Annex Information Technology

Your Success is our Reward

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Computer-Fundamental

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CHAPTER- 1 COMPUTER SYSTEM

DEFINITION OF COMPUTER

Computer can be defined as an electronic device that performs rapid computations and generates desired output for users based on input data and programs. Computer can capture, store, retrieve and process data. The data may be numbers, characters, audio, video, images etc. Basically, computer can recognize only two states - whether a signal is present or not. These two states are represented using binary digits 1 and O. All forms of data are finally converted into binary digits for the computer to recognize and process. Instructions are also converted into binary digits. Digital computer has the capability to manipulate series of binary digits according to the instructions (software) given to it. With software, computer can also be automated to carry out a set of instructions with a preset sequence to complete a task or tasks such as the tasks involved in a production control system.

USE OF COMPUTER

1. **Business**
   A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which made it an integrated part in all business organizations.
   Computer is used in business organizations for: Payroll calculations, Budgeting, Sales analysis, Financial forecasting, Managing employees database, Maintenance of stocks etc.
2. **Banking**
   Today banking is almost totally dependent on computer. Banks provide following facilities:
   Banks provide online accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares, and trustee records. ATM machines are making it even easier for customers to deal with banks.
3. **Insurance**
   Insurance companies are keeping all records up-to-date with the help of computers. The insurance companies, finance houses and stock broking firms are widely using computers for their concerns.
   Insurance companies are maintaining a database of all clients with information showing
   Procedure to continue with policies, starting date of the policies, next due installment of a policy, maturity date, interests due, survival benefits, bonus.
4. **Education**
   The computer has provided a lot of facilities in the education system. The computer provides a tool in the education system known as CBE (Computer Based Education). CBE involves control, delivery, and evaluation of learning. The computer education is rapidly increasing the graph of number of computer students. 15
   There are number of methods in which educational institutions can use computer to educate the students.
   It is used to prepare a database about performance of a student and analysis is carried out on this basis.
5. **Marketing**
   In marketing, uses of computer are following:
   Advertising - With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products. At Home Shopping - Home shopping has been made possible through use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.
6. **Health Care**

Computers have become important part in hospitals, labs, and dispensaries. The computers are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, Ultrasounds and CT Scans etc. are also done by computerized machines. Some major fields of health care in which computers are used are:

Diagnostic System - Computers are used to collect data and identify cause of illness.

Lab-diagnostic System - All tests can be done and reports are prepared by computer.

Patient Monitoring System - These are used to check patient's signs for abnormality such as in Cardiac Arrest, ECG etc. Pharmacy Information System - Computer checks Drug-Labels, Expiry dates, harmful drug's side effects etc. Surgery: Nowadays, computers are also used in performing surgery.

7. **Engineering Design**

Computers are widely used in engineering purpose.

One of major areas is CAD (Computer aided design).that provides creation and modification of images. Some fields are:

Structural Engineering - Requires stress and strain analysis for design of Ships, Buildings, Budgets, and Airplanes etc. Industrial Engineering - Computers deal with design, implementation and improvement of integrated systems of people, materials and equipment's. Architectural Engineering - Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

8. **Military**

Computers are largely used in defense. Modern tanks, missiles, weapons etc. Military also employs computerized control systems. Some military areas where a computer has been used are:

Missile Control, Military Communication, Military Operation and Planning, Smart Weapons.

9. **Communication**

Communication means to convey a message, an idea, a picture or speech that is received and understood clearly and correctly by the person for whom it is meant for. Some main areas in this category are:

E-mail, Chatting, Usenet, FTP, Telnet, Video-conferencing

10. **Government**

Computers play an important role in government. Some major fields in this category are:

Budgets, Sales tax department, Income tax department, Male/Female ratio, Computerization of voters lists, Computerization of driving licensing system, Computerization of PAN card, Weather forecasting

CHARACTERISTIC OF COMPUTER

1. **High Speed**

Computer is a very fast device.

It is capable of performing calculation of very large amount of data.

The computer has units of speed in microsecond, nanosecond, and even the picosecond.

It can perform millions of calculations in a few seconds as compared to man who will spend many months for doing the same task.

2. **Accuracy**

In addition to being very fast, computers are very accurate.

The calculations are 100% error free.

Computers perform all jobs with 100% accuracy provided that correct input has been given.

3. Storage Capability

Memory is a very important characteristic of computers. A computer has much more storage capacity than human beings. It can store large amount of data. It can store any type of data such as images, videos, text, audio and many others.

4. Diligence

Unlike human beings, a computer is free from monotony, tiredness and lack of concentration.
It can work continuously without any error and boredom.
It can do repeated work with same speed and accuracy.

5. Versatility

A computer is a very versatile machine. A computer is very flexible in performing the jobs to be done.
This machine can be used to solve the problems related to various fields. At one instance, it may be solving a complex scientific problem and the very next moment it may be playing a card game.

6. Reliability

A computer is a reliable machine.
Modern electronic components have long lives.
Computers are designed to make maintenance easy.

7. Automation

Computer is an automatic machine.
Automation means ability to perform the given task automatically.
Once a program is given to computer i.e. stored in computer memory, the program and instruction can control the program execution without human interaction.

8. Reduction in Paper Work

The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up a process. as data in electronic files can be retrieved as and when required, the problem of maintenance of large number of paper files gets reduced.

9. Reduction in Cost

Though the initial investment for installing a computer is high but it substantially reduces the cost of each of its transaction.

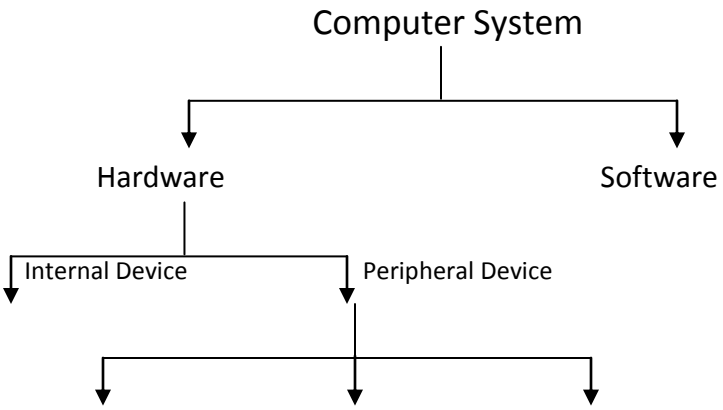
Note: it is also knows as advantage of computer.

DISADVANTAGE OR LIMITATIONS OF COMPUTER

Computer is, no doubt, a marvelous tool. Yet it has some limitations. Some of the major limitations of computer are as follows.

1. Computer cannot think on its own. It has to be given instructions to perform any operation. Research is currently underway to impart artificial intelligence to computer. Once this becomes possible computer will be thinking on its own, then it will be a reasonable replication of human mind.
2. It does not have intuition. It cannot draw a conclusion without going through all intermediate Steps.
3. It can do a task only if it can be expressed in a series of finite steps leading to the completion of The task.
4. Similarly, it cannot handle a situation where a finite number of steps generate an impossibly large Number of computational operations.
5. It cannot learn from experience. It will commit the same error repeatedly and cannot learn from Experience. But changes are taking place in this area as research progresses on artificial intelligence.

COMPUTER SYSTEM



Computer System

Computer system is a combination of input units, processing unit, output unit and storage unit.

Input Unit Contains input devices like keyboard, Mouse, Scanner etc.

Processing unit is commonly known as central processing unit (CPU).

It consists of 3 sub units called Arithmetic and Logic unit(ALU), Control unit(CU) and primary memory (PM).

Output unit Contains output devices like Monitor, Printer, Speaker etc.

Storage unit contains storage devices like hard disk, CD/DVD, floppy disk, pen drive, external hard disk , Memory Card etc.

HARDWARE

A computer, like human brain, receives data and instructions, stores them and processes the data according to the instructions given to it. It receives data from input devices, stores them in memory and displays them through an output device. The physical devices that make up a computer are referred to as hardware. Computer hardware can be broadly' classified into two: CPU and peripherals. The CPU is perhaps: the most important part of a computer. The other hardware pieces like input devices, output devices, etc. are called peripherals. Hardware represents the physical and tangible components of a computer i.e. the components that can be seen and touched.

Examples of Hardware are following:

Input devices -- keyboard, mouse etc.

Output devices -- printer, monitor etc.

Secondary storage devices -- Hard disk, CD, DVD etc.

Internal components -- CPU, motherboard, RAM etc.

SOFTWARE

Software are the set of programs/packages which we cannot touch and feel as like hardware(It is device which we can touch and feel).Software provide better communication between computer/PC and user.

Types of Software:-

1. System Software:-

System software are those software which we can used to control the system and also used for run applications.

Example:-DOS, Unix etc.

2. Application Software:-

Application software are those software which are designed to perform a specific task.

Example tally, payroll etc.

3. Utility Software:-

Utility software are those software which run on computer and work for computer not for user.

Example: - Antivirus

5. Language Software:-

Language software are those software which are used to developed languages code.

Example:-Compiler, Interpreter etc.

INTERNAL DEVICE

Internal is a term used to describe a device that is installed within the computer. For example, a video card is an **internal device** and a printer is an external device. When referring to a drive, an **internal drive** (e.g. internal hard drive) is any drive inside the computer. Below are additional examples of internal hardware in your computer.

Examples of internal computer hardware devices

- CPU
- Drive (e.g. Blu-Ray, CD-ROM, DVD, floppy drive, and hard drive)
- Fan (heat sink)
- Modem
- Motherboard
- Network card
- RAM
- Sound card
- Video card

PERIPHERAL DEVICE

A **peripheral device** is generally defined as any auxiliary **device** such as a computer mouse or keyboard that connects to and works with the computer in some way. Other examples of peripherals are image scanners, tape drives, microphones, loudspeakers, webcams, and digital cameras.

INPUT DEVICE

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 followings are the most useful input devices.

Following are few of the important input devices which are used in a computer:

(Keyboard, Mouse, Joy Stick, Light pen, Track Ball, Scanner, Graphic Tablet, Microphone,

Magnetic Ink Card Reader (MICR), Optical Character Reader (OCR), Bar Code Reader, Optical Mark Reader (OMR).

OUTPUT DEVICE

An output device is any peripheral that receives data from a computer, usually for display, projection, or physical reproduction. For example, the image shows an inkjet printer, an output device that can make a hard copy of any information shown on your monitor. Another example of an output device is a computer monitor, which displays an image that is received from the computer. Monitors and printers are two of the most common output devices used with a computer. Below is a listing of all the different output devices used with a

computer?3D Printer, Braille embosser, Braille reader, Flat panel, GPS, Headphones, Computer Output Microfilm (COM), Monitor, Plotter, Printer (Dot matrix printer, Inkjet printer, and Laser printer), Projector, Sound card, Speakers, Speech-generating device (SGD), TV, Video card

STORAGE DEVICE

Storage device is device that store data. It is advisable to store data in backup storage device to prevent important data from accidental failure of hardware component. E g Hard disk, External hard disk, CDs, DVDs, Pen drive, Memory card etc.

CHAPTER-2 COMPUTER GENRATIONS & TYPES

Generation of Computer

Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. But nowadays, generation includes both hardware and software, which together make up an entire computer system.

There are totally five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics. Here approximate dates against each generations have been mentioned which are normally accepted

Following are the main five generations of co*mput*ers

S.N	Description
1	**First Generation** The period of first generation: 1946-1959. Vacuum tube based
2	**Second Generation** The period of second generation: 1959-1965. Transistor based.
3	**Third Generation** The period of third generation: 1965-1971. Integrated Circuit based.
4	**Fourth Generation** The period of fourth generation: 1971-1980. VLSI microprocessor based
5	**Fifth Generation** The period of fifth generation: 1980-onwards.ULSI microprocessor based

First Generation

The period of first generation was 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit). These tubes, like electric bulbs, produced a lot of heat and were prone to frequent fusing of the installations, therefore, were very expensive and could be afforded only by very large organisations. In this generation mainly batch processing operating system were used. Punched cards, paper tape, and magnetic tape were used as input and output devices. The computers in this generation used machine code as programming language.

The main features of first generation are:

- Vacuum tube technology
- Supported machine language only
- Very costly
- Generated lot of heat
- Slow input and output devices
- Huge size
- Need of A.C.

- Non-portable
- Consumed lot of electricity

Some computers of this generation were:

- ENIAC (Electrical Numerical Integrator Automatic Calculation)
- EDVAC (Electrical Discard Variable Automatic Calculation)
- UNIVAC(Universal Numerical Integrator Variable Automatic Calculation)
- IBM-701
- IBM-650

Second Generation

The period of second generation was 1959-1965. In this generation transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices. In this generation assembly language and high-level programming languages like FORTRAN, COBOL was used. The computers used batch processing and multiprogramming operating system. Ex. IBM 1620, IBM 7094, CDC 1604, CDC 3600, UNIVAC 1108.

Advantages

- They consumed less power and thus generated less heat as compare to first generation of computer.
- They ware faster, cheaper, smaller, and more reliable than their first generation computer.
- They could be programmed using assembly and high level languages.
- These computers had faster primary memory and a larger secondary memory.

Disadvantages

- Second generation computer ware manufactured using transistor, which had to be assembled manually.
- This made commercial production of computer difficult and expensive.

Third Generation

The period of third generation was 1965-1971. The computers of third generation used integrated circuits (IC's) in place of transistors. A single IC has many transistors, resistors and capacitors along with the associated circuitry. The IC was invented by Jack Kilby. This development made computers smaller in size, reliable and efficient. In this generation remote processing, time-sharing, multi-programming operating system were used. High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation. Example of third generations are: IBM-360 series, Honeywell-6000 series, PDP(Personal Data Processor), IBM-370/168, TDC-316.

Advantages

- They ware faster than second generation of computer and could perform millions of transaction of per second.
- They were smaller, cheaper, and more reliable than their predecessors.
- Third generation computer could run time sharing operating system, which allowed interactive use of the computer by one or more users simultaneously, thereby improving the productivity of the users.

Disadvantages

- These computers are difficult to maintain.
- They got heated very quickly.

Fourth Generation

The period of fourth generation was 1971-1980. The computers of fourth generation used Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution. In this generation time sharing, real time, networks, distributed operating system were used. All the high-level languages like C, C++, dbase etc. were used in this generation.
Example of fourth generation computer are DEC 10, STAR 1000, PDP 11, CRAY-1(Super Computer), CRAY-X-MP(Super Computer).

Advantages

- They were smaller, cheaper, and more reliable than their predecessors.
- They consume less electricity and generated less heat.
- They had faster and larger primary memory and secondary storage.
- They could be use general purpose.
- GUIs enabled people to learn to work with computer very easily. Hence, the use of computer both in offices and at homes became widespread.

Disadvantages

- They were not intelligent system.

Fifth Generation

The period of fifth generation is 1980-till date. In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components. This generation is based on parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc. are used in this generation. AI includes Robotics, Neural networks, Game Playing, Development of expert systems to make decisions in real life situations. Natural language understanding and generation.

The main features of fifth generation are:

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

Some computer types of this generation are:

- Desktop
- Laptop
- Notebook
- Ultra Book
- Chrome Book

Classification of Computer

Computers vary widely in terms of their size and purpose they serve. There are very small computers that can be held on a palm. There are also large computers that take a whole room to occupy. They are used by big organizations, public and private. Organizations use computers for a variety of applications ranging from scientific to commercial in nature. The most widely used computers are called personal computers that typically fit on a desktop.

Computers can be classified on several bases as follows.

1. On the basis of electronics or the operating principle

- Analog computer
- Digital computer
- Hybrid computer

2. On the basis of purpose of use

- Special purpose computer
- General purpose computer

1. On the basis of size

- Micro computer
  - a. Portable computer
  - b. Desktop computer
- Minicomputer
- Mainframe computer
- Supercomputer

Analog Computer

Analog computer operates on inputs of continuously varying electrical voltage. It measures the input rather than counting. The name that is derived from the Greek word 'analog' denotes that the computer functions by establishing similarities between two quantities that are usually expressed as voltages or currents. Analog computers are powerful tools to solve differential equations. They are mainly used in scientific design and production environments. Each one has to be constructed to do a specific job and will respond very quickly to changes in the measured inputs.

Digital Computer

"A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system of "0" and "1".

"Computer capable of solving problems by processing information expressed in discrete form. By manipulating combinations of binary digits ("0", "1"), it can perform mathematical calculations, organize and analyze data, control industrial and other processes, and simulate dynamic systems such as global weather patterns. "

Hybrid Computer

A computer that processes both analog and digital data.

Hybrid computer is a digital computer that accepts analog signals, converts them into digital and processes them in digital form" A hybrid computer may use or produce analog data or digital data. It accepts a continuously varying input, which is then converted into a set of discrete values for digital processing.

Examples:

Hybrid computer is the computer used in hospitals to measure the heartbeat of the patient.

Devices used in petrol pump.

Hybrid Machines are generally used in scientific applications or in controlling industrial processes.

Special Purpose Computer

Special purpose computer is tailor-made solely to cater to the requirements of a particular task or application, for example, weather forecasting. It incorporates the instructions needed into the design of internal storage so that it can perform the given task on a simple command. It, therefore, does not possess unnecessary options, and costs less.

General Purpose Computer

The general-purpose computer is designed to meet the needs of many different applications. The instructions needed to perform a particular task are not wired permanently into the internal memory. When one job is over, instructions for another job can be loaded into the internal memory for processing. Thus, a general-purpose machine can be used to prepare pay- bills, manage inventories, print sales reports, do scientific calculations and so on.

Microcomputer

Microcomputer is the low end computer. It is built on a single chip microprocessor. Microcomputers include

(a) Portable computers

(b) Desktop computers.

Portable Computer

Portable computer is a very small, easy to use microcomputer. The users can carry it wherever they go. That is, it provides mobile computing facility. Business executives, travelling salesmen etc. carry it during travel for personal use. This group includes personal digital assistant, pen-based computer, hand-held computer, notebook computer and laptop computer.

Laptop computer is small in size and fits on to the user's lap. It is battery operated and hence it can be carried anywhere. Notebook computer is even smaller than laptop computer. Hand- held computer is smaller than notebook computer. The pen- based computer uses an electronic writing pad and a light sensitive electronic pen. Input is entered into this computer by writing on the electronic pad with the electronic pen. It is useful for people who are always on the move like sales representatives, delivery staff and insurance agents. Personal Digital Assistant (also called Palmtop) is less powerful than PC or laptop computer. It does not have disk drives.

Personal Computer or Desktop Computer

Personal computer is a microprocessor based, single user computer. The peripherals for personal computer include a keyboard and a mouse as input devices, monitor to display information and a hard disk for storage. The personal computer is also called desktop computer as it is normally installed on a desktop and hence the name 'desktop computer'. It is a self-contained system, usually designed for use by one person at a time. Since the personal computers can be easily linked to large computers, they form a very important component of computer network. This type of computer is used as home computer for family use or as personal computer by business executives or by small businesses whose volumes of data and processing speed requirements are small.

The personal computers have been becoming faster, smaller and cheaper. The latest microprocessors are very powerful. The recent development in microprocessor technology is the introduction of 64 bit computing which is a significant advancement over the 32 bit computing. Computer architecture is described as "64-bit" when it has integer registers that are 64 bits wide. It directly supports dealing both internally and externally with 64-bit "chunks" of data. Therefore, the speed of processing data and instructions improves significantly. Personal

computers have a minimum of 128 MB main memory and computing power of many million instructions per second (MIPS). These microcomputers use either Pentium chips from Intel Corp or equally powerful chips from other manufacturers of microprocessor chips like Advanced Micro Devices (AMO) and Cyrix. Most of the personal computers in use currently are Intel microprocessor-based.

Components of Personal Computer

The following are the essential components of a personal computer

1. Central Processing Unit
2. Keyboard
3. Cathode Ray Tube (Monitor)
4. Disk drives, and,
5. Storage Devices

Work Station

Workstation is a powerful computer which in terms of power is between personal computer and minicomputer. It has high resolution graphics monitor, large RAM and secondary storage. Although it is a standalone system, usually it forms part of a network and it uses Unix or Windows NT as operating system. Workstations are used for specialized applications such as desktop publishing, software development and engineering designs.

Mini Computer

Minicomputer is a medium sized computer that is costlier and more powerful than a microcomputer. It is in fact a scaled down version of mainframe computer. This can support up to a few hundred users at a time with multi-terminal, time-sharing system. Minis are the popular data processing systems among the business organisations today. They have many uses in business such as payroll processing, process control, invoicing, and stock control. They are mainly used as departmental computers in large and medium-sized organisations. They are also used in government departments, universities and R & D establishments.

Mainframe

The earliest computers were called mainframes due to their size. The term is still used for the large computers of today. They have large storage capacities, very high speed of processing (compared to micros and minis) and can support a large number of terminals (Many hundreds to thousands) for use by a variety of users simultaneously. They are kept in air-conditioned environment in a special computer room. They are used by big companies, banks, government departments, etc. as their main computer.

Super Computer

It is the fastest and the most expensive computer. This has extremely large storage capacities and computing speeds that are at least ten times faster than that of other computers. It can perform hundreds of millions of instructions per second. The super computer is used for specialized applications such as large-scale numerical problems in scientific and engineering disciplines. These include applications in electronics, petroleum engineering, weather forecasting, medicine and nuclear energy research.

CHAPTER -3 COMPUTER HARDWARE

KEYBOARD

Keyboard is the most popular input device for direct entry of data and instructions into computer. The standard QWERTY keyboard is used for computer. The enhanced keyboard has 101 keys. In addition to them, the computer keyboard usually has special keys like Page Up, Page Down, Print Screen etc. The computer keyboard is very much like the electronic typewriter keyboard. But it has additional keys. Computer keyboard has three types of keys:

- Alphanumeric keys for typing character and numeric data (A-Z, 0-9,!,#,$,%,&,*, etc)
- Punctuation keys like comma, period, colon, semicolon, question mark etc.
- Special keys like function keys, control keys, arrow keys, caps lock etc. The keyboard is linked to the CPU and it is also linked to the computer screen so that the data entered into the memory can be seen by the user as he types in the data.

MOUSE

A mouse is a small hand-held 'point and click' device that is connected to the CPU through a cable. Douglas Engelbart invented mouse in 1963 at Stanford Research Institute. Xerox Corporation's Palo Alto Research Center enhanced its capabilities by adding analogue to digital conversion. In the early 1970's. With the adoption of Graphical User Interface technology, mouse became an essential input device for computer later in the 1970's. There are three types of mouse: mechanical, opt mechanical and optical. The mechanical mouse has a trackball at its bottom. It can be rolled across a flat and smooth surface to control the position of the cursor on the screen. By pointing and clicking on icons and menu options displayed on the screen, it is easy for the user to control the computer with a mouse. Mechanical sensors within the mouse detect the direction the ball is rolling and move the screen pointer accordingly. The opt mechanical mouse is more or less the same as the mechanical mouse, but it uses optical sensors to detect motion of the ball. Optical mouse uses a laser to detect the mouse movement. The mouse requires to be moved along a special mat with a grid so that the optical mechanism has a frame of reference. It has no mechanical moving parts. It responds more quickly and precisely than mechanical or opt mechanical mouse. Optical mouse is more expensive than the other two.

CPU (CENTRAL PROCESSING UNIT)

CPU is the most important component of a computer. It typically consists of a control unit, an arithmetic and logical unit and a primary storage. CPU is the brain of a computer and all processing takes place in the CPU.

1. **Primary Memory**
   A memory or store is required in a computer to store programs and the data processed by programs. The main memory is made up of a large number of cells with each cell capable of storing one bit. The cells may be organized as a set of addressable words, each word storing a string of bits. The main memory provides random access. The main memory is divided into Random Access Memory (RAM) and Read Only Memory (ROM). RAM is dynamic and volatile. ROM is read only memory and this memory cannot be erased and rewritten. That is, ROM is non-volatile.
2. **Arithmetic Logic Unit (ALU)**
   ALU does all the arithmetic and logical operations. Arithmetical operations involve manipulation of numerical data such as addition, subtraction, division and multiplication. Logical operations compare relative magnitudes of two numeric, alphabetic or alphanumeric data items such as greater than, less than, and equal to.
3. **Control Unit (CU**)

The control unit controls and co-ordinates all the operations of the CPU and peripheral devices. Its functions are to ensure that the program instructions are carried out in the desired sequence and to control and co-ordinate the flow of data between the CPU and the input-output devices.

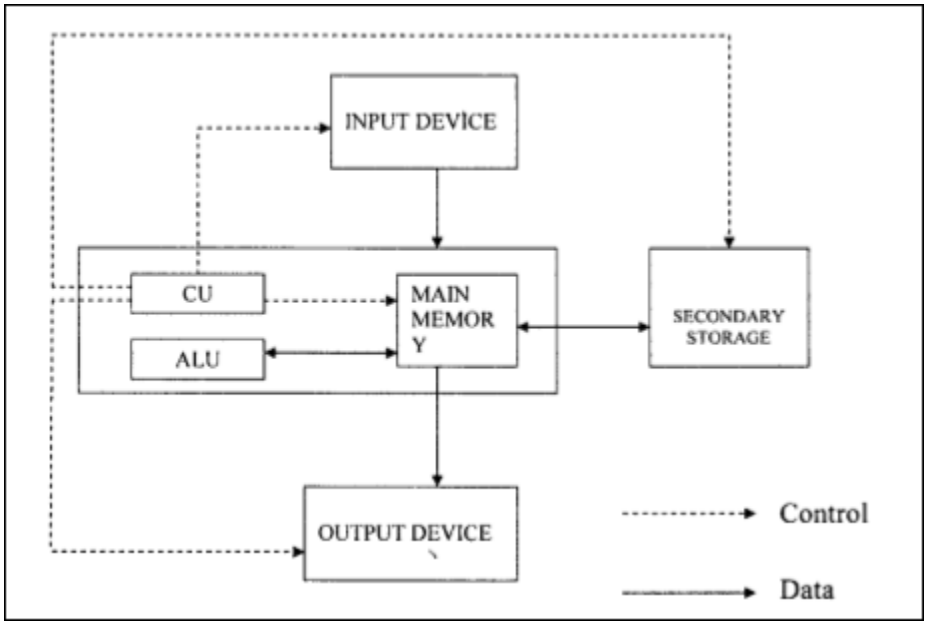


Fig. 1.3: Flow of data and control in a computer system

Modern computers operate on stored program concept. The control unit is designed to execute the stored program. Its tasks are:

a) Fetch the stored instruction whose address is in a special storage area called the Instruction Address Register (IAR) .
b) Decode the instruction, that is, decide what operation is to be carried out and what data are to be used in the operation
c) Replace the address with that of the next stored instruction in IAR
d) Send signals to the rest of the system to ensure that the indicated operation is carried out. For example, for an input or output operation, the CU would activate the I/O device and memory causing proper transfer of data. e) The above operations of the CU form a cycle and starts from step over again.

MONITOR

Visual Display Unit: The most popular input/output device is the Visual Display Unit (VDU). It is also called the monitor. A Keyboard is used to input data and Monitor is used to display the input data and to receive messages from the computer. 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 or monochrome.
Recently flat screen computer monitor are becoming more popular but these are more expensive and in the market now 15,17, 21, 32, 35 Inch screen monitor are available.

Types of Monitors

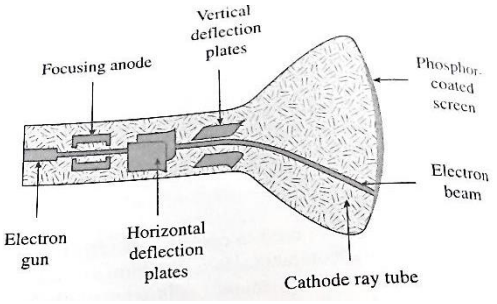
1. Cathode-Ray Tube (CRT)
2. Flat- Panel Display
   - LED (Light-Emitting Diodes)
   - LCD (Liquid-Crystal Device)

1. **Cathode-Ray Tube (CRT)**

The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity, or resolution. It takes more than one illuminated pixel to form whole character, such as the letter 'e' in the word help. A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically. There are some disadvantages of CRT

Large in Size

High power consumption



Advantage

- CRT Monitor provides images of good quality.
- CRT Monitor are chipset when compared to LCD and plasma Monitors.
- The images are clear even when you try to view if from an angle.

Disadvantages

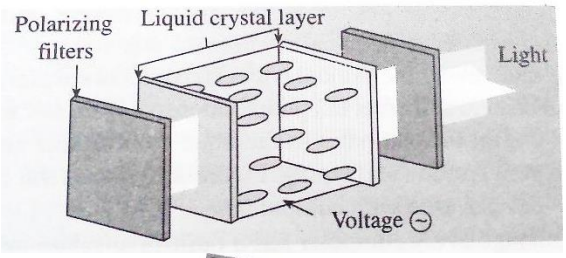
- CRT Monitors occupy a large space on disk.
- They are bigger in size and weight and there for difficult to move one place to another place when compared with another types of monitors.
- Power consumption is higher than the other monitors.

2. **LCD (Liquid Crystal Display)**

An LCD monitor is a thin, flat, electronic visual display unit that uses that light modulating properties of liquid crystals, which do not emit light directely. LCD screens are used in a wide range of application ranging from computer, monitors, television, instrument panels, aircraft cockpit display etc. LCD screens are more reliable and easier on the eyes. LCD are more energitc efficient and offer safer disposal that CRT. It is because of their low electricity power Consumption that are widely being used in battery powered electronic equipment.

Advantage

- LCD monitors are very compact and lightweight.
- They consume less power.
- They do not suffer from geometric distortion.
- There are little or no flicker of image.
- They are more reliable the CRT.
- They cause less eye fatigue.



(b) LCD

Disadvantage

- They are more expensive then CRT.
- Images are not very clear when tried to view from an angle.

3. **LED (Light-Emitting Diodes)**

These monitors are thin and flat monitors widely used in television and computer. The LED display contains two glass plates that have hundreds of thousands of tiny cells filled with xenon and neon gases. The address electrode and the transparent display electrode are sandwiched between the glass plates. The display electrode is covered by a magnesium oxide protective layer and arranged in horizontal rows along the screen.

Advantage

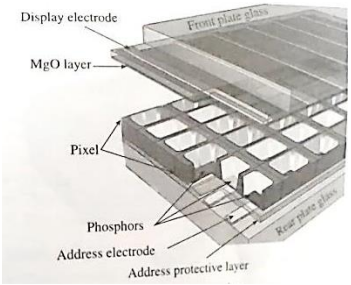
- The technology used in plasma monitors allows producing a very wide screen using extremely thin materials.
- Very bright images are formed which look good from almost every angle.
- These monitors are not heavy and are thus easily portable.

Disadvantage

- These monitors are very expensive.

- They consume more power.
- Since the images are phosphor-based, at times, they may suffer from flicker.

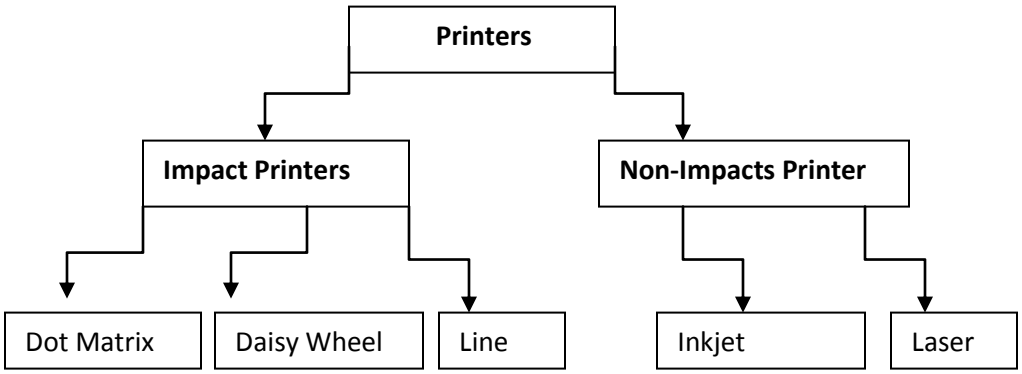
LED Monitor



PRINTER

A printer is a device that takes the text and graphics information obtained from a computer and prints it on to a paper. Printers are available in market in various size, speed, and cost. Printers are including Color, Resolution, Speed, and Memory.

Types of Printers



Impact Printers

These printers print character by striking an inked ribbon against the paper. Example of impact printers including dot matrix printers, daisy wheel printers, and most types of line printers.

Advantages

- These printers enable the user to produce carbon copies.
- They are cheap .

Disadvantages

- Impact printers are slow.
- They offer poor printer quality, especially in the case of images.
- They can be extremely noisy.

1. **Dot Matrix Printer**

   A dot matrix printers print characters and image of all types as a pattern of dots. This printer has print head that Consists of pins representing that character and images. The print head runs back and forth, or in an up-and-down motion on the page and prints by striking and ink-soaked cloth ribbon against the paper, much like the print mechanism of typewriter. From 1970's to 1970's, dot matrix impact printer ware the most common types of printer used in PC. Several dot matrix printers implement color using color ribbon. The speed of dot matrix printers varies in the range of 50- 500 cps (Character Per Second).

Advantages

- The dot matrix printer can produce carbon copies.
- It offers the lowest printing cost per page.
- It was widely used for bulk printing where the quality of the print is not of much importance.
- It is cheap.

- It can use continues paper rather than individual sheets, making them useful for data logging.

Disadvantages

- This types of printer create a lot of noise when the pins striking the ribbon against the paper.
- It can only print lower resolution graphics, with limited quality.
- It is very slow.
- It has poor print quality.

2. **Daisy wheel Printer**

   A daisy wheel printer uses a lot of impact printing technology to generate high-quality output comparable to typewriter, and three times faster. However, today, daisy wheel technology is found only in some electronic typewriter. The print head of daisy wheel printer is circular wheel. About 3 inch in diameter with arm or spokes. The daisy wheel printer print character to be printed is positioned just in front of the printer ribbon. The spoke containing the required character is then hit by hammer, thereby striking the ribbon to leave and impression on the paper placed behind the ribbon. The movement of all these parts is controlled by microprocessor in the printers.

   Benefits

   The key benefits of using a daisy wheel printer is that the print quality is high, such as the exact shape of character hits the ribbon to leave an impression on the paper.

3. **Line Printer**

   A line printer is a high –speed impact printer in which one typed line is printed at a time. The speed of a line printer usually varies from 600 to 1200 line per minute, or approximately 10-20 page per minute. Because of their high-speed, line printers are widely used in data centers and in industrial environments. Band printer is a commonly used variant of line printers.

Non-Impact Printers

These are much quarter then impact printers as their printing heads do not strike the paper. They offer better print quality, faster printing, and ability to create prints that contain sophisticated graphics. Non –Impact printers use their solid or liquid cartridge-based ink, which is sprayed, dripped, or electrostatically drawn onto the page. The types of non –impact printer are laser printer, Inkjet printer, Thermal Printer.

Advantages

- Non-impact printers produce prints of good quality, and hence render sophisticated graphics.
- They are noiseless
- They are fast
- They can print text in different fonts.

Disadvantages

- These printers are expensive.
- The ink cartridges used by them are also costly.

1. **Inkjet Printer**

   Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features.

   They make less noise because no hammering is done and these have many styles of printing modes available. Color printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

   Advantages

   - High quality printing
   - More reliable

   Disadvantages

   - Expensive as cost per page is high
   - Slow as compared to laser printer

2. **Laser Printer**

A laser printer is non-impact printer that works at very high speeds and produce high-quality text and images. It is use photocopier machine technology. When a document is sent to the printer the following steps takes places.

- A laser beam 'drams' the document on a drum (which is coated with a photo-conductive material) using electrical charges.
- After the drum is charged, it is rolled in a toner (a dry powder types of ink).
- The toner sticks to the charged image on the drum.
- The toner is transferred onto a pieces of paper and fused to the paper with heat and pressure.
- After the document is printed, the electrical charge is removed from the drum and the excess toner is collected.

In the market now printer are available of company HP, Canon, Brother, CG etc.

Advantages

- Very high speed
- Very high quality output
- Give good graphics quality
- Support many fonts and different character size

Disadvantages

- Expensive.
- Cannot be used to produce multiple copies of a document in a single printing.

MEMORY

INTRODUCTION

Computer storage can be divided into primary storage and secondary storage. Primary storage or main memory in the computer provides fast access storage. The processor can access it directly for data and instructions. Frequently used files and programs are stored in the primary memory. Since primary storage is expensive, only a limited amount can be stored therein. Cache memory is another memory device. CPU can access it much faster than main memory. But it is very expensive. The secondary storage is used for bulk storage of data and instructions. Large files and databases are stored on secondary storage devices. These devices include hard disk, optical disks, magnetic tapes and floppy disks. Data and instructions from secondary storage devices are transferred to main memory and cache memory in small measures for the CPU to access them for processing. Magnetic core technology and semiconductor technology have been used to make the main memory of a computer system. But today semiconductor technology is widely used for it. The main memory is made up of memory cells. Each of them can store one bit of data. This memory consists 1f electronic components called semiconductor chips. Each chip contains several hundred thousand transistors; each transistor represents the binary state of a bit; on or off. Since a bit can store only one value either l' or 0, the bits are grouped into sets of eight bits called bytes. One byte can store one character of data.

36 Computer Memories.

Memory locations are numbered 0,1,2,3, ... ; the unique number assigned to each location is called its address. Memory is measured in terms of kilobytes (KB) (that is, 210 or 1024 bytes, roughly taken as 1000 bytes) and megabytes (MB) (that is, 220 or roughly 1,000,000 bytes). Gigabytes (GB) and Terabytes TB are the other units of measure of storage. The main memory of a computer is measured in terms of two characteristics viz., capacity and speed of access.

Types of Memory

Memory is primarily of three types

1. Primary Memory/Main Memory
2. Secondary Memory
3. Cache Memory

1. Primary Memory

Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed reside in main memory. It is divided into two subcategories RAM (Random Access Memory) and ROM (Read Only Memory).

Characteristics of Main Memory

- These are semiconductor memories.
- It is known as main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without primary memory.

1.1 RAM (Random Access Memory)

RAM(Random Access Memory) is the internal memory of the CPU for storing data, program and program result. It is read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased. Access time in RAM is independent of the address that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive. RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence a backup uninterruptible power system (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold. RAM chips are available in the market with different memory capacity such as 1 GB, 2 GB, 4 GB.

RAM is of two types

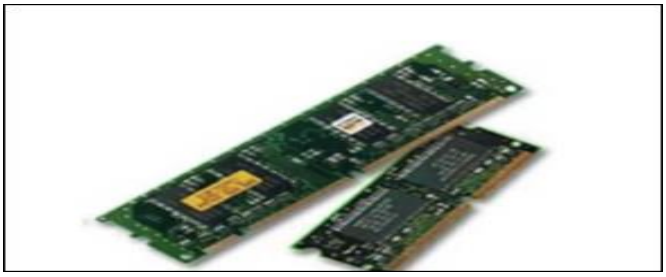
1. Static RAM (SRAM)
2. Dynamic RAM (DRAM)

1.1.1 Static RAM (SRAM)

The word static indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not have to be refreshed on a regular basis. Because of the extra space in the matrix, SRAM uses more chips than DRAM for the same amount of storage space, thus making the manufacturing costs higher. So SRAM is used as cache memory and has very fast access.

Characteristic of the Static RAM

- It has long life
- There is no need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption



1.1.2 Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually refreshed in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory because it is cheap and small. All DRAMs are made up of memory cells which are composed of one capacitor and one transistor.

Characteristics of the Dynamic RAM

- It has short data lifetime
- Need to be refreshed continuously
- Slower as compared to SRAM
- Used as RAM
- Lesser in size
- Less expensive
- Less power consumption

1.2 ROM (Read Only Memory)

ROM stands for Read Only Memory. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM, stores

such instructions that are required to start a computer. This operation is referred to as bootstrap. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

Following are the various types of ROM

1.2.1 MROM (Masked ROM)

The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kinds of ROMs are known as masked ROMs which are inexpensive.

1.2.2 PROM (Programmable Read only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

1.2.3 EPROM (Erasable and Programmable Read Only Memory)

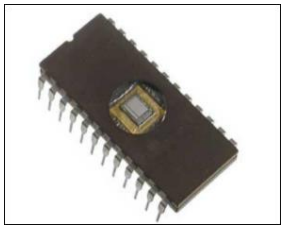
The EPROM can be erased by exposing it to ultra-violet light for duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming, an electrical charge is trapped in an insulated gate region. The charge is retained for more than ten years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal windows (lid). This exposure to ultra-violet light dissipates the charge. During normal use the quartz lid is sealed with a sticker.

1.2.4 EEPROM (Electrically Erasable and Programmable Read Only Memory)

The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (milli second). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of re-programming is flexible but slow.

Advantages of ROM

- Non-volatile in nature
- These cannot be accidentally changed
- Cheaper than RAM
- Easy to test
- More reliable than RAM
- These are static and do not require refreshing
- Its contents are always known and can be verified



2. SECONDARY MEMORY

This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing data/Information permanently. CPU directly does not access these memories instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory, and then CPU can access it. For example: Hard disk, CD-ROM, DVD etc.

Characteristic of Secondary Memory

- These are magnetic and optical memories.
- It is known as backup memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without secondary memory.
- Slower than primary memories.

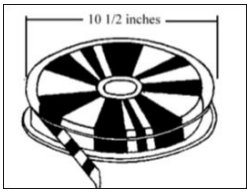
Types of secondary memory

1.1 Magnetic Tape
1.2 Magnetic Disk
  1.2.1 Floppy disk
  1.2.2 Hard disk
1.3 Optical disk(CD, DVD)
1.4 USB Flash Disk (Pen drive)

1.5 Memory Card

2.1 Magnetic Tape

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 similar to cassette tape recorder.



Advantages of Magnetic Tape:

- **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 without loss of data.

2.2 Magnetic Disk

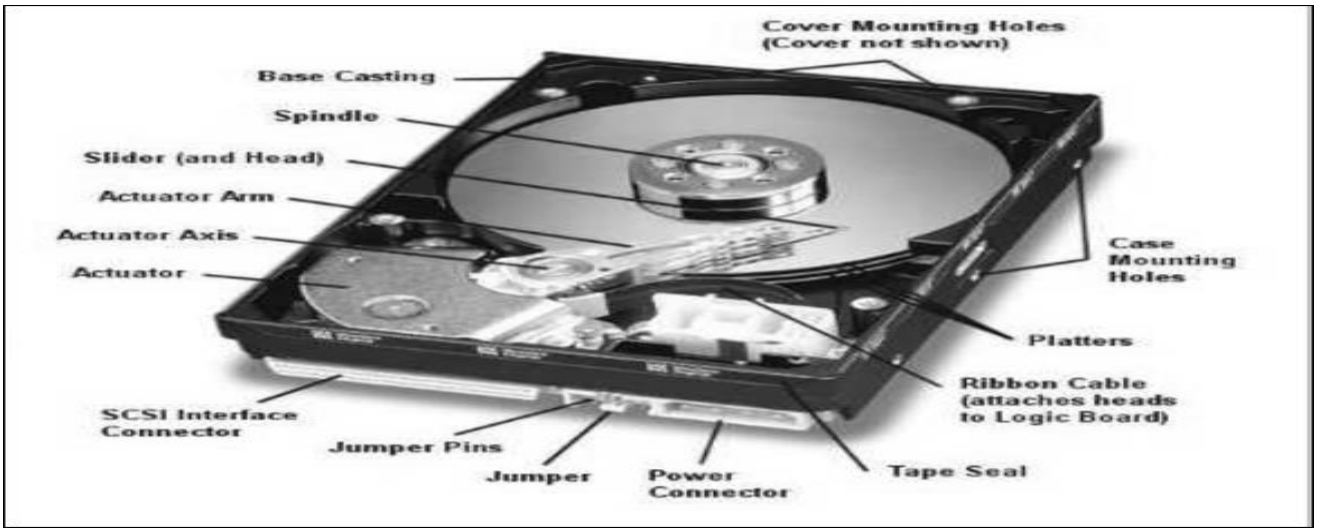
You might have seen the gramophone record, which is circular like a disk and coated with magnetic material. Magnetic disks used in computer are made on the same principle. It rotates with very high speed inside the computer drive. Data is stored on both the surface of the disk. Magnetic disks are most popular for direct access storage device. Each disk consists of a number of invisible concentric circles called tracks. Information is recorded on tracks of a disk surface in the form of tiny magnetic spots. The presence of a magnetic spot represents one bit and its absence represents zero bit. The information stored in a disk can be read many times without affecting the stored data. So the reading operation is non-destructive. But if you want to write a new data, then the existing data is erased from the disk and new data is recorded.

1.2.1 Floppy Disk

These diskettes, made of synthetic plastic material, are flexible. Hence they are called floppy diskettes or simply floppies. Floppies are cheaper and more rugged than metal disks. The floppies were introduced in the early 1970s and became very popular with the arrival of microcomputers. The floppies are popularly used on microcomputers. They are reliable and portable. They are available in many sizes like 5 1.4 -inches and 3 Yz -inches and vary in storage capacity from 360 KB to 2.88 MB. The 5 1.4 -inch floppies are not used these days. The 3 Inch floppies, called microfloppies, are very popular and they can hold 1.44 MB to 2.88 MB of storage. The current trend is towards reducing the size and increasing the storage capacity of the floppies.

1.2.2 Hard Disk

Hard Disks Hard disk is a metal platter with magnetic coating on both sides. Several such hard disks are stacked one on the other, without touching each other, into a disk pack for large storage. The disk pack, housed in metal container with a read/write head assembly unit, is fixed inside a computer permanently. Hard disks are highly reliable and accessing data from hard disk is faster and more efficient than that from floppies. A disk pack is a collection of disks stacked vertically one on top of the other and it is mounted on a disk drive. The disk drive has a head assembly with a read/write arm for each pair of recording surfaces. Each disk has two surfaces for storage. The top surface of the first disk and the lower surface of the last disk are not used for recording as small dust particles might settle down on them. The disk drive mechanism rotates the disk pack at a constant speed. Each read/write arm has one pair of read/write head, one for each surface. To increase the speed of access, the read/write arm carries as many heads as the number of tracks on the disk. The access time is determined by two factors: the seek time and the rotational delay. The seek time is the time required to locate the track on the recording surface. Rotational delay involves positioning the read/write arm at the right track of the surface for reading/writing.



Now days 120,320, 500, 1000 GB Hard disk are available in market

Advantages of Hard Disks

- They support direct access.
- They have quick access rates.
- They have fairly large storage capacities.
- Hard disks are essential for online systems.

Disadvantages of Hard Disks

- Hard disks are expensive.
- Hard disks are not always reliable. For example, hard disks can crash. If they crash, the entire data on them may be lost as data recovery is difficult and expensive.
- Speed and performance of hard disks are slower than that of CPU. Hence, they slow down overall speed of performance of the computer.

1.3 Optical Disks

Optical storage technology uses light as the medium for representing data. Laser beams are used to store and retrieve data. Commonly used optical storage devices include CD-ROM, CD-R, CD-RW and DVD.

CD-ROM

Compact-disk Read-Only Memory (CD-ROM) is the most exciting development that has taken place in secondary storage in recent years. CD-ROM can store huge quantity of data, of about 650 MB, which is equivalent to 200,000 pages of ordinary text on a single disk. It is relatively inexpensive and is used in both small and large computer systems. This disk is made of synthetic resin that is coated with a reflective material, usually aluminum. When high intensity laser beam is focused on the disk, it forms tiny pits on it. The pit represents I and the data are read using low intensity laser beams. The pit reflects less intense light. The reflected light is sensed to know the bit 0 from 1; the light will be more intense in the case of the former as there is no pit. A special feature of CD-ROM is its ability to store different kinds of data such as text, pictures, animation, sound, video and graphics. This makes it valuable for certain industries like travel, entertainment and motion pictures. The data stored on CD-ROM are read only as the name indicates, that is, the data on CD-ROM cannot be modified. Hence, it is well suited for storing relatively static data.

CD-R

This is Compact Disk -Recordable. It can be used to write data on it once. The data on it can be retrieved as and when needed.

CD-RW Compact Disk Re-writable (CD-RW) is an optical disk that can be rewritten many times. That data store on it can be read, erased and re-written as frequently as needed.

DVD

Digital Versatile Disk (earlier known as Digital Video Disk.) is a large capacity secondary storage device. It stores seven times CD capacity on a single side. Double-sided or dual layer DVDs are also available with much larger storage capacity. DVD uses a 5-inch disc for storage. That is, it is of the same size as a CD ROM. Single layer, single-sided DVD has a storage capacity of 4.7 GB. With double-layer, double sided disc, it can store 17 GB of data on a single disk. (Single sided DVDs can store 4.7 GB for single layer and 8.5 GB for dual-layer disks. Double sided DVDs can store 9.40 GB for single layer and 17 GB for dual-layer disks).

With such huge storage capacity, DVDs are used to store full-length commercial motion pictures, video albums etc. and its viewing quality is much better than tape storage. DVD system delivers a picture with over twice the definition of traditional storage like VHS.

1.4 USB Flash Derive or Pen Derive

USB flash drive are removable , rewritable, and are physically much smaller drives, the storage capacity of Flash drive is 256 GB . a flash drive consists small printed circuits board carrying the circuits elements and a USB connector, insulated electrically and protected inside a plastic, metal, or rubberized case that can be carried in a pockets. We can use pen drive in personal data transfer, system administrator, booting operating system , music storage and marketing , brand and product promotion , Backup any data for future uses.

Advantages

- Data can store easily and safely.
- We can kept our important data in any ware with together.
- Compare to hard disk it is very fastest device to data transfer.
- It can format easily If virus effected.

Disadvantages

- Flash drive can easily misplace.
- It is difficult to search if it lost.
- If Pen drive corrupted at a time then it never be recover.
- If it protected with password then never be recover data without formatting it.

1.5 Memory Card

A memory card some time called flash memory card or a storage card. Memory card is small device that can storage digitals files. They are easily portable from one place to another. A user can take a memory card, insert in into a computer, store file such as text, audio, video, documents etc.

3. Cache Memory

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.

Advantages The advantages of cache memory are as follows

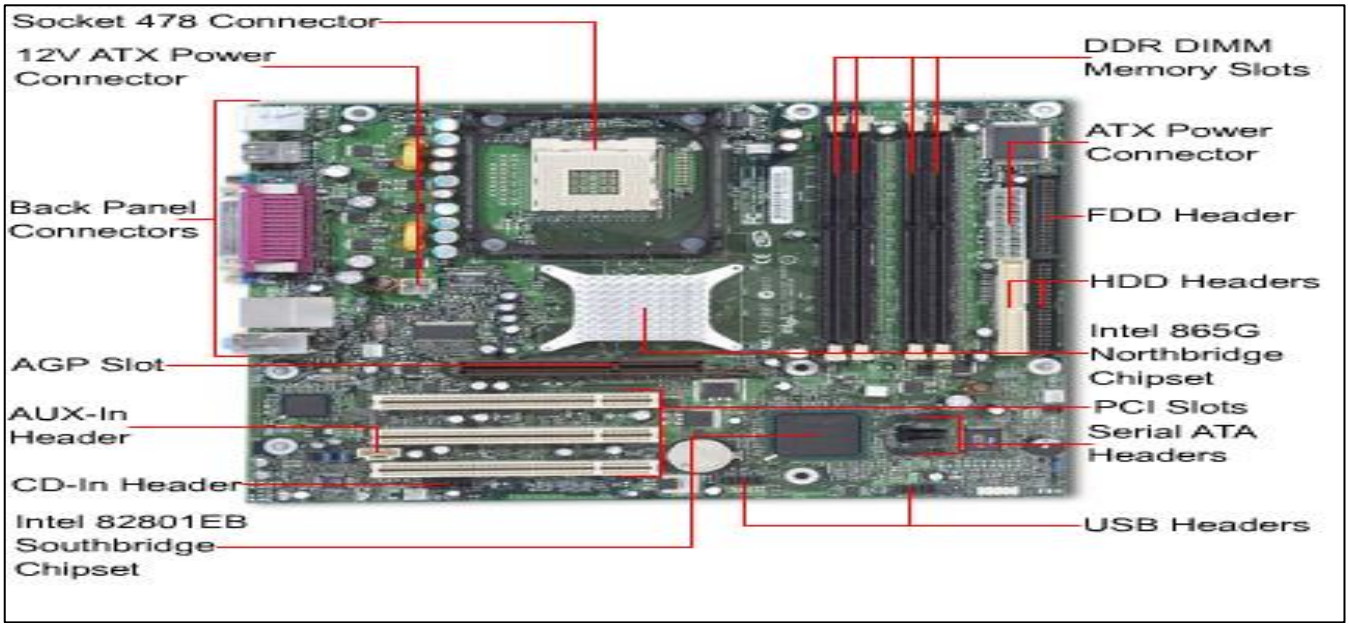
- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

Disadvantages The disadvantages of cache memory are as follows

- Cache memory has limited capacity.
- It is very expensive.
-

MOTHER BOARD

The motherboard is mounted inside the case and is securely attached via small screws through pre-drilled holes. Motherboard contains ports to connect all of the internal components. It provides a single socket for CPU whereas for memory, normally one or more slots are available. Motherboards provide ports to attach floppy drive, hard drive, and optical drives via ribbon cables. Motherboard carries fans and a special port designed for power supply.
There is a peripheral card slot in front of the motherboard using which video cards, sound cards and other expansion cards can be connected to motherboard.
On the left side, motherboards carry a number of ports to connect monitor, printer, mouse, keyboard, speaker, and network cables. Motherboards also provide USB ports which allow compatible devices to be connected in plug- in/plug-out fashion for example, pen drive, digital cameras etc.



Features of Motherboard

- Motherboard varies greatly in supporting various types of components.
- Normally a motherboard supports a single type of CPU and few types of memories.
- Video Cards, Hard disks, Sound Cards have to be compatible with motherboard to function properly.
- Motherboards, cases and power supplies must be compatible to work properly together.

Popular Manufacturers

Intel, ASUS, AOpen, ABIT, Biostar, Gigabyte, MSI, Gsonic, Esonic.

CHAPTER-4 COMPUTER SOFTWARE

Introduction

Software is a set of programs, which is designed to perform a well-defined function. A program is a sequence of instructions written to solve a particular problem.

There are two types of software

1. **System Software**
2. **Application Software**

System Software

The system software is collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software are generally prepared by computer manufactures. These software products comprise of programs written in low-level languages which interact with the hardware at a very basic level. System software serves as the interface between hardware and the end users. Some examples of system software are Operating System, Compilers, Interpreter, and Assemblers etc. system software divided in two categories. Operating system software and language processer software.

1. Operating System

Operating system establishes a link between application programs and the computer itself. It also provides an interface for the user with the machine. It executes application programs by fully exploiting the available computing power. Today's operating systems are highly sophisticated and are capable of executing several programs simultaneously.

Examples of operating system are DOS, Win 95, Unix, Linux, Windows 7, 8, 10, Windows Server 2003,8,12 etc.

Advantage

- It provide graphical user interface.
- It is user friendly in use.
- It provides facility to transfer information between applications.
- It provides finding facility.
- It allow to running more than one application at a time.
- It accepts large file name.
- It gives online helping facility.

2. Language processer

That program that translate the program written in other (high-level, low level) language (source program) into machine language (object program) are called language processers. Ex Assembler, Compiler, Interpreter.

There are three types of language processers

1. **Assembler**
   Assembler translates written in low level language (assemble language) into machine language or binary language.
2. **Compiler**
   Compiler translates the program written in high level language into machine (binary) language. It translate whole program at a time and makes the execution faster.
3. **Interpreter**
   Interpreter is different types of translator. It translates single statement at time and checking line by line. So it easier to understand error location in the program. Assembler and compiler are translators.

Application software

Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Application software may consist of a single program, such as a Microsoft's notepad for writing and editing simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Examples of Application software are Office, Tally, Photoshop etc.

Features of application software are as follows

- Close to user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language

- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

Utility software

Utility software is design to perform on computer for computer system .these types of software keep safe our computer from virus and spyware. Example Disk Defragment, antivirus, system checker etc.

CHAPTER - 5 OPERATING SYSTEM

Definitions

An operating system is designed as a huge modular program that manages the overall operations of a computer. It is a master control program that acts as a manager, housekeeper and traffic police for the computer system. It allocates resources for running different application programs, tracks the use of computer resources and ensures efficient use of resources. Application programs are run under the supervision of the operating system in the environment set by it. It loads programs into memory, performs input/output operations and communicates with the user as to the state of processing, errors etc. Operating system sets up the computer environment. A personal computer requires a single-user environment. Many operating systems are available for personal computers. They include MS DOS, 05/2, MAC for Apple Macintosh computers, XENIX which is the microcomputer version of UNIX from the Microsoft Corporation and MS Windows. Windows is rapidly growing in popularity and has replaced disk operating systems such as PC DOS and MS DOS on personal computers. A multi-user system environment is provided by operating systems like UNIX, Windows NT or Linux. A networked computer system requires a network operating system like Novell NetWare.

Functions of Operating System

1. **Resource management**
   Allocation of computer resources such as memory to various jobs is done by the operating system. It manages hard disk storage, the CPU, main memory and other peripheral devices.
2. **Data Management**
   Operating system provides data management facilities such as data organization and retrieval from secondary storage devices. Files are created, named, read, deleted and renamed by the operating system.
3. **Job Management**
   In multi-user systems, it selects new jobs for execution according to the priority fixed.
4. **Input/output management**
   It manages the flow of data and instructions between the input/output devices and primary storage. It allocates and manages 110 devices. It provides I/O instructions to start printing, stop printing etc. If user intervention is required, for example, when printer is run out of paper, the operating system sends an appropriate message to the user.
5. **Maintaining Security etc.**
   Maintain security, communication of error and error control messages to the users, etc. are the other functions of the operating system.
6. **Memory management**
   Operating system manages the memory of the computer system. It allocates the memory on the need of the user and checks how many bytes are used and how many bytes are available.

Objectives of Operating System

- To make a computer system convenient to use in an efficient manner
- To hide the details of the hardware resources from the users
- To provide users a convenient interface to use the computer system
- To act as an intermediary between the hardware and its users and making it easier for the users to access and use other resources

- To manage the resources of a computer system
- To keep track of who is using which resource, granting resource requests, according for resource using and mediating conflicting requests from different programs and users
- To provide efficient and fair sharing of resources among users and programs

Types of Operating System

Single User Operating system > in this OS only one task can be perform or one job at a time.
Ex. DOS, Win95/98/ME/XP

Multiuser Operating System > in this OS More than one Work can perform.
Ex. UNIX, Linux, Windows NT/2000 Server/ 2003 Server/2008/ 2012

CHAPTER-6 DISK OPERATING SYSTEM

Microsoft DOS is a non- graphical command line operating system. This was introduced by Microsoft Company in August 1981. It was the first widely installed operating system in personal computer in the 1980s. MS DOS was not only one of the most powerful operating system of that time but was also easy to load and install. It requires neither much memory not a very sophisticated computer to run on.

Since MS-DOS supports a CLI (Command Line Interface) user need to remember the command and know where the programs and data are stored. The command.com module of the MS-DOS command more interprets the command and executes it. As compared to the operating system of today, MS-DOS has relatively a very small number of the commands. MS –DOS basically a single user, Single Tasking Operating system. Therefore, at a given instance of time, only one user can use it to perform only one task. Another Drawback of MS-DOS is that it does not have a built –in support for networking.

Moreover, MS-DOS is a 16 bit operating system. Therefore, it can send, Receive, or process only 16 bit of data at a time. It is unable to take advantage of the 32-bit or 64 bit processer available in the market today. MS-DOS. Its last version, MS-DOS 6.22, was released in 1994, although users do not use MS-DOS today, its command Shell (now called Windows Command Line) is still popular among users.

Some Properties/Features of MS-DOS

- it is single user operating system.
- it can co-exist with other operating system in the same drive.
- It manage file in hierarchal order.
- It support both hard disk and floppy disk.
- Dos support only one user or single processers.
- Dos file name are limited or 8 Character and 3 character extension name.

Essential file used in MS-DOS

MS- Dos consists 3 essential file for the booting of computer which are

1. **IO.SYS**
2. **MS-DOS.SYS**
3. **COMMAND.COM**

1. IO.SYS

- it is a program to handle input/output operating of your device.
- It permanently resides in the memory as long as the power is on even the change of application software, this program remains in the memory.

2. MS-DOS.SYS

- It is a program for the use of an application programs.
- It contains special program to make common operation easy for the program.

3. COMMAND.Com

It is command interpreter program that accepts and understand that command and five the desire result.
All the internal commands are stored in command.com file

Some Term related to Ms-DOS

Files

It is the collection of related information. It is an electronic record of any types of information. Files are the heart of DOS. All of the information is stored under a unique file name. File names are divided into two parts, first parts

Is called the primary file and the second files is called the extension file name.

Rules for writing the file name:

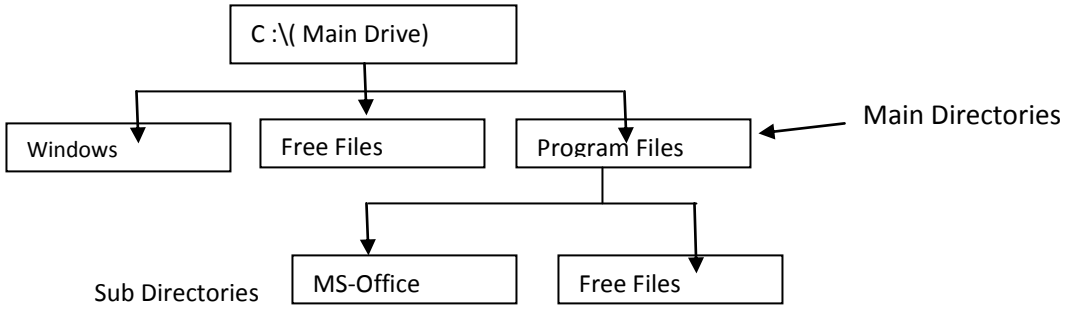
- The primary file name cannot give more than 8 characters.
- Extension file name can give maximum of 3 characters.
- Characters (a to z) and number (0 to 9) can be used for file name.
- Punctuation marks: @ (at symbol), # (Hash- Number Symbol), $(Doller Sign), % (Percentage Symbol), ^ (Caret), _ (Underscore) and & (Ampersand) can be used for the file name.
- It is a not case sensitive.
- Primary and Extension file name is separated by a period/dot (.).

Directory

It is the main heading (cabinet), where files are kept. It is the partitioned room (Space) of the memory. A directory may contain many files and sub- directories. It contains the name of the files. Their size, last date of modification and address of the files as to where the disk file is residing.

Many directory can be maintained on the same disk. But one directory always exists on each disk called “root”. The root directory is symbolized by “\” within which other directories can be created. A sample directory structure

Is given blew.



DOS Prompt

It is the main gate of the MS-DOS, from where we can do anything of work. It is donated by : A:\> or, C:\>,or D:\>etc

But if you place inside of directory and sub directory then the prompt appears as C:\Windows>or C:\Windows\Desktop> etc.

Wild card Character

Wild card character are commonly used for the quick function for the execution of DOS commands. Basically the wild cards

Are “?” and “*”. These have been used with “.” To get different function. These have been listed as follows.

* : Represent a group of unknown characters.
.* : Represent any unknown extension(s).
. : Represent any unknown file name with any extension.
^ : Represent a control (Ctrl) sign.
> : Represent a prompt component.
? : Represent a single unknown character.
/ : Represent adding option/switch.
: : Represent a drive Component.
\ : Represent a root component.

DOS – Command

A command is a set of instruction used to perform a specific task. When a user type a command in command prompt shell and presses the <Enter> key, the operating system command interpreter converts the command into machine language which is processed to give the required result.
There are two kinds of DOS command. They are

1. **Internal command**
2. **External command**

2. Internal Command

Those are internal commands, which can easily understand by an interpreter file (Command.com) internals command are execute immediately because they are built for in DOS, therefor , When DOS is loaded, these command are ready to executed. You cannot see these at command names likes in called command.com because
They are not of a file called COMMAND.COM. Some internal commands are as follows.

DATE	TIME	DIR	CLS	DEL OR ERASE
EXIT	COPY CON	COPY	REN	MD
CD	RD	PROMPT	VOL	TYPE
VER	PATH	BREAK	ECHO	PAUSE
VERIFY	SET	START	COLOR	

3. External Command

External commands are on the disk as program files. The disk has two read the files before execution. The files which have .COM EXE OR BATS are known as external files. They are many external files some are as follows.

CHKDISK	DISKCOPY	FORMAT	LABEL	SYS
TREE	DEL TREE	MEM	EDIT	XCOPY
ATTRIB	PRINT	MORE	SCANDISK	DISKCOMP

Booting:

The process of loading system files and command.com from a disk in computer's memory is called boting.

There are two types of booting.

Types of booting:

a)cold booting

Booting bu turn on computer

B) Warm booting:

Pressing reset/restart button while the computer is in ON state or press Alt+Ctrl+Del.

Different between Internal Command and External command

Internal Command	External Command
Internal commands are built-in the command.com	External command are stored on directory of disk having the extension.exe
Internal command are memory resident.	External commands are disk resident and are on the disk as program files
Internal commands are primary commands and available In RAM	Commands available on disk are called external command
Internal commands can be executed from any DOS prompt	The disk drive must read the content of each file before execution

BAT File

- A bat file is a small program file containing the list of dos commands.
- This file helps to perform any task by using the series of dos commands and with the help of single file name. Those extensions have filename.bat.
- After making any batch file you just enter a file name at the dos prompt and have to press enter key at once. Ex. Open notepad and type their DATE and save it file name with .bat extension and run.

CHAPTER-7 INTERNET AND EMAIL

INTRODUCTION

The Internet is a giant global network. It is in fact an amorphous collection of networks and millions of computers across the globe. It all started with the Advanced Research Project Network (ARPANET) set up by the Defense Department of the United States. It wanted to create a large computer network for military communication with no controlling center. ARPANET was used primarily by research institutions until the mid-1980s when its use was widened. By 1990 the network came to be known as Internet and since then its growth has been phenomenal. The Internet has changed the entire communication and business paradigm. Though its growth was limited in two decades from the early seventies, it grew astronomically in the 1990s. It is sweeping the entire world by its sheer reach and ease of use. Millions of host computers and users form the global **Internet**

- Internet is a world-wide / global system of interconnected computer networks.
- Internet uses the standard Internet Protocol (TCP/IP)
- Every computer in internet is identified by a unique IP address.
- IP Address is a unique set of numbers (such as 192.168.1.1) which identifies a computer's location.
- A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.
- For example, a DNS server will resolve a name http://www.aitgaur.com to a particular IP address to uniquely identify the computer on which this website is hosted.
- Internet is accessible to every user all over the world.

Internet Protocols

There are a large number of Internet related protocols. Some of the important Internet protocols are:

1. TCP/IP. The Transmission Control Protocol I Internet Protocol and related protocols are the basic Internet technology which has paved the way for fast growth in Internet use. This set of protocols permits any computer to communicate with any other computer regardless of the platform.
2. HTML The Hyper Text Markup Language defines how text, images and sound are delivered to users. HTTP The Hyper Text Transport Protocol decides how HTML documents are to be served via the Internet.
3. SMTP Simple Mail Transfer Protocol enables the basic text based message communication between users.
4. Other support protocols include Telnet, File Transfer Protocol, Common Gateway Interface etc

Services available on the Internet

- World Wide Web
- Electronic Mail
- Usenet/ News groups
- FTP
- Telnet

- Internet Relay Chat
- Online shopping
- Entertainment
- Business communication

Equipment required for Internet Connection

1. Computer System
2. Telephone Line
3. Modem
4. Internet Software/ Program
5. ISP(Internet Service Provider)

Note: Now days USB plug-in internet device is widely used for internet connection.it only required Prepaid SIM (SKY,NTC) or connection devices. Also NTC has lunch ADSL service for both phone and internet services.

Advantages of Internet

- Provide information and entertainment.
- Provide facility of online shopping.
- Get current news and event from any ware.
- Download Software and games free ware
- 24 hour internet is available to user.
- Send and receive document from any ware to Word
- Provide facility to get online study for user.
- Industrial company and People can be able to published our product on internet free.

Disadvantages of Internet

- If sever is fail than whole computer internet will fails.
- If computer firewall is not enabled then virus can attack on our computers.
- Unlimited time wastage while user doesn't know how
- Junk email can be received
- Hacker can attack on our computer online
- More fake or prone sites are available one internet.
- Anyone can share your correct information by changing in wrong information to users.

Intranet

Intranet is a local area network that uses Internet technologies for communication within an organization. It is not accessible for outsiders. Internet Protocol suit such as TCP/IP, SMTP, WWW, FTP and remote login are used for communications within an organization. The internal applications are integrated with email. FTP. Webserver Mail server etc. It requires a local area network to be set up and then the network resources are integrated with the Internet technologies. Users browse the network with a web browser to access information within an Organisation. The web browser becomes a simple user interface for sharing data. The Intranet need not be connected to the Internet. Intranet is implemented within organisations.

Advantages

- Based on internet
- Worldwide accessible
- Low networking cost
- Easy to scale up and down

- All internet facility is available (Mail, Chart, Conferencing etc.)

Similarities in Internet and Intranet

- Intranet uses the internet protocols such as TCP/IP and FTP.
- Intranet sites are accessible via web browser in similar way as websites in internet. But only members of Intranet network can access intranet hosted sites.
- In Intranet, own instant messengers can be used as similar to yahoo messenger/ talk over the internet.

Differences in Internet and Intranet

- Internet is general to PCs all over the world whereas Intranet is specific to few PCs.
- Internet has wider access and provides a better access to websites to large population whereas Intranet is restricted.
- Internet is not as safe as Intranet as Intranet can be safely privatized as per the need.

Email

Short for **electronic mail**, **e-mail** or **email** is information stored on a computer that is exchanged between two users over telecommunications. More plainly, e-mail is a message that may contain text, files, images, or other attachments sent through a network to a specified individual or group of individuals. The first e-mail was sent by Ray Tomlinson in 1971. By 1996, more electronic mail was being sent than postal mail.

Advantages of Email

- It is faster and cheaper technique to send data one place to another.
- It is more reliable than postal mail.
- It can send image, number, text, or document file at once time.
- Get information about receivable people her get email or not.
- It can automatically send message in future if you already set it.

Disadvantages

- It cannot send more than 50 MB data at a time.
- Hacker can hack our data by sending emails
- We can get easily IP address of Sender machine

Username

Username is the name of the administrator that manages email account and is unique combination of character and numbers.

User name must be different that other user on server.

Example : aitgaur

Email Address

- Email address is a location and individual mailbox on internet.
- Each and every user identify by her unique ID, Which is called Email Address.
- To send any message we must be have their email address.
- Email address consist two part which is separated by using @ (at the rate) sign
- Here: aitgaur is username and gmail.com is domain name.

Domain Name

Domain Name System is an inter-network system used to keep order in computer addresses by converting computer host names into numeric IP addresses. A domain name also contains more than two separated with comma which is called Period [.].

Example www.aitgaur.com

Some categories are as follows of domain name.

Com = commercial

Edu = Education

Gov = Government

Org = organization

Mil = military

Net = network

In = india

Np = Nepal

Some Term Related to internet

1. WEBSITE

It is collection of web page. Website are created by tools and coding to provide information about any particular object such as business, company, university, Institute, college etc.

Website has its own address that is called website host name. some example of website are www.microsoft.com www.ctevt.org.np.com www.facebook.com www.aitgaur.com

Some language that use for built website are HTML, CSS, Java Script, PHP, Joomla, ASP.NET Ajex etc.

2. WEBPAGE

Webpage is collection of large data text, images, number and wrapped in one page by written one and more than one web scripting language. Such as Home.html is a webpage. In one website more than one webpage consist of providing all information with separated page.

3. WEB BROWSER

Web browser is application software that is required to explore the internet on computer system.

Some example of webpage are Google Chrome, Mozilla Fire Fox , Internet Explorer, Opera, Safari, Netscape etc.

4. WEB SERVER

Web server is place where all website are contain there.

It is program to responsible to request from web browser to relative resources.

5. WWW (WORLD WIDE WEB)

One of the ways of accessing information on the Internet is through the World Wide Web (WWW or the Web in short). The Web had its origin in 1989 at the European Centre for Particle Physics (CERN), Geneva. It was the brainchild of Tim Berners- Lee. Berners-Lee conceived it as a way of publishing hyperlinked scientific documents over the Internet. The concept allows users to follow ideas from one document to another irrespective of where the documents are stored. The links connect documents on one computer to documents on the same computer or to those on other computers in the same location or in distant locations. The concept was extremely useful in collating data present in scattered locations.

6. FIREWALL

Firewall is a combination of software and hardware that prevents hackers and others from infiltrating a computer or internal network from an outside network. It is simply a barrier between two networks. One of the networks is internal that is trusted and the other is external to the organisation. The external network is not trusted. Firewalls are designed to protect an organization's network, its data and systems. Fire walls check incoming and outgoing packets of data and block or let them flow in according to a set of rules defined by the administrator.

7. SEARCH ENGINE

The Web contains tens of thousands of websites with content on vastly different topics. Users need search tools to get to the information they look for easily. Search engines, directories, indexes etc. help the users in their search. Search engines use key words and phrases to search the Internet.

Most search engine are Google, khoj, Goto, Alta Vista, Yahoo, Facebook,

8. BANDWIDTH

Bandwidth is the data rate when communicating over certain media or devices. Communication requires connectivity- wired or wireless. In either case, data have to be sent and received between communicating devices. The rate at which data are transferred between devices is called the bandwidth. Usually, it is measured in kilobits per second (KBPS) or megabits per second (MBPS). 64 KBPS or above is said to be broadband Most critical data communications require broadband connectivity.

9. ISP (INTERNET SERVICE PROVIDER)

ISP are companies that provide to access the internet and the world wide web (WWW). When you sign in contact with an ISP , you are given the telephone number a user name, a computers. An ISP charges monthly or hourly basis. by using ISP user can get Internet Access from remote place by using computer and telephone line. ISP for Nepal is NTC, World Link. etc. and for India is BSNL, Airtel etc.

10. DNS(DOMAIN NAME SYSTEM)

The Domain Name System (DNS) is a distributed hierarchical naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participants. Most importantly, it translates domain names meaningful to humans into the numerical (binary) identifiers associated with networking equipment for the purpose of locating and addressing these devices worldwide. An often-used analogy to explain the Domain Name System is that it serves as the "phone book" for the Internet by translating human-friendly computer hostnames into IP addresses. For example, www.example.com translates to the addresses 192.0.32.10 (IPv4) and 2620:0:2d0:200::10 (IPv6).

CHAPTER-8 COMPUTER VIRUS

Definition

A computer virus is a program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. Viruses can also replicate themselves. All computer viruses are man-made. A simple virus that can make a copy of it over and over again is relatively easy to produce. Even such a simple virus is dangerous because it will quickly use all available memory and bring the system to a halt. An even more dangerous type of virus is one capable of transmitting itself across networks and bypassing security systems. Since 1987, when a virus infected ARPANET, a large network used by the Defense Department and many universities, many antivirus programs have become available. These programs periodically check your computer system for the best-known types of viruses. Some people distinguish between general viruses and *worms.* A worm is a special type of virus that can replicate it and use memory, but cannot attach it to other programs.

Origin of Computer Virus

John Von Neumann first suggested the concept of self- replicating programs in 1950. A few of the programmers at AT&T started working on self-replicating programs as a game. The game involved writing

code to destroy other's code in the computer memory and the one who has maximum number of lines of code wins the game. The game was kept a secret and was never released for the public. Later, Ken Thomson, co-author of UNIX encouraged programmers to write programs like the one at AT &T. Early viruses were developed by hackers to enter other's systems.

Types of Viruses

There are thousands of viruses and several thousand variations of these viruses. Some of the commonly found computer viruses are:

1. Stone Marijuna Virus

This affects boot sector of floppy diskettes and the master boot record containing partition table on hard disks. It displays a message "Your PC is stoned".

2. The Vienna-648 Virus

This virus infects files with size larger than 10 bytes. It usually infects' .com' files and increases infected file size by 648 bytes.

3. Joshy

This virus is of Indian origin and affects boot sector of floppy diskettes and master boot record of hard disks. It becomes active on the 5th of January every year and the computer system hangs when the virus is active. If the message "Happy birth day Joshy" is typed, the system starts functioning normally.

4. Dark Avenger Virus

It infects files with size larger than 1800 bytes and is very difficult to remove. It affects' .com' and' .exe' files. It increases the size of infected files by 1800 bytes, reduces RAM by 4 KB and displays the message "Eddie Lives Somewhere in Time".

5. Stealth Viruses

Stealth viruses are hard to detect and are very dangerous. They include 512A, Holocaust, V-2000 Whale, Murphy and Michael Angelo. The Michael Angelo virus wipes out data on hard disk on Friday the 6th of March, the birthday of artist Michael Angelo.

6. Flush Virus

It is a memory-resident virus that infects' .com' and' .exe' files.

7. Jerusalem Virus

It affects' .exe' and' .com' files. It increases the size of '.exe' files by 1808 bytes and that of' .com' files by 1813 bytes.

8. Perfume

It infects '.com' file and increases its size by 765 bytes. It shoots a question and if the number 4711 (the name of a German perfume) is typed, it functions normally.

9. Detection of Viruses

Viruses can be detected by running disk scanners special programs for it.

Disk scanners, like UT Scan, check the hard disk or floppy diskettes for viruses and display the result of scanning.

10. **Boot Monitors and File Monitors**

They give an alarm to users if a virus attempts at infecting boot sector or '.com' and' .exe' files.

Removal of Viruses

Anti-virus software is available for removing known viruses. After locating a virus, the anti-virus software is run to remove the virus from the affected files and the boot sector. For example, UT Scan has a scanning program,

(Scan.exe) to scan the disk for viruses and a cleaning program (Clean.exe) to remove them. Other packages of anti-virus software include Nashot, VirScan, Red Alert and Norton Anti-virus.

List of some Virus Name

Win-32, New Folder.Exe, Trojan, smss.exe, Die-hard, Disk Killer, Logic bomb, Worms, Data Crime, C-Crime, C-Brain, Norton, Macro virus etc.

What will be in computer if virus affect in System

- it change the file size.
- If virus affects one file then there is a change of spreading it to other important files.
- Virus may cause data to be lost or corrupted.
- It hangs the application program while running.
- It slow down the computer system and reduce computer ability.
- Decrease in the amount of available memory.
- Increase In Bad Sector/ Lost Clusters.
- It change the extension of file.
- Cannot be execute executable file (.exe)
- Screen show some unusual output.
- It takes very long time to load program and open computer due to virus affect.
- The computer may not boot and hangs.

For prevent from virus

Do not plug pen drive in computer without checking.

Don't install direct software from internet.

Always keep firewall on in computer while you working on internet.

CHAPTER-9 NUMBER SYSTEM

When we type some letters or words, the computer translates them in numbers as computers can understand only numbers. A computer can understand positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.

A value of each digit in a number can be determined using

- The digit
- The position of the digit in the number
- The base of the number system (where base is defined as the total number of digits available in the number system).

Decimal Number System

The number system that we use in our day-to-day life is the decimal number system. Decimal number system has base 10 as it uses 10 digits from 0 to 9. In decimal number system, the successive positions to the left of the decimal point represent units, tens, hundreds, thousands and so on.

Each position represents a specific power of the base (10). For example, the decimal number 1234 consists of the digit 4 in the units position, 3 in the tens position, 2 in the hundreds position, and 1 in the thousands position, and its value can be written as

(1x1000)+ (2x100) + (3x10)+ (4xl)

$(1x10^3)+ (2x10^2) + (3x10^1)+ (4xl0^0)$

1000 + 200 + 30 + 4

1234

As a computer programmer or an IT professional, you should understand the following number systems which are frequently used in computers.

S.N.	Number System and Description
1	Binary Number System Base 2. Digits used: 0, 1
2	Octal Number System Base 8. Digits used: 0 to 7
3	Hexa Decimal Number System Base 16. Digits used: 0 to 9, Letters used: A- F

Binary Number System

Characteristics of binary number system are as follows

- Uses two digits, 0 and 1.
- Also called base 2 number system
- Each position in a binary number represents a 0 power of the base (2). Example 20
- Last position in a binary number represents a x power of the base (2). Example 2x where x represents the last position - 1.

Example

Binary Number: 101012

Calculating Decimal Equivalent:

Step	Binary Number	Decimal Number
Step 1	10101_2	$((1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0))_{10}$
Step 2	10101_2	$(16 + 0 + 4 + 0 + 1)_{10}$
Step 3	10101_2	21_{10}

Note 10101_2 normally written as 101101

Octal Number System

Characteristics of octal number system are as follows

- Uses eight digits, 0,1,2,3,4,5,6,7.
- Also called base 8 number system
- Each position in an octal number represents a 0 power of the base (8). Example 80
- Last position in an octal number represents a x power of the base (8). Example 8x where x represents the last position - 1.

Example

Octal Number: 125708

Calculating Decimal Equivalent:

Step	Octal Number	Decimal Number
Step 1	12570_8	$((1 \times 8^4) + (2 \times 8^3) + (5 \times 8^2) + (7 \times 8^1) + (0 \times 8^0))_{10}$
Step 2	12570_8	$(4096 + 1024 + 320 + 56 + 0)_{10}$
Step 3	12570_8	5496_{10}

Note: 12570_8 is normally written as 12570.

Hexadecimal Number System

Characteristics of hexadecimal number system are as follows

- Uses 10 digits and 6 letters, 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F.
- Letters represents numbers starting from 10. A = 10. B = 11, C = 12, D = 13, E = 14, F = 15.
- Also called base 16 number system
- Each position in a hexadecimal number represents a 0 power of the base (16). Example 160 ? Last position in a hexadecimal number represents a x power of the base (16). Example 16x where x represents the last position – 1

Example

Hexadecimal Number: $19FDE_{16}$

Calculating Decimal Equivalent

Step	Binary Number	Decimal Number
Step 1	$19FDE_{16}$	$((1 \times 16^4) + (9 \times 16^3) + (F \times 16^2) + (D \times 16^1) + (E \times 16^0))_{10}$
Step 2	$19FDE_{16}$	$((1 \times 16^4) + (9 \times 16^3) + (15 \times 16^2) + (13 \times 16^1) + (14 \times 16^0))_{10}$
Step 3	$19FDE_{16}$	$(65536 + 36864 + 3840 + 208 + 14)_{10}$
Step 4	$19FDE_{16}$	106462_{10}

Note: $19FDE_{16}$ is normally written as 19FDE.

CHAPTER-10 PROGRAMMING LANGUAGES

You are aware with the term language. It is a system of communication between you and me. Some of the basic natural languages that we are familiar with are English, Hindi, Oriya etc. These are the languages used to communicate among various categories of persons. but how you will communicate with your computer. Your computer will not understand any of these natural languages for transfer of data and instruction. So there are programming languages specially developed so that you could pass your data and instructions to the computer to do specific job. You must have heard names like FORTRAN, BASIC, and COBOL etc. These are programming languages. So instructions or programs are written in a particular language based on the type of job. As an example, for scientific application FORTRAN and C languages are used. On the other hand COBOL is used for business applications.

Programming Languages

There are two major types of programming languages. These are Low Level Languages and High Level Languages. Low Level languages are further divided in to Machine language and Assembly language.

Low Level Languages

The term low level means closeness to the way in which the machine has been built. Low level languages are machine oriented and require extensive knowledge of computer hardware and its configuration.

(a) Machine Language

Machine Language is the only language that is directly understood by the computer. It does not needs any translator program. We also call it machine code and it is written as strings of 1's (one) and 0's (zero). When

this sequence of codes is fed to the computer, it recognizes the codes and converts it in to electrical signals needed to run it. For example, a program instruction may look like this:

1011000111101

It is not an easy language for you to learn because of its difficult to understand. It is efficient for the computer but very inefficient for programmers. It is considered to the first generation language. It is also difficult to debug the program written in this language.

Advantage

The only advantage is that program of machine language run very fast because no translation program is required for the CPU.

Disadvantages

1. It is very difficult to program in machine language. The programmer has to know details of hardware to write program.
2. The programmer has to remember a lot of codes to write a program which results in program errors. 3.
3. It is difficult to debug the program.

(b) Assembly Language

It is the first step to improve the programming structure. You should know that computer can handle numbers and letter. Therefore some combination of letters can be used to substitute for number of machine codes.

The set of symbols and letters forms the Assembly Language and a translator program is required to translate the Assembly Language to machine language. This translator program is called `Assembler'. It is considered to be a second-generation language.

Advantages:

1. The symbolic programming of Assembly Language is easier to understand and saves a lot of time and effort of the programmer.
2. It is easier to correct errors and modify program instructions.
3. Assembly Language has the same efficiency of execution as the machine level language. Because this is one-to-one translator between assembly language program and its corresponding machine language program.

Disadvantages:

One of the major disadvantages is that assembly language is machine dependent. A program written for one computer might not run in other computers with different hardware configuration.

HIGH LEVEL LANGUAGES

Sometimes abbreviated as **HLL**, a **high-level language** is a computer programming language that isn't limited by the computer, designed for a specific job, and is easier to understand. It is more like human language and less like machine language. However, for a computer to understand and run a program created with a high-level language, it must be compiled into machine language.

The first high-level languages were introduced in the 1950's. Today, there are many high-level languages in use, including BASIC, C, C++, Cobol, FORTRAN, Java, Pascal, Perl, PHP,Python, Ruby, and Visual Basic.

Advantages of High Level Languages

Higher level languages have a major advantage over machine and assembly languages that higher level languages are easy to learn and use. It is because that they are similar to the languages used by us in our day to day life. example QBASIC, C, C++ JAVA. Etc.

Loaders

A loader is a program that places programs into memory and prepares them for execution. In a loading scheme the assembler outputs the machine language translation of a program on secondary storage device and a loader is placed in main memory. The loader places into memory the machine language version of the users program and transfers control to it. Since the loader program is much smaller than the assembler, this makes more memory available to the user's program. The time taken for loading and preparing an object program for execution is less

Linkers

The software that links these object modules into a load module is called linker. Even if program is a single unit without sub routines, it may have to be linked with sample routines offered by the translator. These are called library routines. The linker program links the program with these library routines and enables it to use these routines during execution.

POPULAR HIGH LEVEL LANGUAGES

Some of the popular high-level languages are briefly introduced in the following section.

BASIC

Prof.John Kemeny and Thomas Kurtz developed the BASIC language in the year 1964 at Dartmouth College in the USA. Their purpose was to develop a language that would be very easy to learn and program. The purpose has been achieved to a large extent. A person with little or no knowledge of computers and programming can learn BASIC programming in a short period of time. In BASIC as a program is being entered, its statements are checked for syntax errors which can be immediately corrected. This feature of BASIC makes it one of the most popular computer languages used in microcomputer systems. Though simple and easy to learn, yet it is quite flexible and reasonably powerful. It can be used both for business and scientific applications. Probably the greatest drawback of this language is that it has not yet been standardized. The language varies significantly from one computer system to another. Thus a BASIC program written on one computer may not work on another unless modified.

FORTRAN

FORTRAN (FORMULA TRANSLATION) is one of the oldest and popular high-level languages. It was originally developed by IBM for its 704 computer in 1957 to solve scientific and engineering problems. The language, designed as an algebra-based programming language, is oriented towards mathematical problems. Any mathematical relationship can be easily expressed as a FORTRAN instruction. FORTRAN program consists of a series of statements. These statements supply input / output, calculation, logic operation and other basic instructions to the computer.

PASCAL

This language is named after the French Mathematician Blaise Pascal and was first introduced in 1971 by Prof.Niklaus Wirth of the Federal Institute of Technology, Switzerland. It is the first language to fully embody in an organised way the concepts of structured programming. The language is relatively easy to learn and it allows the programmer to structure the programming problem. The program is designed as modules and a main module, which controls the program, calls the other modules. This language can be used for both scientific and commercial applications.

ADA

This language is named after lady Ada Agustha, daughter of Lord Byron and the first computer programmer. She was also an associate of Charles Babbage. ADA is a general-purpose
272 Programming Languages. language developed in 1980 at the Honeywell Computer Company by a group of scientists headed by Ichbiah on request by the Department of Defence of the US government for military applications. ADA is an extremely complicated language with a very large number of features and capability to use normal packages. Another feature of ADA is the use of tasks. Tasks are used to allow concurrent programming which is very useful for military applications.

C

C is a relatively new language and was designed at Bell Telephone Laboratories, USA. C is fast becoming the most popular language. Like PASCAL, C is a block structured language and has several features that allow the user of various concepts of structured programming. A special feature of C is that it allows the manipulation of internal processor registers of the computer. Thus the language also enjoys the advantage of having some of the powers of assembly language. Because of this feature, C is now being extensively used for systems programming like design of compilers and operating systems. Most computer vendors of today supply this language along with their computer systems.

COBOL

COBOL is a very structured language and it has very powerful data organisation and file handling capabilities. The programmer can define convenient data structures, design input and output formats and pet form operations on these data structures using COBOL statements. COBOL is a programming language developed during the 1960's and later standardized by ANSI. It is a procedural language and compared to fourth generation languages (4GLs), programming in COBOL is a bit too cumbersome. But its closeness to English language and its superior and powerful file handling facility make it most suitable for business data processing.

JAVA

Java is an object oriented programming language. The Java executable code is machine independent and will run on 2"'\1 system like Macintosh, x8S, Pentium, silicon-graphics or Spare. Recently all major operating system vendors have announced to incorporate Java in their operating system.

CHAPTER -11 MULTIMEDIA

INTRODUCTION

Multimedia computing and communications are attracting a lot of interest these days. It is a term generally used to mean any application or technology that is used to manipulate text, audio, video, images and graphics. It can provide certain amount of interactivity to users. It is used extensively in education, business advertising, publishing, website design, entertainment and video games. The increasing popularity of multimedia opens up large number of career opportunities for the youth like video editor, Visual effects designer, Animator, Cartoon Animator, Software editor, Software mixer, Audio and Video Specialist, Visual effects Professional, Author, Script Writer, Set Designer, Audio Editor, 3D Animator, Character Animator, and Special Effects Manager.

Meaning of Multimedia

The term 'multimedia' means use of multiple media for communicating information. The common media used include text, graphics, animation, audio and video. Use of two or more of these media for presenting

information is, therefore, called multimedia presentation. Multimedia software can handle different types of data and hence it enhances the effectiveness of communication. In addition to different media mentioned above, the term 'media' can also be understood in terms of data representation
medium like ASCII and EBCDIC, image representation through JPEG and MPEG formats, presentation medium like paper, screen and speaker, data storage medium like floppy disk, hard disk and CD-ROM. The medium may also mean transmission medium like wired or wireless networks.

MULTIMEDIA COMPONENTS

The multimedia components include text, graphics, animation, audio and video. Two or more of these components are combined into presentations or creations for desired effects with the target audience.

Text

Text contains d .ata in alphanumeric form. Hardware required for text precessing requires keyboard, optical scanners, display screens and printers. The software required for text processing includes word processors for editing and formatting text with different fonts, hypertext features etc.

Animation

Computer animation is the use of graphic tools to create visual effects. The visual effects can be in the form of changes in shape, colour, lighting, position etc. Computer animation gives movement to objects. Graphic software is used to create such objects. Computer animation is used in cartoon films, electronic advertisements, video games and virtual reality applications. Indian mythological characters like Hanuman, Ram and Lakshman are being recreated in cartoon films with animation. Animation application areas include movies, television production, product promotions, computer based training and education, graphics in publishing, web design, virtual reality for simulations, engineering, advertising and fashion design.

Audio

Audio is an important component of multimedia. Audio or sound is produced by vibration of matter. As the matter vibrates, variations in air pressure around it is propagated in a wave like motion. Audio techniques deal with processing of these sound ·waves. Audio component deals with synthesizing, recording and play back of audio. It is extensively used in education and training software. Musical Instrument Digital Interface (MIDI) is another technology that helps in enhancing audio special effects.

Video

It is a sequence of moving images of a real life situation. Properties of human eye and neuronal processing are critical factors in video systems. With 30 frames per second, video motion appears smooth and continuous. Images Image is a spatial representation of an object. Images are represented in computer with a matrix of numeric values to manipulate pixels. That is, digital images are stored as two- dimensional array of values. Each value represents the data associated with a pixel.

Graphics

Computer graphics deal with the generation and manipulation of digital objects. The objects may be drawn with graphic software or scanned-in with digital scanners. The objects can be animated by controlling speed, portion of the total scene in view etc.

APPLICATIONS OF MULTIMEDIA

The flexibility of using different types of data for communication makes multimedia especially suitable for some applications like education, training, entertainment, advertisement, cartoon movies, video games etc.

Multimedia in education

Multimedia is particularly suitable for developing digital content for education and presenting it attractively. The students can view text in a text box which can be scrawled up and down. Simultaneously, they can listen to audio that reads out the text. Drawings and animation are used to make objects appear real life with movements.

Multimedia in Training

Another important use of multimedia is in training. Voice, text, images, movies and animation are used in developing training material. The trainees can interact with the software. Multimedia makes the presentation visually attractive and stimulates thinking.

Special effects in movies

Multimedia technology is used in movies for special effects. Movies with multimedia effects are much in demand. Jurassic park, Spiderman, Harry Potter and Titanic are examples where multimedia helps in creating special effects.

Multimedia on the web

With multimedia, emails, instant messaging and websites can be made much more attractive and lively. It can be used to enrich the content and provide interactivity for the users. It can attract more visitors to the site. The Web has become the standard medium for global communications.

Multimedia in Printing and Publishing

Multimedia is used in printing and publishing to improve quality of print and layouts. With a variety of font designs, colors, graphics etc. multimedia can be used to enhance quality of printing and publishing.

Multimedia in Designing

Computer graphics and 3-D object modeling help designing in creating designs of objects with ease. A range of colors, forms, textures and tones enable them to experiment with designs. Multimedia, thus, enables designers to give shape to their imagination virtually.

Some multimedia tools name

- Any Converter
- EDUIS Video Maker
- Total Video Maker
- Adobe Effect

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