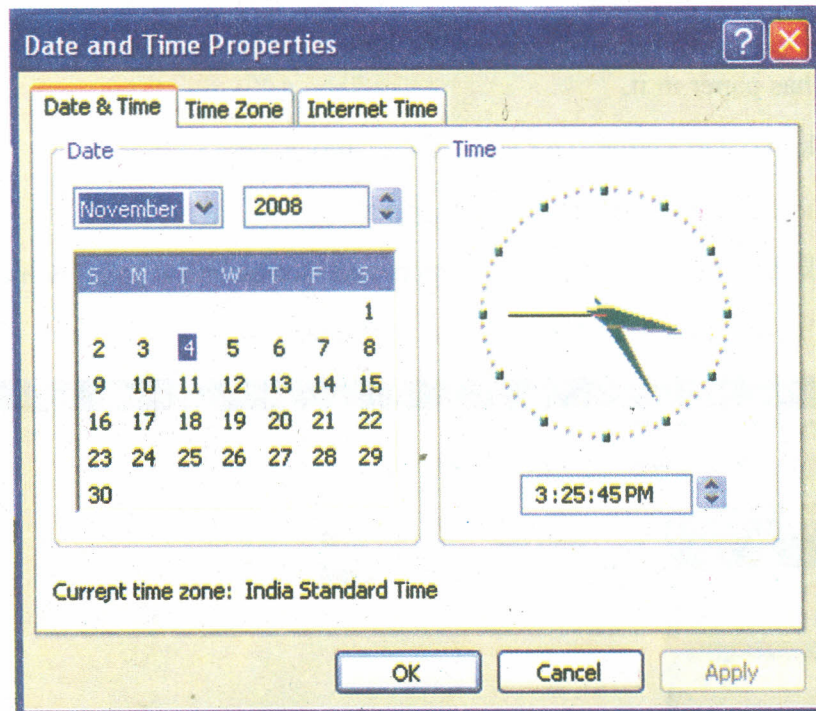


Figure 3.8: Date and Time Properties Dialog Box

5. In the Date frame, select the month and year.
6. In the Month field, click to open the drop-down menu and select the current month.
7. Type the year in the Year field or use the arrows next to the field to move forward or backward until you get to the current year.
8. The Time field is divided into four segments: hour, minutes, seconds, and AM and PM. To make an adjustment:
9. Click in the segment and either type in the correct information or use the arrow keys on the right side to select the correct hour, minute, second and AM or PM.

Time Zone:

1. Click the Time Zone tab.
2. Choose the correct time zone from the drop-down menu.
3. If you want the clock to automatically adjust to daylight saving time, check the box on the screen.
4. Click the Apply button.
5. Click OK.

Change your date and time setting of your computer according to India.

Try your self



3.14 INSTALLING A NEW PRINTER

To install a new printer:

1. Make sure your printer is plugged in, connected to your computer, turned on, and has paper in it.
2. Click the Start button. The Start menu will appear.
3. Highlight Settings. A submenu will appear.
4. Click Printers and Faxes. The Printers and Faxes control panel will appear.
5. Double-click on Add Printer. The Add Printer Wizard will open.

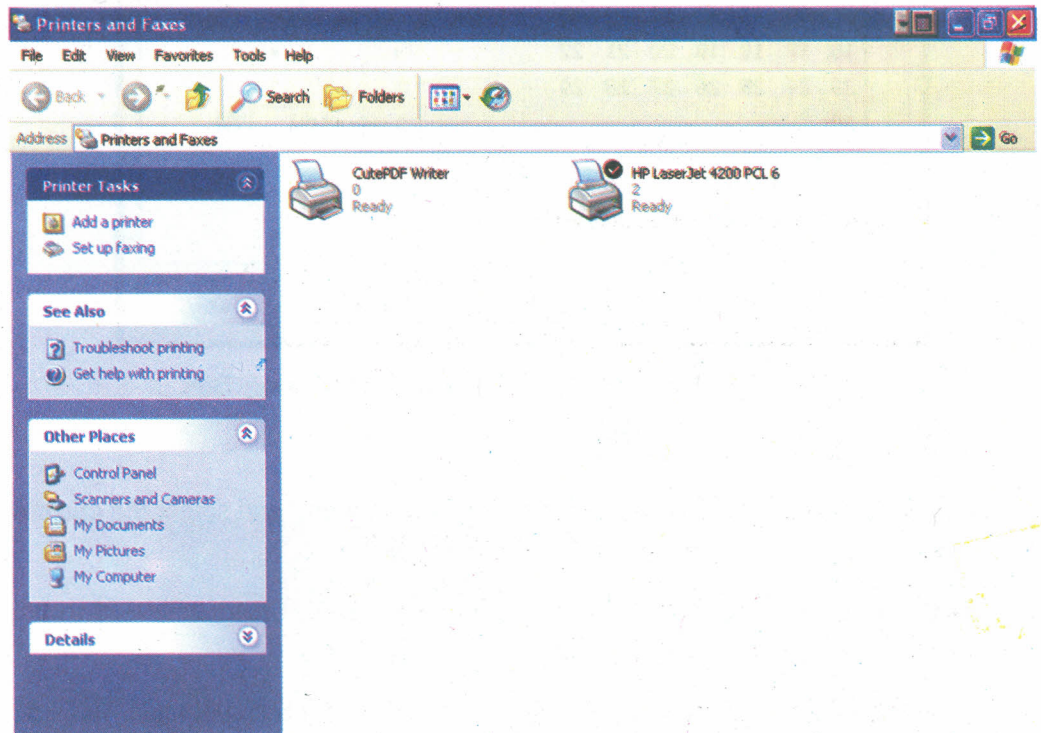


Figure 3.9: Printers and Faxes Window

3.15 DESKTOP SHORTCUT

A desktop shortcut, usually represented by an icon, is a small file that points to a program, folder, document, or Internet location. Clicking on a shortcut icon takes you directly to the object to which the shortcut points. Shortcut icons contain a small arrow in their lower left corner. Shortcuts are merely pointers. Deleting a shortcut will not delete the item to which the shortcut points.

How do I create a desktop shortcut?

To create a shortcut to an item located on the Start menu:

1. Click Start. The Start menu will appear.
2. Locate the item to which you want to create a shortcut. If the item is located on a submenu, go to the submenu.
3. Click and drag the item to your desktop.

To create a shortcut to items visible in Windows Explorer:

1. Open Windows Explorer.
2. Minimize the Windows Explorer window.
3. Locate in Windows Explorer the item to which you want to create a shortcut.
4. Hold down the right mouse button and drag the item onto the desktop.
5. Release the right mouse button. A context menu will appear.
6. Click Create Shortcuts Here.

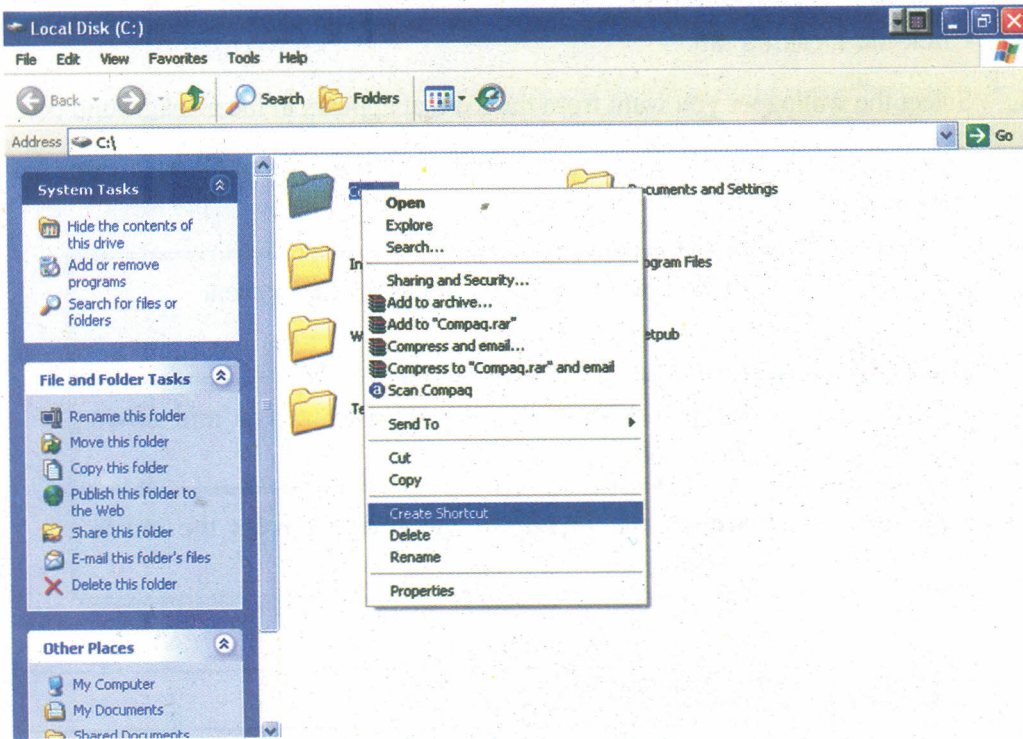


Figure 3.10: Creating shortcut

How do I rename a desktop shortcut?

To rename a shortcut:

1. Right-click the shortcut.
2. Click Rename.
3. Type the new name.

How do I delete a desktop shortcut?

To delete a shortcut:

1. Click the shortcut.
2. Press the Delete key.
3. Click Yes.

Create desktop shortcuts for your regular used programs and rename them according to yourself.

Try your self



3.16 CHANGING WALLPAPER

Wallpaper is the background that displays on your desktop.

How do I change my wallpaper?

To change your wallpaper:

1. Right-click your desktop.
2. Highlight Properties.
3. Click the Desktop tab.
4. Select the wallpaper you want from the list that appears in the Background box.
5. Select how you want your image to appear on the screen. Choose from the following:

Center	Place the image in the center of the screen.
Tile	Have the image display as tiles across and down the screen.
Stretch	Stretch the image so the image covers the entire screen.

3.17 CHANGING SCREENSAVER

Computer monitors display images by firing electron beams at a phosphor-coated screen. If the same image stays on the screen too long, there is a danger that the image will leave a permanent imprint on the screen. Screen savers help prevent this by providing a constantly changing image.

Try your self



Try out which option is suitable for wallpaper display Center, Tile and stretch.

How do I select a screen saver?

To select a screen saver:

1. Right-click anywhere on the Windows desktop. A context menu will appear.
2. Choose Properties. The Display Properties dialog box will appear.
3. Click the Screen Saver tab.
4. The Screen Saver field provides the list of available screen savers. Select the screen saver you want from the list.
5. Click Preview to preview your screen saver.
6. Click Esc to return to the Display Properties dialog box.

7. In the Wait field, set the number of minutes of inactivity before the screen saver starts.
8. Click OK

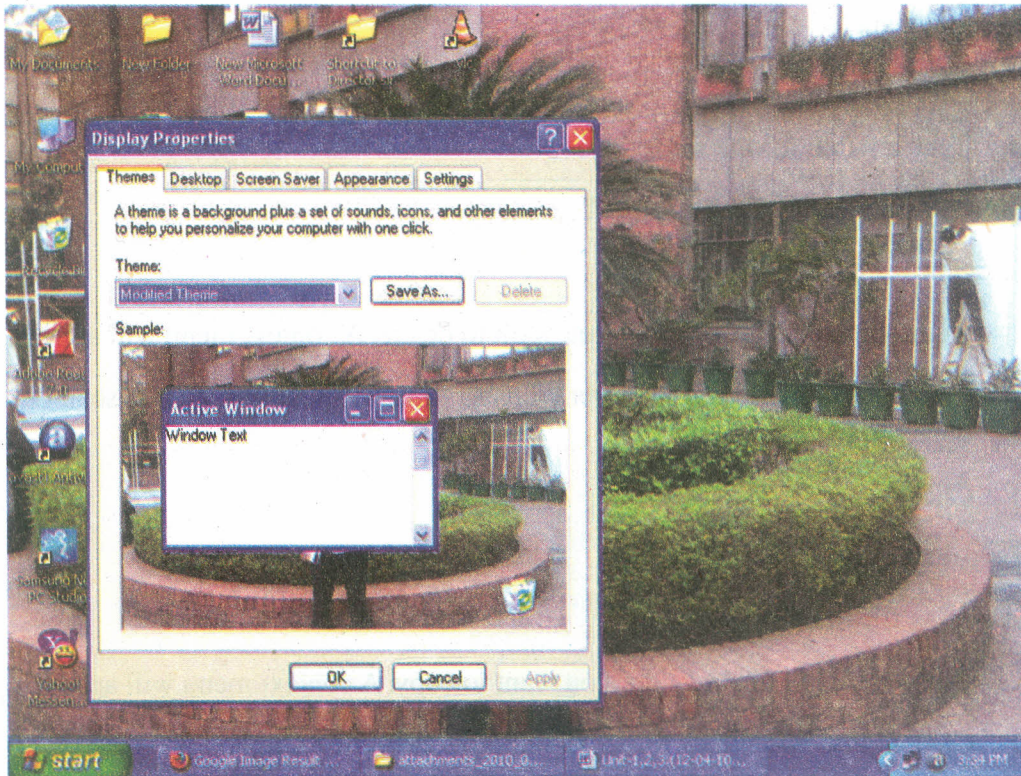


Figure 3.11: Display Properties Dialog box to set screensaver

3.18 DISK DRIVES

Drives are used to store data. Almost all computers come with at least two drives: a hard drive (which is used to store large volumes of data) and a CD drive (which stores smaller volumes of data that can be easily transported from one computer to another). The hard drive is typically designated the C:\ drive and the CD drive is typically designated the D:\ drive. If you have an additional floppy drive, it is typically designated the A:\ drive. If your hard drive is partitioned or if you have additional drives, the letters E:\, F:\, G:\ and so on are assigned.

List out how many drives are there in your computer and write down how many folders are there in your C drive?

Try your self



3.19 CREATING FOLDERS

Folders are used to organize the data stored on your drives. The files that make up a program are stored together in their own set of folders. You will want to organize the files you create in folders. You will want to store files of a like kind in a single folder.

How do I create a new folder in Windows Explorer?

To create a new folder:

1. In the left pane, click the drive or folder in which you want to create the new folder.
2. Click any free area in the right pane. A context menu will appear.
3. Highlight New.
4. Click Folder.
5. Type a name for the folder.

How do I delete a file or folder?

To delete a file or folder:

1. Right-click the file or folder you want to delete. A context menu will appear.
2. Click Delete. Windows Explorer will ask, "Are you sure you want to send this object to the recycle bin?"
3. Click Yes.

How do I copy a file or folder?

To copy a file or folder:

1. Right-click the file or folder you want to copy. A context menu will appear.
2. Click Copy. The file or folder should now be on the Clipboard.

How do I cut a file or folder?

To cut a file or folder:

1. Right-click the file or folder you want to cut. A context menu will appear.
2. Click Cut. The file or folder should now be on the Clipboard.

How do I paste a file or folder?

To paste a file or folder:

1. After cutting or copying the file, right-click the object or right-click in the right pane of the folder to which you want to paste. A context menu will appear.
2. Click Paste.

How do I rename a file or folder?

To rename a file or folder:

1. Right-click the file or folder. A context menu will appear.
2. Click Rename.
3. Type the new name.

3.20 WINDOW

A window is an area on your desktop within which all Windows-based programs run as you can see in Figure 3.12.

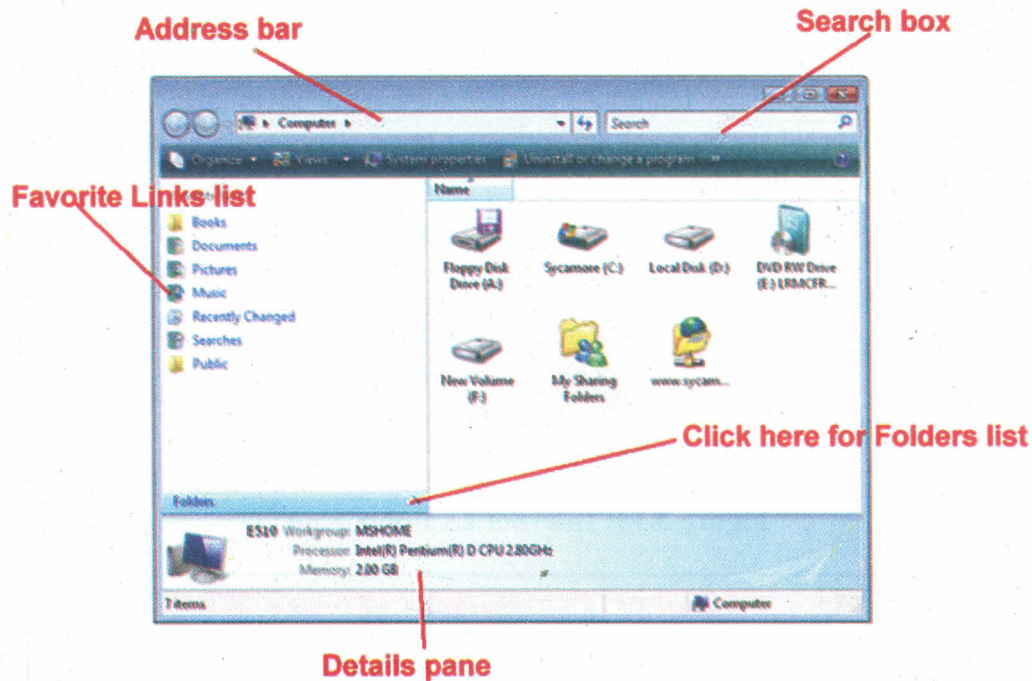


Figure 3.12: Window and their components.

Source: www.soyouwanna.com/lesson/13_full_exploring-the-windows-vista-interface.html

Control Box: The control box provides a menu that enables you to restore, move, size, minimize, maximize or close a window.

Border: The border separates the window from the desktop. You resize the window by dragging its borders outward to expand it and inward to contract it.

Title bar: The title bar displays the name of the current file and the name of the current program.

Minimize button: Use the Minimize button to temporarily decrease the size of a window or remove a window from view. While a window is minimized, its title appears on the taskbar.

Maximize button: Click the Maximize button and the window will fill the screen.

Restore button: After you maximize a window, if you click the Restore button, the window will return to its former size.

Close button: Click the Close button to exit the window and close the program.

Menu bar: The menu bar displays the program menu. You send commands to the program by using the menu.

Toolbars: Toolbars generally display right below the menu bar, you can drag them and display them along any of the window borders. You use the icons on the toolbars to send commands to the program.

Work area: The work area is located in the center of the window. You perform most of your work in the work area.

Status bar: The status bar provides you with information about the status of your program.

3.21 ICON

An icon is a graphic image. Icons help you execute commands quickly. Commands tell the computer what you want the computer to do. To execute a command by using an icon, click the icon.



Figure 3.13: Internet Explorer Icon

3.22 MENU

Menus provide a way for you to send commands to the computer (tell the computer what you want the computer to do). When you open a window, menu options are listed from left to right just below the title bar on the menu bar. When you click a menu item, a drop-down menu appears. Select the command you want to execute from the drop-down menu. An ellipsis after a drop-down menu item signifies that there are additional options; if you select that option, a dialog box will appear.

3.23 CUT, COPY AND PASTE

The Cut, Copy and Paste commands are nearly universal. These three functions are used by almost every Windows program and perform more or less the same function in each of them. You can cut, copy and paste programs, disks and text, to name just a few things.

Cut: When you cut something, it is deleted from its current location and saved to the Clipboard. Information saved to the Clipboard stays there until new information is either cut or copied. Each time you execute Cut or Copy, you replace the old information on the Clipboard with whatever you just cut or copied. You can paste the same Clipboard information as often as you like.

Copy: Copy is similar to Cut except the original item is not deleted. When you copy something, a copy of the item is saved to the Clipboard. Information stored on the Clipboard stays there until new information is either cut or copied. Each time you execute Cut or Copy, you replace the old information on the Clipboard with whatever you just cut or copied. You can paste Clipboard information as often as you like, until you replace it with something else.

Paste: You can place information on the Clipboard wherever you like. Execute the Paste command and information you have cut or copied is placed wherever your cursor is located.

There are three major methods of cutting, copying, and pasting. The three methods are using the menu, using keyboard shortcuts, and using icons. We will review all of them. In most programs, they will work exactly as described here.

Using the Menu:**Cut**

1. Select what you want to cut.
2. Click Edit, which is located on the menu bar. A drop-down menu will appear.
3. Click Cut.

Paste

1. Place the cursor at the point where you want to place the information that is currently on the Clipboard.
2. Click Edit. A drop-down menu will appear.
3. Click Paste.

Copy

1. Select what you want to copy.
2. Click Edit, which is located on the menu bar. A drop-down menu will appear.
3. Click Copy.

Using Keyboard Shortcuts:**Cut**

1. Select what you want to cut.
2. Press Ctrl-x.

Paste

1. Place the cursor at the point where you want to place the information that is currently on the Clipboard.
2. Press Ctrl-v.

Copy

1. Select what you want to copy.
2. Press Ctrl-c.

Using Icons:**Cut**

1. Select what you want to cut.
2. Click the Cut icon.

Paste

1. Place the cursor at the point where you want to place the information that is currently on the Clipboard.
2. Click the Paste icon.

Copy

1. Select what you want to copy.
2. Click the Copy icon.

Check Your Progress II

Note: a) Write your answer in the space provided.

b) Check your answer with the possible answer provided at the end of the unit.

1) What is Standby mode? How do I put my computer in Standby mode?

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2) What is wallpaper? How do I change my wallpaper?

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3) Write the procedure of copy and paste using menu.

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4) What are folders? Write down the steps to create a new folder.

3.24 LET US SUM UP

Let us recapitulate what we have learnt in this unit:

- An Operating System is a program which acts as an interface between a user and the hardware.
- Operating system's functions broadly fall into three categories : Essential functions, Monitoring functions and Service functions.
- Main function of an operating system is process management, memory management, file management and device management.
- Windows XP introduced in 2001 from Microsoft's Windows family of operating systems..
- When you start your computer, the first thing you see is the desktop. The desktop is your work area.
- When your computer is in the Standby mode, it consumes less electricity, but is ready for immediate use.
- Windows Explorer is a place where you can view the drives on your computer and manipulate the folders and files.
- A desktop shortcut, usually represented by an icon, is a small file that points to a program, folder, document, or Internet location.
- Folders are used to organize the data stored on your drives. The files that make up a program are stored together in their own set of folders.
- A window is an area on your desktop within which all Windows-based programs run.
- An icon is a graphic image. Icons help you execute commands quickly.
- Menu provide a way for you to send commands to the computer

3.25 REFERENCES AND SUGGESTED READINGS

- Foundations of Computing, "Sinha and Sinha," BPB Publications.
- www.nos.org/htm/funda2.htm
- Understanding Computer Applications, "MFN-010 IGNOU COURSE".
- *Micrsoft help center: support.microsoft.com/*
- www.karbosguide.com/hardware/module6c1.htm
- www.coolnerds.com/XP/Desktop/xpDesktop.htm
- www.soyouwanna.com/lesson/13_full_exploring-the-windows-vista-interface.html

3.26 CHECK YOUR PROGRESS- POSSIBLE SOLUTIONS/ANSWERS

Check Your Progress I

- 1) An operating system is an important component of a computer system which controls all other components of the computer system. An operating system acts as an interface between computer hardware and users. Examples of an operating system are Windows, Unix, Linux, Macintosh etc.
- 2) An Operating system's functions broadly fall into three categories : Essential functions, Monitoring functions and Service functions. Major Operating System functions are Process Management, Memory Management, File Management and Device Management.
- 3) System requirements: System requirements for Windows XP Home and Professional editions are as follows:

System	Minimum	Recommended
Processor	233 MHz	300 MHz or higher
Memory	64 MB RAM	128 MB RAM or higher
Video adapter and monitor	Super VGA (800 x 600) or higher resolution	
Hard drive disk free space	1.5 GB or higher	
Drives	CD-ROM Drive or DVD Drive	

Check Your Progress II

- 1) The purpose of the Standby mode in your computer is that it consumes less electricity but, is ready for immediate use. However, if the computer loses electrical power while in the standby mode, any information you have not saved will be lost.

To put your computer in Standby mode you have to follow the steps mentioned below:

- Click the Start button. The Start menu will appear.
- Click Turn Off Computer. The Turn Off Computer dialog box will appear.
- Click the Stand By icon.

- 2) Wallpaper is the background that displays on your desktop. You can change or set new wallpaper; even you can use your images too.

To change your wallpaper:

- Right-click your desktop.
- Highlight Properties.
- Click the Desktop tab.
- Select the wallpaper you want from the list that appears in the Background box.
- Select how you want your image to appear on the screen.

- 3) The following procedure of copy and paste using the Menu are explained below:

Copy

- Select what you want to copy.
- Click Edit, which is located on the menu bar. A drop-down menu will appear.
- Click Copy.

Paste

- Place the cursor at the point where you want to place the information that is currently on the Clipboard.
- Click Edit. A drop-down menu will appear.
- Click Paste.

- 4) Folders are used to organize the data stored on your drives. The files that make up a program are stored together in their own set of folders. You will want to organize the files you create in folders. You will want to store files of a like kind in a single folder.

To create a new folder:

- In the left pane, click the drive or folder in which you want to create the new folder.
- Click any free area in the right pane. A context menu will appear.
- Highlight New. Click Folder.
- Type a name for the folder.

Lab Exercise:

Note: a) Write your answers at space provided in the end of the unit.

b) For practical purpose attend practical lab.

- 1) Install a new printer in your system.
- 2) Differentiate all Windows versions and named an efficient operating system for home user.

Space provided for practical work

BPR-005: Basic Computer Literacy

Block 1 : Basics of Computer

Unit 1 : Introduction to Computers

Unit 2 : Network

Unit 3 : Operating System

Block 2 : Basic Applications of Computers

Unit 1 : Introduction to MS-Word

Unit 2 : Introduction to MS-Excel

Unit 3 : Power Point Presentation

Block 3 : Further Applications

Unit 1 : Internet Overview

Unit 2 : Pay Roll

Unit 3 : Accounts

NOTES

The following table shows the results of the experiments conducted on the effect of temperature on the rate of reaction between hydrogen peroxide and potassium iodide. The reaction is catalyzed by the presence of a small amount of potassium iodide.

Temperature (°C)	Time taken for the reaction to complete (s)
10	120
20	60
30	30
40	15
50	8

It is evident from the above table that the rate of reaction increases as the temperature increases. This is because the molecules of the reactants possess more energy at higher temperatures and hence they are able to overcome the activation energy barrier more easily.

About the Project

IGNOU through the Ministry of Panchayati Raj and under the sponsorship of United Nations Development Programme (UNDP) undertook a project on '**Capacity Building of PRIs Through a Multi-Mode Training Intervention**' as an attempt at empowering and capacity building of elected members of *Panchayats* and development functionaries. It also aimed at institutionalizing mechanisms to strengthen this capacity building intervention. The Project covered six northern states including **Bihar, Haryana, Madhya Pradesh, Rajasthan, Chhattisgarh** and **Uttarakhand** with the **Indira Gandhi National Open University (IGNOU)** as the implementing agency. The Project envisaged joint action by Government established institutions (SIRDs) and NGOs engaged in Capacity Building of PRIs.

In terms of strategy it involved developing a **suitable learning package through a balanced mix of distance learning and conventional training**; adapting the materials to local requirements and implementing the capacity building intervention through distance mode for the elected members of *Panchayats* and train associated development functionaries through face to face mode through a network of SIRDs and NGOs.

In terms of activities and output of the Project, the Project has been able to prepare a multi-media package consisting of 11 self-learning booklets and six video programmes for distribution among the *Panchayats*; undertook capacity building of Collaborating Institutions (CIs); published of local Governance updates in each participating state; conducted BDOs Symposia and orientation programmes for development functionaries. One of the major activities taken up by the above CIs was to undertake hardware mapping of *Panchayats* in 4 Districts in each participating State. The Diploma in Panchayat Level Administration and Development, planned and developed as a part of academic activities of the School of Continuing Education, was also sponsored under the above Project.

About IGNOU & SOCE

The **Indira Gandhi National Open University**, established by an Act of Parliament in 1985, has emerged as the largest Mega University in the democratic world. The University offers 486 Certificates, Diploma, Degree and Doctoral programmes through its 21 schools of Study, 12 Divisions, 14 Centres, 61 Regional Centres, over 3,000 Study Centres, 67 Partner Institutions spread across 35 countries. Additional help is also sought from about 6,000 experts from conventional universities and other organizations, and about 45,000 part-time academic counselors.

IGNOU caters to learners from rural and tribal areas, disability groups, jails and rehabilitation centres, government and non-governmental organizations, parents and home-makers, the employers and the employed.

One of the mandates of the University is to reach out to the disadvantaged by offering programmes in all parts of the country at affordable cost. IGNOU, the National Resource Centre for Open and Distance Learning with international recognition and presence, is expected to provide seamless access to sustainable **and learner centric quality education, skill upgradation and training** to all by using innovative technologies and methodologies and ensuring convergence of existing systems for massive human resource required for **promoting integrated national development** and global understanding.

The **School of Continuing Education (SOCE)** one of the oldest Schools currently has four disciplines assigned to it by the Academic Council. These include: **Rural Development, Nutritional Sciences, Child Development and; Home Science**. The School has currently on offer Ph.D programmes in three discipline areas, two Master's Degree level programmes, one Post Graduate Diploma, two Diploma Programmes, four Certificate Programmes and four elective and application oriented courses in the above mentioned disciplines.