

UNIT-1

INTRODUCTION TO COMPUTERS

1. Definition of Computer

Computer is an *electronic data processing* device, which accepts data and instructions, process the data according to given instructions and produces the desired results to the user.

1.1.1 Computer Science

It is the study of the various parts of computer systems such as Hardware, Software and humans who use them, as well as the society and organization in which they are used.

1.1.2 Characteristics of Computer

1. *Speed*: Computer is capable of doing arithmetic and logical calculations with rapid speed [in nano seconds]. The speed of the computer can be measured in millions of instructions per second (MIPS)
2. *Accuracy*: 100 % error free results by its process
3. *Storage & retrieval*: Large amount of data / Information can be recorded, stored, and retrieved in future in faster way.
4. *Diligence*: Computers can be used for continuous processes
5. *Versatility*: It can be used for various works such as Office automation, worksheet calculations, engineering drawing etc.,

1.1.3 Applications of Computers

1. **Mission control and Simulation**: Computers can be used to mission control like airplanes (auto pilot), rockets, and satellites. And computers are also used for simulations of different models of planes, ships, and vehicles before they are going to manufacture.
2. **Engineering applications**: For the purpose of Computerized design and drafting and Machine or **CAD / CAM** and for various engineering applications
3. **Accounting and Statistics**: For the purpose of accounting process such as invoices, Inventory, Pay bill and statistical calculations.
4. **Medicine**: To record and maintenance of Patients/Staff/Inventory databases and Preparation of different scanning/analysis reports.
5. **Education**: Giving of **Computer based Teaching and Training** [CBT] and providing computerized library for articles and publications.
6. **Entertainment**: Using it as an entertainment device for listening music, watching video and pictures and playing of games.

1.1.4. History of computers

The calculi

- Unknown origin

The Abacus

- From 2600 BC

Calculating machines

- Babbage and Byron in 1800s

Theory of computation

- During 1936

Programmable computers

- Aiken, 1944
- ENIAC, 1946

Store program computers

- Von Neumann, 1945
- EDSAC, 1949

Before 1976

- Mostly mainframe computers
- Very large computers
- Very expensive computers

First microcomputer

- Apple Computer Inc, 1976

8086

- IBM PC revolution, 1981
- Speed > 1000 Mhz, 2001

1.1.5. Generation of Computers

First Generation Computers (1940-1956)

- Were vacuum tube based machines
- Used magnetic drums for memory
- Input was based on punched cards and paper tape
- Output was displayed on printouts
- Relied on binary coded language (language of 0s and 1s) to perform operations
- Examples : ENIAC, EDVAC and UNIVAC
- Computation time was milliseconds
- Were very large, and required a lot of space for installation
- Were non-portable
- Were very expensive to operate and used a large amount of electricity

Second Generation Computers (1960s)

- Were based on transistor technology
- Used magnetic drums/tapes for memory
- Input was based on keypads
- Used printed displays/seven segment display screens for output
- Relied on assembly and binary coded languages
- Computation time was in microseconds
- Smaller than first generation computers
- Were movable
- Less expensive than first generation computers

Third Generation Computers (1964 to early 1970s)

- Were based on integrated circuit technology
- Used magnetic disks for memory
- They were able to reduce computational time from microseconds to nanoseconds.
- They were easily portable and more reliable than the second generation
- The size of these computers were smaller as compared to previous computers.
- Extensive use of high-level languages became possible
- Commercial production became easier and cheaper.

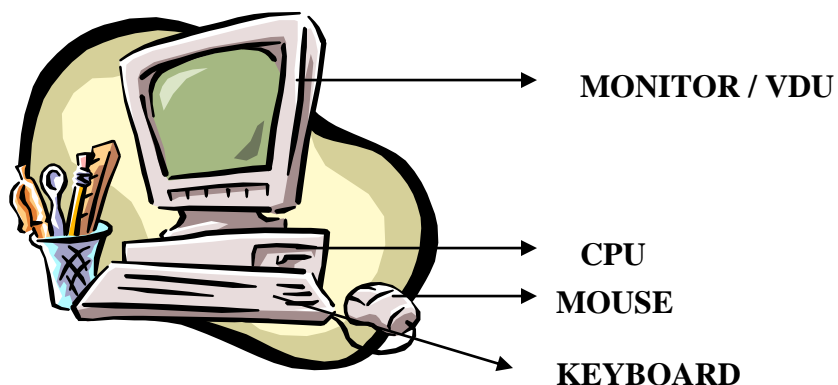
Fourth Generation computers (from late 1970s)

- Were microprocessor based systems
- Were based on VLSI (very Large Scale Integrated Ci rcuits) technology
- Using mass storage device for memory
- These computes are very small
- They are portable and quite reliable
- Interconnection of computers leads to better communication and resource sharing
- The production cost is very low
- Cheapest among all the other generations

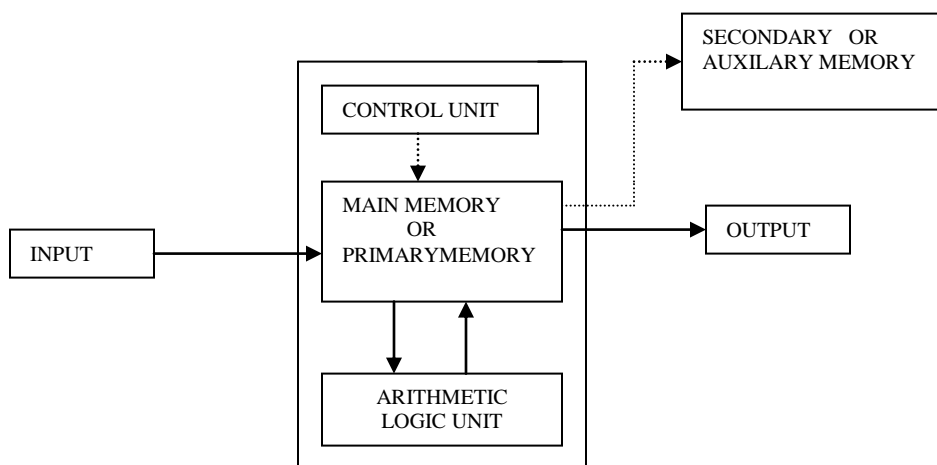
Fifth Generation Computers

- Up to fourth generation, the classification was based purely on hardware. Fifth generation computers are classified based on software also. VLSI technology is used in fifth generation computers. They have large main memories. The speed is also high. In addition to all, this fifth generation computers run software called 'expert systems'.

1.1.6 GENERAL PICTURE OF PRESENT COMPUTERS



1.2 BLOCK DIAGRAM OF A COMPUTER



1.2.1 SYSTEM UNIT (CENTRAL PROCESSING UNIT): This unit processes instructions, performs calculations and manages flow of information or data. This system unit communicates with input, output and storage devices to perform tasks (jobs). The system unit contains control unit, main or primary memory and arithmetic logic unit.

1.2.2 CONTROL UNIT: This is the administrative section of the computer. It is the computer's co-ordinator and is responsible for supervising the operation of the other sections. Control unit tells the input unit when information should be read in to the memory unit, tells the ALU when information from the memory unit should be utilized in calculations, and tells the output unit when to send information from the memory unit to certain output devices.

1.2.3 ARITHMETIC LOGIC UNIT (ALU):This performs mathematic and logic operations including calculations such as additions, subtractions, multiplications and divisions.

1.2.4 INPUT UNIT: This is the "receiving" section of the computer. Input refers to the process of entering/capturing, data, programs and commands into the main memory of a computer. This is done with input devices. The two most commonly used input devices are Keyboard and Mouse. Other forms of Input devices include joystick, touch screen and speech recognition.

Keyboard: This is the most commonly used input device and resembles the typewriter keyboard. Keyboard usually contains alphabetic keys (A to Z), numeric keys (0 to 9), special keys (ctrl, alt, esc.etc.), functional keys (F1 to F12) and cursor control keys (Up Arrow, Down Arrow, Left Arrow, Right Arrow, Page Up, Page Down).

Mouse: Mouse is optical technology pointing device used to select processing options or information on the screen it is used in the GUI (Graphical user interface).

Special purpose input devices:

MICR (Magnetic Ink Character Recognition): It reads special magnetic ink characters, which are written on bank cheques. It eliminates the need to manually enter data like amount, branch code, and account number.

OMR (Optical Mark Reading and Recognition):It reads data from specially designed forms; these are used for conducting objective type exams like Entrance exams for universities, jobs.

OCR (Optical Character Recognition): It used to read images and convert into 0s and 1s .it is also used to read data from objective type question in banking and entrance.

BARCODE READER: Small bars of vertically thicken and spacing of printed on package badges, tags etc, which are read by optical readers and converted to electrical pulses. These are used to billing, identifying goods/items automatically using computer system. Mainly used in supermarkets, big shopping complexes.



FIG :BARCODE



FIG: BARCODE READER

TOUCH SCREENS: Are devices that allow you to use a computer by touching the surface of its video display screen? They omit a grid of infrared rays, sound waves, or a slight electric current that is broken when the screen is touched.

They are used in

- Public Information Systems:
- Customer Self-Service:
- Control / Automation Systems
- Computer Based Training(CBT)

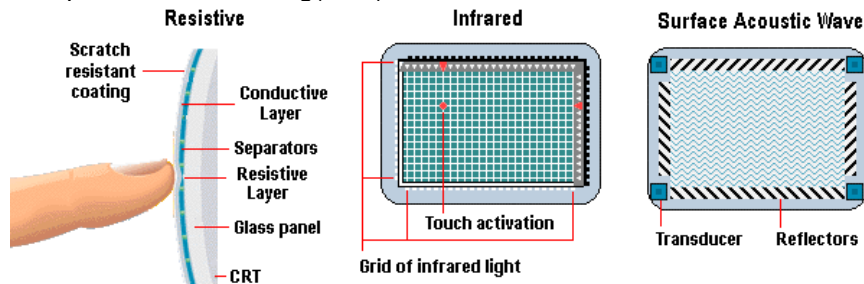


FIG: TOUCH SCREEN

SCANNERS: Which are used to scan images and pictures and convert them into computer data. Which are used in offices and DTP(DESK TOP PUBLISHING) centers.



FIG:SCANNER

TRACK BALL/JOY STICK: Which are used to play games. It converts mechanical movements into electrical pulses and transmits into computer signals.



FIG: TRACK BALL

TOUCH PADS: They are used for handheld computers or PDA personal digital assistants. They recognize and digitize hand written hand printing and hand drawing.

DIGITAL CAMERAS AND WEB CAMS: They are used to take, shoot, store and download still photos or full motion video with audio into your PC.

SMART CARDS: They are used to take data into computer like employee information in offices, corporate, industries automatically when they insert their cards into computer.

MIC AND SPEECH RECOGNISATION DEVICES: They made easy to take data entry with help of mic . They take voice input and digitize, analyze and classify the speech and its sound pattern. They need special software like voice express and via voice. Blind and other handicapped users specially use these devices.

1.4.5 OUTPUT UNIT: Output is the result of processes that are done on the computer. An Output device displays the result of processes in a language that humans or another machine can read and understand.

Output that is readable by the user can be categorized into two categories namely *hard copy* and *soft copy*. Hard copy is relatively permanent form of output that can be read immediately or stored for later use, such as paper. Printers are the most common hard copy output devices. Soft copy is a transient form of output, for example, text on a screen display (Monitor). It is lost when the computer is turned off unless it is saved on a disk.

MONITORS: Monitors are the visual output devices of computers. A monitor looks like a television and has a screen. The monitor will display what the user is doing, so he or she can see it before producing a hard copy. Two popular kinds of viewing screens are *cathode ray tubes* and *flat panel displays*.

A color monitor can display text or graphics in color. Color monitors are used very widely today. Some are capable of displaying millions of colors, more than the human eye can see, but the average monitor will display up to *256 colors* at one time.

Monochrome monitors display a single color such as green or amber on a black background or black characters on a white background. These monitors are no more in use.

CATHODE RAY TUBE

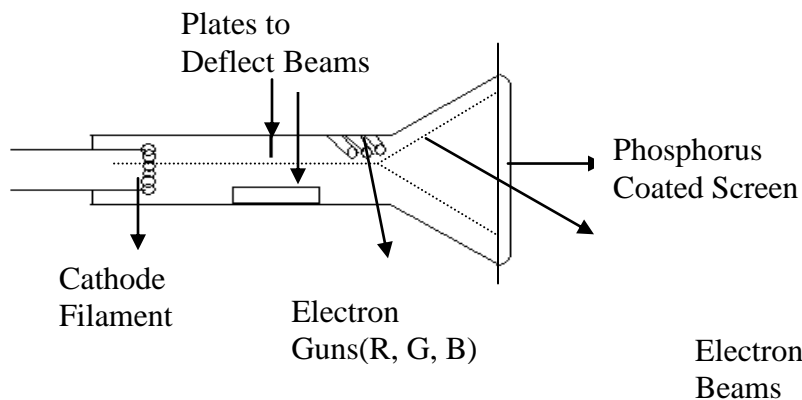


FIG: CROSS

SECTIONAL VIEW OF CRT:

The cathode ray tube contains one filament, which will produce electron beam on passing electrons (Power) then the beam is made to pass through two electron plates, one is horizontal and another is vertical, these two plates are to deflect the beams towards CRT screen. Then the three electron guns(R, G, B), which produce different colors, are mixed with these beams and hit the phosphorus-coated screen. As the ray hits the screen the phosphorous will be burnt and can be seen as illumination nothing but light.

FLAT PANEL DISPLAYS: These are mostly used for laptop computers where we need small and compact screens. This is also advanced version of the CRT tubes. Flat panel screens use LCD (Liquid Crystal Display) , Plasma ,and field emission display. This technique is mostly used in portable computers like palmtop.

PRINTERS: Printers are usually categorized under two categories namely Impact printers and Non-impact printers.

IMPACT PRINTERS: Impact printers transfer the image onto paper through a printing mechanism that strikes the paper, ribbon and character together. Most impact printers use continuous form paper, which means the paper is connected together to produce a continuous flow through the printer. Examples of Impact printers are *Dot Matrix printer* and *Band / Chain printers*.

Dot Matrix Printer/Serial Printer: Serial printer prints one character at a time, with the print head block moving across a line. They are like typewriters. These type of printers are normally very slow and in such a printer the print head block consists of array of pins.



FIG: DOT MATRIX PRINTER

Band /Chain printer:A chain printer has a steel band on which the character sets are embossed. The band is rotated at a high speed, as the band rotates a hammer is activated when the desired character as specified in the buffer register comes in front it. The advantage of chain/ band printer is with which chains may be changed.

NON-IMPACT PRINTERS: Non-Impact printing means that printing occurs without having a mechanism to strike the paper. Ink can be sprayed against the paper or heat and pressure used to fuse a fine black powder into the shape of a character. Examples of Non-Impact printers are *Ink-Jet printers, Laser printers*, etc.,

Z

Ink-Jet printers: An electronic controlled cartridge (ink toner) that sprays the ink on the paper with the help of nozzle in the desired character/symbol.



FIG :INK-JET PRINTER

Laser printers:An electronically controlled laser beam traces out the desired character to be printed on a photoconductive drum. The drum attracts an ink toner on to the exposed areas. This image is transferred to the paper which comes in contact with the drum. These printers give excellent outputs and can print a variety of fonts/symbols.



FIG: LASER PRINTER

Comparison of printers:

Printer type	Speed	Quality	Cost
Dot Matrix	100 haracters/sec	Average	Low
Chain printer	100 lines/min	Average	High
Ink-Jet	100 haracters/sec	Good	High
Laser Printers	10-100 pages/min	Very Good	Very High

PLOTTERS: Plotters are special purpose output devices to produce good quality drawings and graphs. There are two types of plotters one is “Drum plotter”, and another is “Flatbed plotter”. The latest plotters can produce colored graphical outputs. Plotters are mostly used in the fields of engineering, geology etc



FIG : MODERN PLOTTER

1.3 MEMORY DEVICES:

1.3.1. Main Memory (Primary Memory): This is the rapid access; relatively low capacity warehouse section of the computer. It retains information that has been entered through the input unit so that the information may be made immediately available for processing when it is needed. This memory is also called as temporary memory. When ever power failure occurs or if you shutdown the computer the data or instructions in this memory will be erased.

The basic unit of memory is a byte, which consist of eight bits. A bit is the smallest piece of data that a computer can process. The size of main memory is measured in kilobytes or megabytes. A kilobyte (K or KB) is 1024 bytes and a megabyte is 1024 kilobytes.

The two most common types of memory chips are *Random Access Memory* (RAM) and *Read Only Memory* (ROM). A third memory type is a cache memory that complement RAM.

RANDOM ACCESS MEMORY (RAM): RAM is the name given to integrated circuits, or chips, that are used for main memory. This memory can be accessed in any order (can be stored and erased at any time) and It is the *temporary memory* that allows you to run applications. When a computer is turned off, data stored in RAM memory is erased, therefore RAM is volatile /temporary. Programs that need to be saved should be transferred to secondary storage before the power is turned off. This is one of the many reasons why a computer has to be properly shut off before the power button is turned off. **RAM** stores System Software or Operating System, Data and Instructions.

READ ONLY MEMORY (ROM): ROM is the name given to a chip that store information or instructions written in machine language. When we power On the computer this **ROM** will run for *Power On Self Test* (POST), which means testing whether necessary current is flowing through the computer and also it will check for the necessary hardware is connected to the computers. It is also called non-Volatile memory.

CACHE MEMORY: Cache memory is a complimentary memory to RAM. It generally increases the speed at which data and instructions can be accessed and therefore the speed at which the task is completed.

STORAGE DEVICES: To store data permanently in the memory we need to go for secondary memory. This concept is achieved by storing data in secondary storage devices. Secondary storage devices are also called as auxiliary storage and these devices are detachable and or can be inserted when there is a need. The data and programs that are stored in secondary storage devices will be retained even though the computer is switched off. The size of storage devices differs according to the users requirement.

The several types of storage devices are

- Hard disk
- Floppy disk
- Compact disk (CD)
- Zip disk
- Magnetic tapes

- Memory stick

HARD DISK: Hard disk is a very important secondary storage device. This contains multiple magnetic disks that allow data to be directly retrieved without searching through the entire contents of the disk. Hard disk transfers data to the CPU much faster than the other secondary devices. Usually hard disks are permanently mounted (fixed) inside the CPU. Hard disk capacity is usually measured in terms of MB, GB and TB. The access time of hard disk is 10 to 100 milliseconds. Data can be accessed faster in hard disk compared to other storage devices. This is used to store operating system and user data.

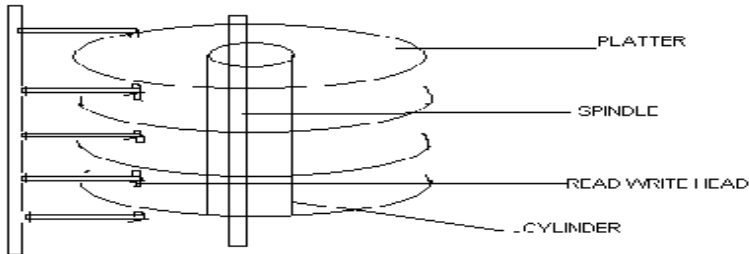


FIG: HARD DISK



FIG: CROSS SECTION VIEW OF HARD DISK

FLOPPY DISK: Floppy disks are also a kind of magnetic disk, but they store much less data when compared to hard disk and they are much sensitive to damage, cheaper and they will be easily effected to virus, and takes more time to access data through the cpu when compared to the time taken by the hard disk through the cpu .The most common size of a floppy is 3.5 inches with storage capacity of 1.44 mega bytes (MB) or 2 MB depending on the type. 1 basically determines the access time for data stored on a disk. Seek time 2. Latency time.

Seek time: The time required to position a head over the proper track.

Latency time: The time required to spin the needed data under the head.

The average access time for floppies is usually 60 to 600 milliseconds.

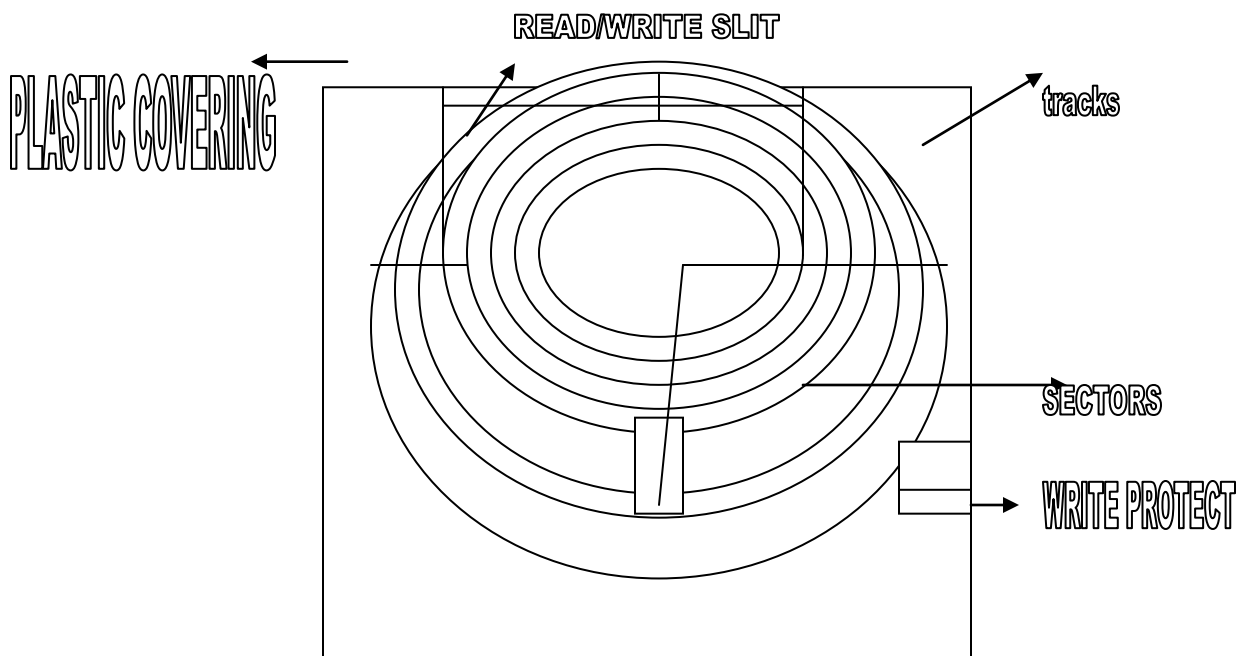


FIG: FLOPPY DISK

COMPACT DISK (CD): Compact disks (CD's) are used to store large amount data when compared to floppy disks. CD-ROM stands for Compact Disk Read Only Memory. A CD-ROM uses optical technology to read and write data such as audio,video and text files. The storage capacity of CD-ROM is about 600-850 MB and to store data on a CD-ROM we require CD-Writer ,But most computers will have only CD-Reader to retrieve data.

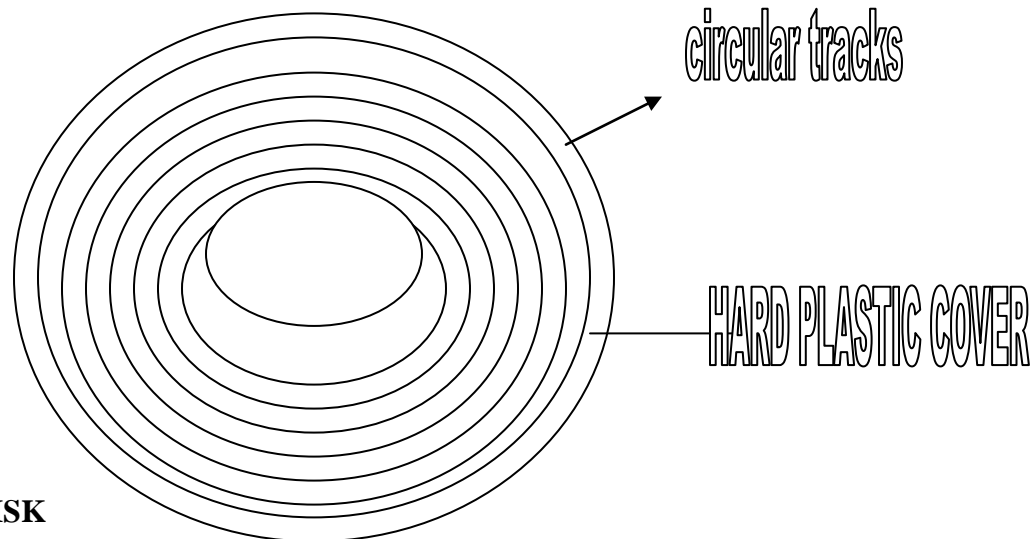


FIG: COMPACT DISK

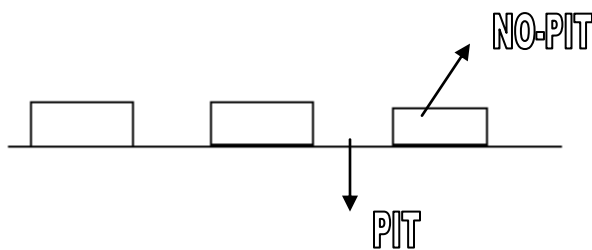


FIG: CROSS SECTIONAL VIEW

ZIP DISKS: Zip disks are essentially small removable disks with an access speed that is higher than that of floppy disks, but lower than that of hard disks. Zip disks are the disks, which will store the data in a compressed format, and these disks can store data up to 100 MB. These disks are used to store generally back up data. And the needs of zip disks are occurred because of larger size of programs and files.



FIG:ZIP DISK

MAGNETIC TAPES: Magnetic tapes are far cheaper when compared to all other storage devices. They can store more information depending on the capacity of the tape. As most of the Secondary storage devices will work on this mechanism can be used on both input and output devices. The main draw back of magnetic tapes is accessing of information is very slow when compared to all other secondary storage devices because it

strictly follows sequential access to the medium. Cartridge tape is the cheapest type of storage available. And it is basically used for back ups of direct access disk files.

MEMORY STICKS: Memory sticks are more compatible, flexible and portable storage devices. It looks like a pen and it can be easily inserted and removed into the system using USB (Universal Serial Bus) port. So it is called external and removable memory device. Memory stick can store more information (250 MB and more) than a floppy disk and it is easy to carry .



FIG: MEMORY STICK

1.4 Types of computers: There are different types of computers based on their technology. They are digital computers, analog computers and hybrid (combination of digital and analog) computers.

1.4.1.1: Digital computers: Digital computers are operated using binary codes (0 & 1) by means of counting and taking the samples in discrete form. These are used for solving arithmetic equations and logical expressions. These computers are very fast in performance and gives accurate results.

Note: Most of the computers that are used in day-to-day life are digital computers. Ex: pocket calculators, palmtops, etc.

1.4.1.2: Analog computers: Measuring quantities, which are in terms of analog signals in the continuous form, operates Analog computers. These are mainly used in scientific applications. These computers are not that much fast and accurate as compared to digital computers. These computers accept data in continuous form and gives sampled results. Ex: Ammeter, speedometer, telephone billing machine, etc.

1.4.1.3 Hybrid computers: Hybrid computers are the combination of both analog and digital computers, which are used, in scientific and robotic applications where we need both kinds of technologies.

Ex: robots

1.4.2 Classification of computers: There are different ways in which computers can be distinguished. Their purpose, design, capacity, etc.

1.4.2.1 Micro Computer: These are the smallest types of computers in terms of size. These are the familiar personal computers used in offices and homes. Their size may vary from the notebook size to desktop versions. It has all the functional components of large computer like microprocessor, memory chips, etc. All the systems, which we are using now in homes, offices, colleges for inventory and payroll calculations come under microcomputer category. They have 16-bit and more processor with processing speed of 0.5 MIPS (million instructions per second).

Ex: IBM think pad, NOTEBOOK PC, desktop computer etc.

1.4.2.2 Mini Computers: The definition of mini computer was originally given as a small general-purpose computer about the size of a file-drawer cabinet. These are much more advanced than microcomputers and which are generally used in networking environment for distributed data processing among other several computers. Many large companies/industries have branches in different locations have large computer (SERVER) in their main office; the computer is connected to mini computers in the various branches. These

are also called as mid-range computers and specifically used in manufacture, control, and scientific research. They have 16-32 bit processor with processing speed of 0.25 MIPS. Ex: IBM, AS-400.

1.4.2.3 Main Frame Computers: A computer generally more powerful than a typical mini computer is now called as mainframe computer. These machines can also enable a few hundreds of users to work concurrently from their terminals. These computers are used for solving large, computation intensive scientific, engineering, and business problems. They have processors with 32-60 bits with processing speed of 10 MIPS. Ex: IBM-9000, UNIVAC-1100.

1.4.2.4 Super Computers: super computers are the most powerful and most expensive computers manufactured today. In these computers can perform billions of calculations in a very high degree of accuracy. These computers are used in weather prediction, nuclear research, advanced scientific and engineering research. They are also called parallel systems with more number of processing units. They have processor with 64-96 bits with processing speed of 100 MIPS. Ex: CRAY 1(USA), PARAM (INDIA).

INTERNAL HARDWARE

Internal bus system – CPU structure – bus system - bus size – speed – capacity - smps – ports – mother board – post and booting

CPU Structure

The strategy adopted is to draw a relatively detailed conceptual diagram of the components followed by a photograph. This is expected to impart an understanding of the operation of the components followed by an impression of the physical appearance of the components. We will start with the C.P.U.

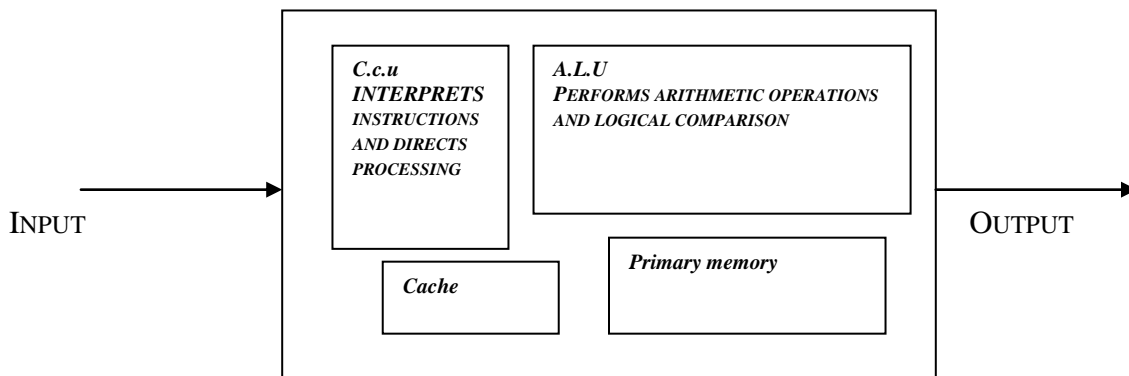


FIG: CENTRAL PROCESSING UNIT

Physically the C.P.U consists of the primary memory and microprocessor. The primary memory is made up a group of ROM and RAM chips. The microprocessor often wrongly referred as the C.P.U is a single physical unit that fulfills the functions of the A.L.U and the C.C.U. It contains registers and cache memory. Registers hold data immediately being processed by the A.L.U. Cache holds instructions and data that is expected to be

executed next. The microprocessor is about the size of a stamp. Examples of microprocessors include AMD (Advanced Micro Devices) Athalon, AMD Duron, Pentium (P1, P2, P3, P4, P5) series and Motorola 6800.

Consider the transmission of a word between the microprocessor and another component.

The processor must identify the component with which communication is required. It must also declare the nature of the communication. For example whether it wants to read from or write to the component. Finally it must also give the address, Internal to the component, to read from or write to. The component will then WRITES to the specified address (if the command was a write command) or retrieve and transmit the data (if the command was a read command).

2.1 BUS: Communication between components of a computer takes place via the system bus. The system bus contains three other buses, the address bus, the data bus and the control bus.



2.1.1 Data Bus: The data bus carries data between components. It is made up of a set of parallel lines of electrical conductors. This allows the transmission of all the bits of a word simultaneously. So the number of lines, also known as the bus size, is equal to the number of bits in a word. A bit is transmitted as a single electrical pulse.

2.1.2 Address Bus: A word is not only the smallest addressable memory unit but also the unit in which data is transmitted. Before the word is transmitted the address from which it must be fetched or to which it is written must be specified. It is the function of the address bus to transmit this address to the relevant component.

2.1.3 Control Bus: This bus carries control commands such as READ, WRITE, and START, AND SEEK STOP, e.t.c from the processor to I/O components and memory. It also carries status information from the I/O units to the processor.

Bus Size: The size of a bus is the number of bits it can send simultaneously. This is equal to the number of parallel lines that make up the bus.

Bus Speed.: The speed is the number of bits that a bus line can transmit in a specified time, normally a second. This is measured in Mega Hertz. A Mega Hertz is one Million bits/cycles per second. The speed is also equal to the number of words that the bus can transmit in a second.

Bus Capacity: This is the product of the Bus Size and Bus Speed. The bus capacity is really the number of bits a bus can transmit in a second.

Note: The Data, Address and Control buses are collectively known as the System Bus.

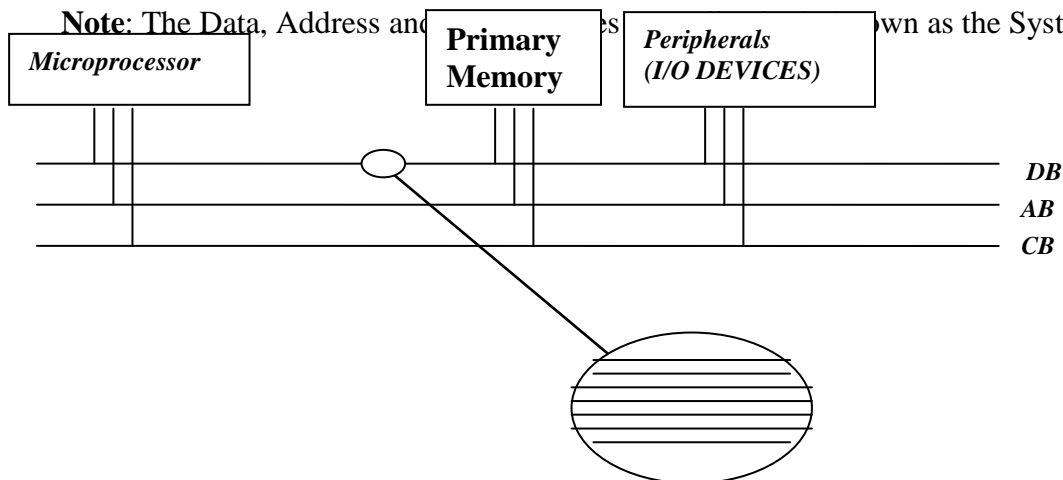


FIG : (DB-Data Bus, AD-Address Bus, CB- Control Bus)

Each bus is made of many parallel communication lines.

2.2 Power supply unit: The components of a computer cannot run on the voltage supplied by the mains. This is because the voltage is too high (240 V) and alternates (A.C). The voltage required by components of a computer ranges from about 12 volts to a fraction of a volt. The power supply unit also known as a switch mode power supply/Symmetric Multiplexing Power Supply (SMPS) takes power directly from the mains at 110V-240V and reduces this to a set of voltages. It distributes the voltage (power) to each component according to its requirement.

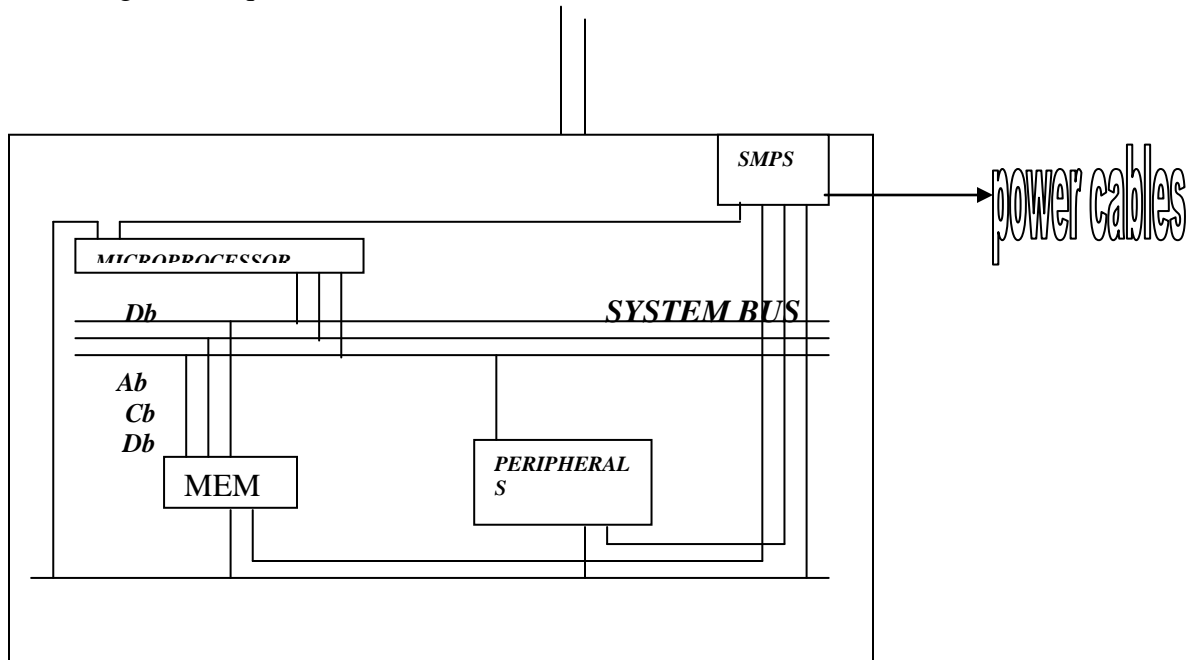


FIG: THE MOTHERBOARD AND BASIC COMMUNICATION CHANNELS BETWEEN COMPONENTS AND POWER DISTRIBUTION.



Port

FIG: POWER DISTRIBUTION TO THE COMPONENTS

2.3 PORTS: A port is a connection point for a peripheral device. It is like a plug that connects a device to the C.P.U. The keyboard, mouse and other peripheral devices are connected to the motherboard via ports.

There are two types of ports, serial and parallel ports. Serial ports transmit the bits one after the other i.e. sequentially. This requires a single transmission channel between components. Parallel ports transmit several bits at a time, which require several lines between components. A SERIAL PORT CONNECTS A KEYBOARD TO THE C.P.U. while a parallel port connects a printer. Normally a port will serve a particular device. So a keyboard port cannot be used to connect a mouse however a Universal Serial Bus or commonly USB is designed for different devices.

2.4 Motherboard: The electrical components of a computer are very delicate and generally susceptible to damage. Dust, vibrations, static electricity e.t.c can easily damage the components. The motherboard is a board on which most components are mounted. Devices that are not installed directly on the motherboard are linked to it by a cable or expansion cords or connected via a port. The motherboard also offers a platform on which the communication channels (buses) are etched, making the computer compact and less prone to short circuit. The main purpose of a motherboard is to facilitate proper location and connection of all delicate components of the Computer

Inside the Case

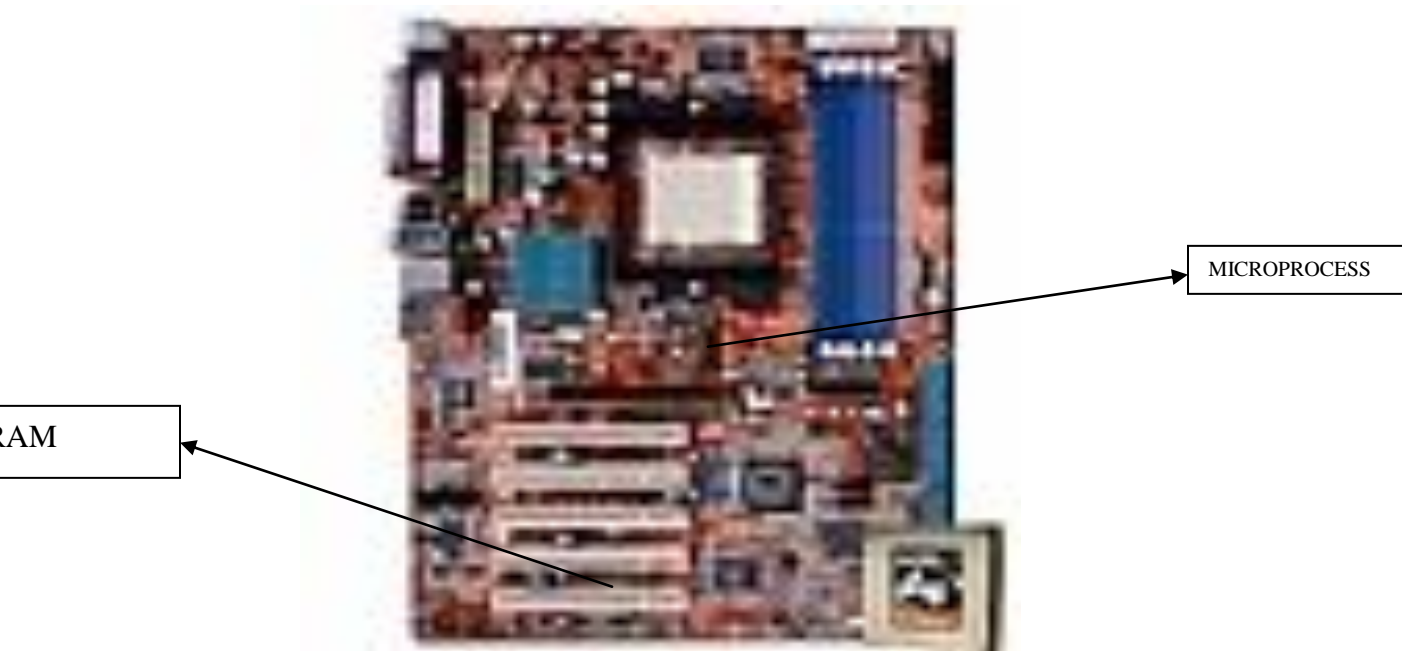
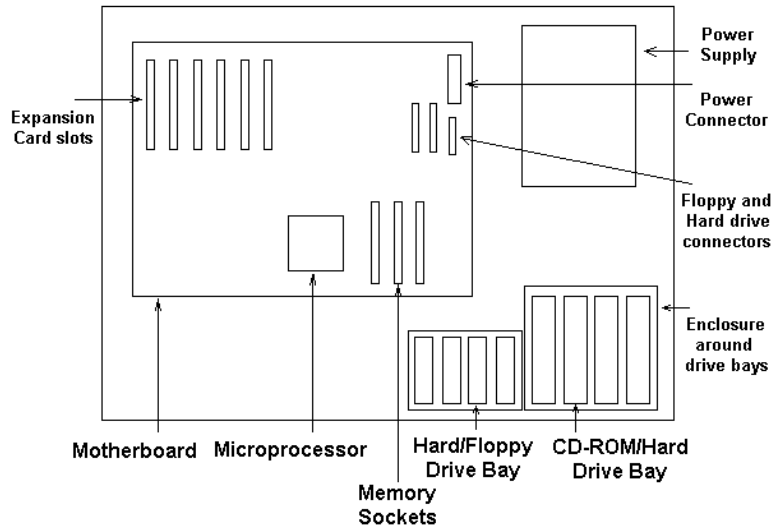


FIG: MOTHER BOARD

FIG : THE MOTHERBOARD AND THE OTHER MAJOR COMPONENTS IN THE A CASE.

Expansion slots: are used to add more /advanced hardware components to the system in future for the up gradation of the system. For example we can add additional hard disk/additional RAM.

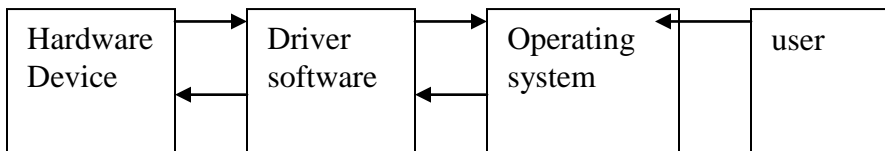
2.6 MICROPROCESSOR: It is made up of silicon chips and collection of integrated circuits, semiconductors. It is the main part of C.P.U. Every instruction either from user or operating system will be

executed by processor with the help of registers and buses for transferring of instructions from different units. Processor will instruct as well as take data from different units for execution and error handling.

Ex: Motorola, AMD, Intel 8086,186,286,386,486,586. The other name for these versions is P1, P2, P3, P4, and P5.

2.7 REGISTERS: It is made up of circuits, which will work as temporary storage locations, which are fixed on the microprocessor for storing data, addresses and instructions that are to be used by microprocessor

DRIVERS: Driver is a software it is used as a interface between the actual hardware device and the operating system. In every system there are different drivers for different hardware components. For example printer drivers, mouse drivers, key board drivers, hard disk drivers.



BOOTING: Booting is the first step when we switch on the computer every time and it is a process of loading the operating system into random access memory. During booting , the OS, driver files, library files, will be loaded .

POST: POST stands for Power On Self Test. This process is used to check the system and all the connecting devices and making the initial configuration checking's before starting up of booting process. This process is done by software, which is stored in ROM.

UNIT - II NUMBER SYSTEMS

DATA REPRESENTATION

BIT:

Digital computers use the binary number system, which has two digits 0 and 1. A binary digit is called a bit.

Byte:

8bit = 1byte. The data bus consists of 8 lines. The information contained in the data bus is called a byte.

Word:

A memory unit stores binary information in groups of bits called words. A memory word is a group of 0's and 1's and may represent a number, an instruction code, alphanumeric character or any other binary-coded information.

NUMBER SYSTEM:

DECIMAL	BINARY	OCTAL	HEXADECIMAL
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

DECIMAL TO BINARY CONVERSION

$$(19)_{10} = (?)_2$$

2	19	
9	1	↑
4	1	
2	0	
1	0	

Collecting the remainders in the reverse, we get $(10011)_2$

DECIMAL TO OCTAL CONVERSION

$$(26)_{10} = (?)_8$$

8	26	
3	2	↑

$$(32)_8$$

DECIMAL TO HEXADECIMAL CONVERSION

$$(213)_{10} = (?)_{16}$$

$$\begin{array}{r|l} 16 & 213 \\ & 13 \\ & 5 \\ & D \end{array} \uparrow$$

$$(D5)_{16}$$

BINARY TO DECIMAL CONVERSION

$$(10011)_2 = (?)_{10}$$

$$\begin{aligned} 10011 &= 1 * 2^4 + 0 * 2^3 + 0 * 2^2 + 1 * 2^1 + 1 * 2^0 \\ &= 16 + 0 + 0 + 2 + 1 \\ &= 19 \end{aligned}$$

$$(19)_{10}$$

OCTAL TO DECIMAL CONVERSION

$$(756.52)_8 = (?)_{10}$$

$$\begin{aligned} 756 &= 7 * 8^2 + 5 * 8^1 + 6 * 8^0 \\ &= 448 + 40 + 6 \\ &= 494 \end{aligned}$$

$$(494)_{10}$$

HEXADECIMAL TO DECIMAL CONVERSION

$$(3FC.8)_{16} = (?)_{10}$$

$$\begin{aligned} 3FC &= 3 * 16^2 + 15 * 16^1 + 12 * 16^0 \\ &= 3 * 256 + 15 * 16 + 12 * 1 \\ &= 768 + 240 + 12 \\ &= 1020 \end{aligned}$$

HEXADECIMAL TO BINARY CONVERSION

$$(64)_{16} = (?)_2$$

Take each hexadecimal value and convert it into 4bit binary value

$$(64)_{16} = (0110 0100)_2$$

OCTAL TO BINARY CONVERSION

$$(32)_8 = (?)_2$$

Take each octal value and convert it into 3bit binary value

$$(32)_8 = (011\ 010)_2$$

BINARY TO HEXADECIMAL CONVERSION

To convert a binary number to hex, we have to arrange the bits into group of 4 bits starting from LSB (Least Significant Bit). If the final group has less than 4 bits, just include zeros to make it a group of 4 bits.

For decimal value arrange the bits into group of 4 bits starting from MSB (Most Significant Bit).

$$(11111111)_2 = (?)_{16}$$

$$(0111\ 1111) = (7F)_{16}$$

BINARY TO OCTAL CONVERSION

To convert a binary number to octal, we have to arrange the bits into group of 3 bits starting from LSB (Least Significant Bit). If the final group has less than 3 bits, just include zeros to make it a group of 3 bits.

For decimal value arrange the bits into group of 3 bits starting from MSB (Most Significant Bit).

$$(11111)_2 = (?)_8$$

$$(011\ 111) = (37)_8$$

HEXADECIMAL TO OCTAL CONVERSION

To convert a value from hexadecimal to octal we have to follow these steps

- convert a given hexadecimal value to binary
- convert the binary value again to octal

$$(AF)_{16} = (?)_8$$

$$\begin{aligned}(AF)_{16} &= (1010\ 1111)_2 \\ &= (010\ 101\ 111) \\ &= (2\ 57)_8\end{aligned}$$

OCTAL TO HEXADECIMAL CONVERSION

To convert a value from octal to hexadecimal we have to follow these steps

- convert a given octal value to binary
- convert the binary value again to hexadecimal

$$(32)_8 = (?)_{16}$$

$$\begin{aligned}(32)_8 &= (011\ 010)_2 \\ &= (0001\ 1010) \\ &= (1A)_{16}\end{aligned}$$

UNIT – III: SYSTEM SOFTWARE

System, application software and operating system – introduction – functions of operating system – examples of operating system - languages – generations of languages - compilers and interpreters.

SOFTWARE: We know that computer is a set of hardware components integrated together but the entire functionality of the computer is done by set of instructions called **program** and these set of programs is called **software**, which is used for maintaining, co-ordination and communication between all the hardware components.

The computer software may be classified into two broad categories, called **System software and Application software**.

System software: It is a set of general programs written for the system, which provide the environment to facilitate the writing of the application software and maintaining the system resources and files. Ex: Operating systems like DOS, Windows2000, and Linux etc.

Application software: It is a set of programs to carry out operations for a specific application. Ex: To solve set of equations, process exam results.

Application software is further classified into packages and languages.

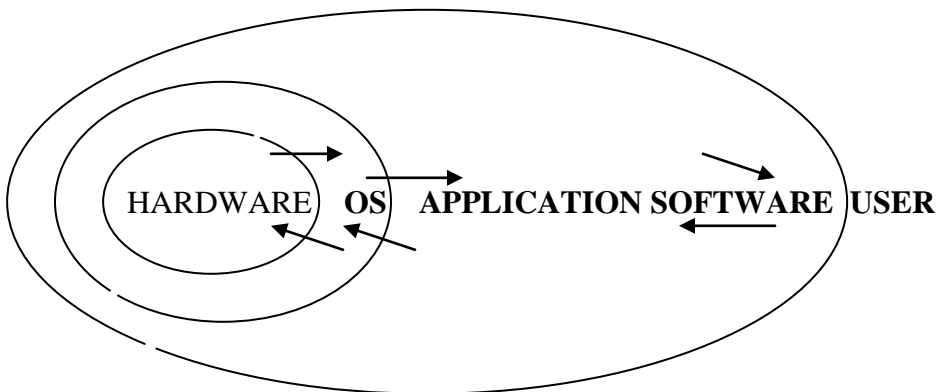


FIG: Interface between user, application S/W, OS and Hardware

Program: It is a set of sequential/ordered instructions to solve specific problem.

Software: Software is a collection of programs for solving any specific application.

Languages: Languages are more powerful when compared to packages because languages are used to develop some application software and system software.

Ex: Basic, C-Lang, C++, COBOL, JAVA, Python etc.

Package: Package is pre-developed software for solving specific applications like word processing, hotel billing systems, accounting, games etc.

Operating system: Definition:

An operating system is a program that acts as an intermediary between a user of a computer and the computer hardware. The purpose of an operating system is to provide an environment in which a user can execute programs in a convenient and efficient manner. It controls and co-ordinates the operations of a computer system.

The operating system must ensure the correct operation of the computer system to prevent user Programs from interfering with the proper operation of the system, the hardware must provide appropriate mechanisms to ensure such proper behavior.

The operating system provides certain services to programs and to the users of those programs in order to make the programming task easier. The specific services provided will of-course differ from one operating system to another, but there are some common classes of services that we identify and explore. An operating system is an important part of almost every computer system. A computer system can be divided roughly in to four components.

- 1) Hardware
- 2) Operating system
- 3) Application programs
- 4) Users

It is shown in the following. Fig

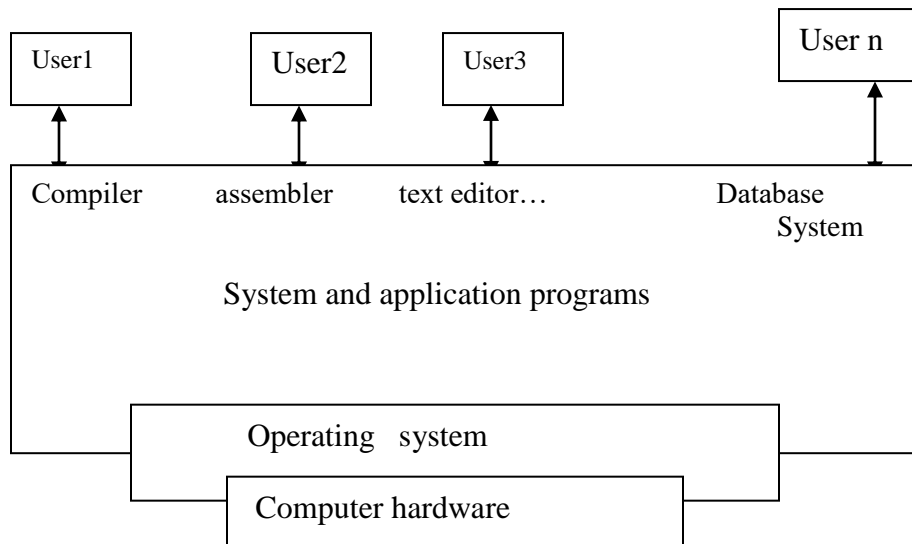


Fig: Abstract view of the components of a computer system.

The hardware – the central processing unit (CPU), the memory, and the input/output devices – provides the basic computing resources.

The application programs such as compiler, database system, games and business programs define the ways in which the resources are used to solve the computing problems of the users. There may be many different users (people, machines other computers) trying to solve different problems. Accordingly, there may be many different application programs.

We can view an operation system as a resource allocation. A computer system has many resources (hardware and software) that may be required to solve a problem: - CPU Time, memory space, I/O device and so on. The operation system acts as the manager of these resources and allocates them to specific programs and users as necessary for tasks.

NEED OF AN OPERATING SYSTEM: An operation system is a control program. It is needed to control the various I/O devices and user programs. A control program controls the execution of user programs to prevent errors and improper use of the computer. It is especially concerned with the operation and control of I/O devices.

GOALS OF AN OPERATING SYSTEM: The primary goal of an operating system is Convenience for the user. This goal is important for small personal computers. The secondary goal of an operating system is efficient operation of the computer system. This goal is important for large, shared multi user system.

FUNCTIONS OF OPERATING SYSTEM: An operating system provides an environment for the execution of programs. The operating system provides certain services to programs and to the users of those programs. The specific services provided will, differ from one operating system to another, but there are some common classes that we can identify. These operating system services are provided for the convenience of the programmer to make the programming task easier.

Program execution: The system must be able to load a program into memory and to run it. The program must be able to end its execution, either normally (or) abnormally (indicating error)

I/O operations: -A running program may require I/O. This I/O may involve a file or an I/O device. For specific devices, special functions may be desired (such as rewind a tape drive, or blank the screen on a CRT) for efficiency and protection; users usually cannot control I/O devices directly. Therefore the operating system must provide some means to do I/O.

File-system manipulation: -The file system is of particular interest. It should be obvious that programs need to read and write files. They also need to create and delete files by name. The operating system is responsible for the following activities in connection with file management.

- The creation and deletion of files
- The creation and deletion of directories
- The support of primitives for manipulating files and directories
- The mapping of files onto secondary storage

Communications: There are many circumstances in which one process needs to exchange information with another process. There are two major ways in which such communications can occur. The first takes place between processes executing on the same computer. The second takes place between processes executing on different computer systems that are tied together by a computer network. Communications may be implemented via shared memory, or by the technique of message passing, in which packets of information are moved between processes by the operating system.

Error detection: The operating system constantly needs to be aware of possible errors. Errors may occur in the CPU and memory hardware (such as a memory error or a power failure) in I/O devices (such as a parity error on tape, a connection failure on a network, or lack of paper in the printer) or in the user program (such as an arithmetic overflow, an attempt to access an illegal memory location, or a too great use of CPU time). For each type of error, the operating system should take the appropriate action to ensure correct and consistent computing.

In addition another set of operating-system functions exists not for helping the user, but rather for ensuring the efficient operation of the system itself. They are:

Resource allocation: -When there are multiple users or multiple jobs running at the same time, resources must be allocated to each of them. Many different types of resources are managed by the operating system. Examples for Resources are CPU cycles, main memory, file storage and I/O devices etc.

Accounting: -Operating system helps us to keep track of which users use how much and what kinds of computer resources. This record keeping may be for accounting so that users can be billed (or) simply for accumulating usage statistics. Usage statistics may be a valuable tool for researchers who wish to reconfigure the system to improve computing services.

Protection: If a computer system has multiple users and allows the concurrent execution of multiple processes, then the various processes must be protected from one another activities. Protection refers to a mechanism for controlling the access of programs, processes, or users to the resources defined by a computer system. Protection involves ensuring that all access to system resources is controlled. Security of the system from outsiders is also important. Operating systems provides security to access the resources by each users have to authenticate himself or herself to the system, usually by means of a password.

EXAMPLES OF OPERATING SYSTEMS:

- 1) **MS-DOS** (Microsoft-Disk operating system): Microsoft Corporation develops it. It is the most common system for 16-bit microcomputers. DOS is a single user and single programming operating system.
- 2) **Windows-95:** It is developed by Microsoft Company, which is more user friendly with graphical user interface (GUI). Because of this feature the operating system has become more popular and claimed major role in improvement of computer usage in industry. Windows is a multi-user and multi-programming operating system.
- 3) **Windows-98:** It is the enhanced version of win-95. It supports more security and extra features were added in order to provide more convenience to the user.
- 4) **UNIX:** Ken Thompson of the Research Group at Bell Laboratories developed UNIX operating system. UNIX is a multi-programmed system. It is mainly designed for multi user purpose. It is one of the powerful operating system.
- 5) **LINUX:** LINUX is another UNIX-like system that has gained popularity in recent years. It is a multi user, multitasking system with a full set of UNIX-compatible tools. It runs on a variety of other platforms.
- 6) **Windows-NT:** Microsoft designed Windows-NT to be an extensible, portable operating system, able to take advantage of new techniques and hardware. It is a multitasking operating system for modern microprocessors. It is mainly used for client-server Applications. Windows NT is more suitable as server operating system and mostly used in networking environments.
- 7) **Windows-2000:** This is another version of Microsoft windows product. It has more enhanced features. The successors of Windows 2000 were, windows ME, XP and recently vista and Windows 7 are released.
- 8) **Mac:** It is developed at Carnegie Melon University. It is further developed by Apple incorporation, Inc or USA. It is otherwise known as mackintosh operating system. It incorporates multiprocessing and GUI support.

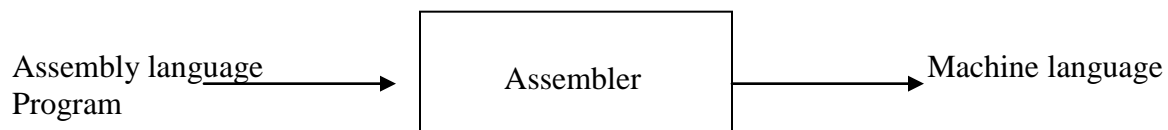
UNIT IV – INTRODUCTION TO LANGUAGES AND ALGORITHM & FLOWCHARTS

LANGUAGES:

GENERATIONS OF LANGUAGES: Computer languages are divided into different generations based on their programming concepts like flexibility, reusability, modular design, machine independent, user friendly, etc.

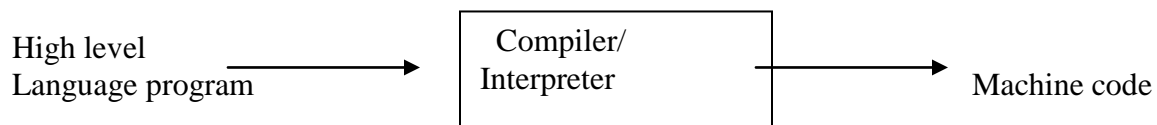
IST GENERATION: In first generation people used to operate/ instruct the computer using binary codes (1 & 0). These binary codes are called as machine code and the language is called as **machine language**, but the users found it very difficult to interact with the computer using this language unless they are having good knowledge in the hardware.

IIND GENERATION: The first step in the evolution of programming languages was the development of what is known as **Assembly language**. In an assembly language mnemonics are used to represent operation codes and strings of characters to represent address. The objective of assembly language is to replace each machine code with an understandable mnemonic, therefore it is more machine dependent and it require assembler to convert assembly language (source programming) into equivalent machine language (binary codes).



IIIRD GENERATION LANGUAGE: These languages are also called as high-level languages because they appear as simple English statements and provide more flexibility to develop application software and system software. These languages are user friendly in the sense they provide help and this generation languages having the unique feature of modular coding (top down and bottom up) approach, which provides the convenient coding mechanism and procedure oriented. This 3rd generation languages are easy to learn and implement when compared to previous languages. These generation languages are required a unique component/software called “Compiler/Interpreter” to convert high-level language into low level (machine codes).

Ex: C, Pascal, FORTRAN, COBOL, BASIC, etc.



IVTH GENERATION LANGUAGE: This generation language is also called as high level language but in this generation more advanced features like object oriented, code reusability, write once run anywhere (WORA), GUI oriented, user friendly.

Ex: OOP with C++, JAVA, VB.

COMPILER: Converts high-level language into machine language whole at a time.

Ex: COBOL, C compilers.

INTERPRETER: Converts high-level language into machine language line by line.

Ex: basic interpreter.

ABBREVIATIONS:

BASIC: Beginners all purpose symbolic instruction and code

COBOL: Common business oriented language.

FORTRAN: Formula translator

GUI: Graphical User Interface

WORA: Write once run anywhere.

OOP: Object oriented programming .

VB: Visual Basic.

ALGORITHM-FLOWCHART

ALGORITHM: Algorithm is an order / sequence of steps used to solve a given problem. An algorithm can be defined as a finite number of well-defined procedural steps to solve the problem. If algorithm is not effective it will lead to infinite steps without giving result.

CHARACTERISTICS OF ALGORITHM: - A well-defined algorithm has **five** basic characteristics.

1. **Input:** Every Algorithm must accept with required input data. Ex.: Read N, Sum;
2. **Output:** Every Algorithm will have one or more outputs. Ex.: Print N, Sum;
3. **Definiteness:** - Every step must be clear, well defined & precise. There should not be any ambiguity.
4. **Finiteness:** - An algorithm must always terminate in finite time & finite number of steps. It should not enter an infinite loop.
5. **Effectiveness:** - The steps must be sufficiently basic, so that the calculation can be performed normally.

1. Write an Algorithm to calculate the area & circumference of a circle.

Step 1. **Start**

Step 2. Read the value of Radius as **R**

Step 3. Compute **Area = 3.142 * R * R** [Area of circle is calculated by using the formula = πR^2]

Step 4. Compute **Circum = 2 * 3.142 * R** [Circumference of a circle is calculated by using the formula = $2\pi R$]

Step 5. Print the results **Area and Circum**

Step 6. End of algorithm [STOP]

2. Find the largest number among three numbers

Step 1. Start

Start 2. Read 3 numbers as A, B, C

Step 3. Compare A with B and C like If $A > B$ then followed by $A > C$

Step 4. If the conditions are true, then print "A is large"

Step 5. If $A > B$ condition is False then compare $B > C$ then Print "B is large" when the condition is true otherwise Print, "C is large".

Step 6. End of algorithm [STOP]

3. Find the sum of First N Natural Numbers

Step 1. Start

Start 2. Read N value

Step 3. Set Sum equal to 0 i.e., $\text{Sum} \leftarrow 0$

Step 4. Compute the sum of all N numbers from 1 to N as

For I = 1 to N in step of 1

Then Sum = Sum

5. Print Sum of N Natural Numbers = Sum

Step 6. End of algorithm [STOP]

FLOWCHART: Flowchart is a representation of graphical /pictorial form of an algorithm.

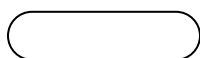
Types of Flowcharts: i. Program flowchart ii. System flowchart

I) PROGRAM FLOWCHART: Program Flowchart specifies the flow of operations of an algorithm graphically. It illustrates pictorially how the program instructions or operations flow in a sequence; when the sequence of execution of instructions changes.

But program flowchart never specify the computer environment in which the program will be executed i.e., it will not show whether the program is stored on magnetic disk, whether data will be coming in from keyboard /disk and the results or output are printed out on printer etc.,

II) SYSTEM FLOWCHART: System flowcharts are drawn to show diagrammatically the total environment of computer system on which the given algorithm of program is to be solved.

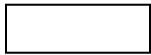
BASIC SYMBOLS OF FLOWCHART:



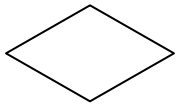
Oval: It indicates beginning or end of flowchart



Parallelogram: It indicates input or read, output/write operation



Rectangle: It indicates arithmetic operation, assignment operation and any other computation step like initialization



Rambus: It is used to check a condition, depending on the result of condition decision is taken



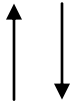
Hexagon: It is used to represent repetition loops



Circle: It is used to connect two parts of a flowchart that indicates the continuously.,



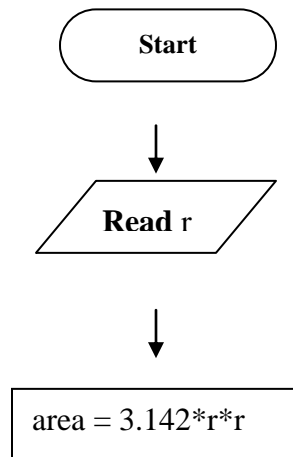
Card: This symbol shows that input & output device is punched card

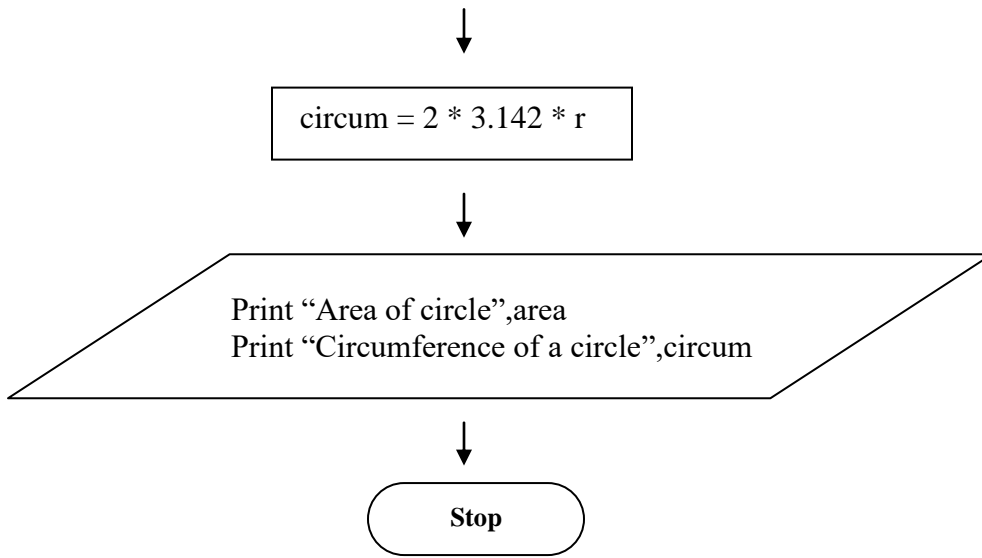


Arrows: These symbols indicate the flow of operations. They are used to interconnect different boxes of

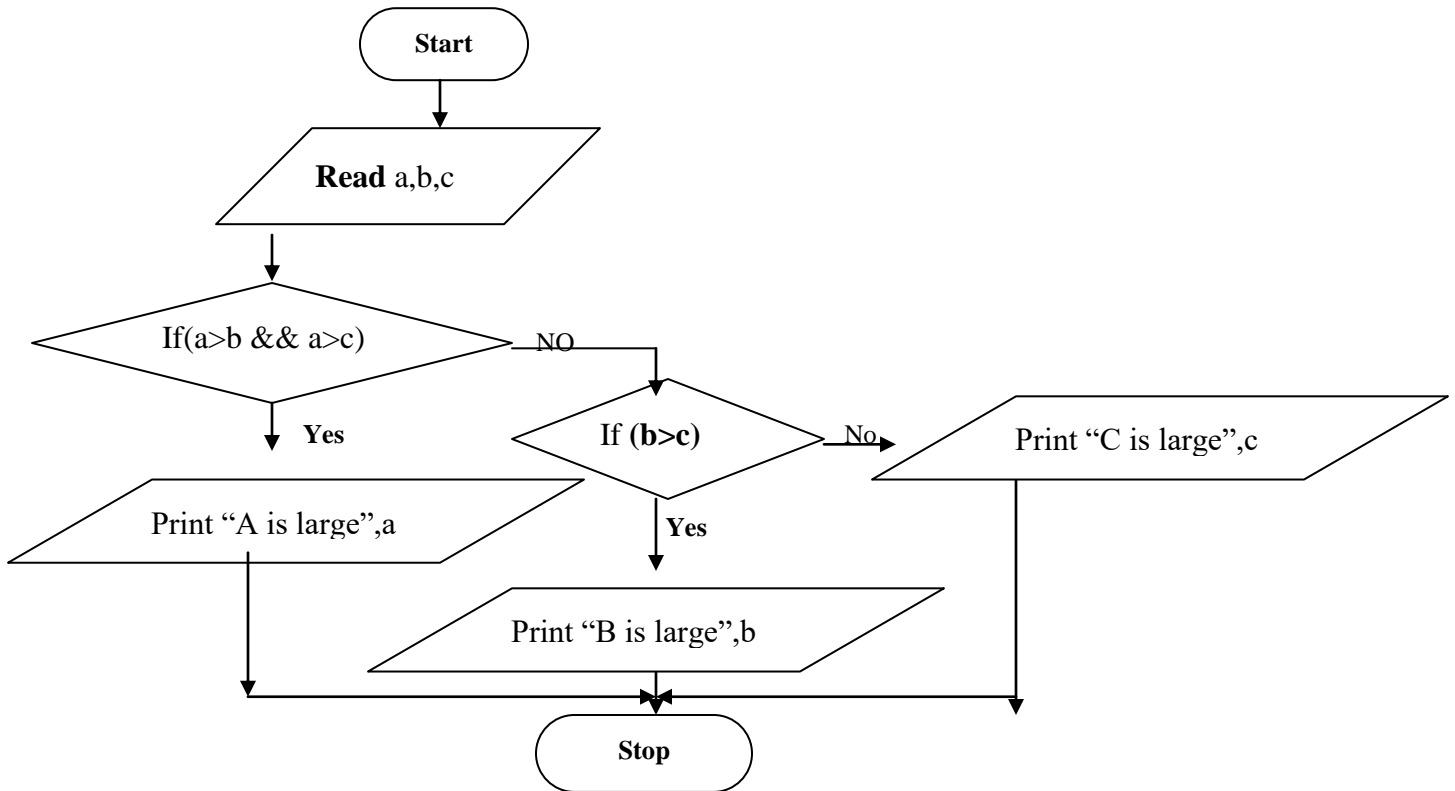
flowchart.

Examples of Program flowcharts: Calculate the area & circumference of a circle.

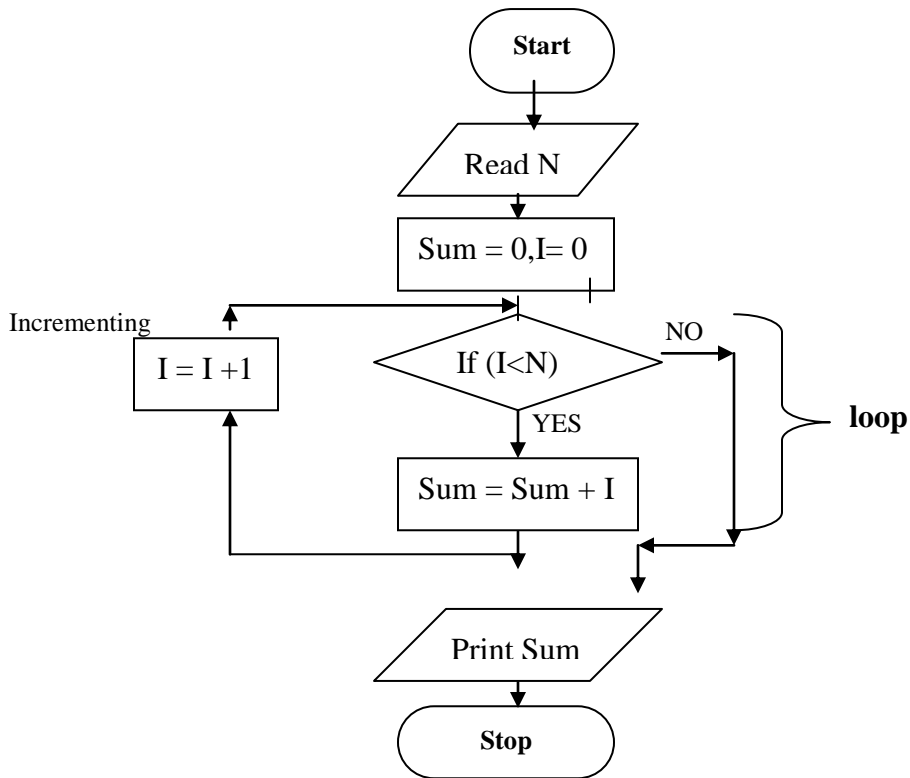




1. Find the largest number among three numbers



2. Find the sum of First N Natural Numbers:



UNIT V
BASICS OF NETWORKING
AND
INTRODUCTION TO DATABASE

What is a network?

Set of devices communicating with each other.

For example

- Could be a CPU, monitor and other peripheral devices connected (and exchanging data) to each other.
- Could be a group of people A network of friends.
- Or, could be a set of computers communicating with each other.

Computer Network

An interconnected collection of *autonomous* computers called computer network.

(Note: **Interconnected**: can exchange information via fiber, copper, wireless, **autonomous**: in the sense that they have processing capability independent of the network.)

The network can be established with a variety of combinations of computers such as a net of only microcomputers, microcomputers and one or more minicomputers and a set of microcomputers connected to a mainframe computer.

ADVANTAGES OF NETWORKING

The main advantages of networking are:

(i). Hardware resource sharing:

Network enables sharing of expensive resources such as processor, storage space and peripherals like modern, fax, and laser printer.

(ii). Sharing of databases:

The network permits concurrent access to the same data file by many users in the network. Thus, user in the sales department, production department, inventory department etc share corporate databases.

(iii). Sharing of Software:

Any user in a network can load and use the software installed on any of the computer of fileserver in the network.

(iv). Communication between users:

The Network users can communicate between them. E-mail facility can also be used for communication.

(v). Decentralized data processing:

In a network, the data processing can be decentralized by enabling local offices to capture and store data, and generate information to meet most of their requirements a local level itself.

(vi) Security of data:

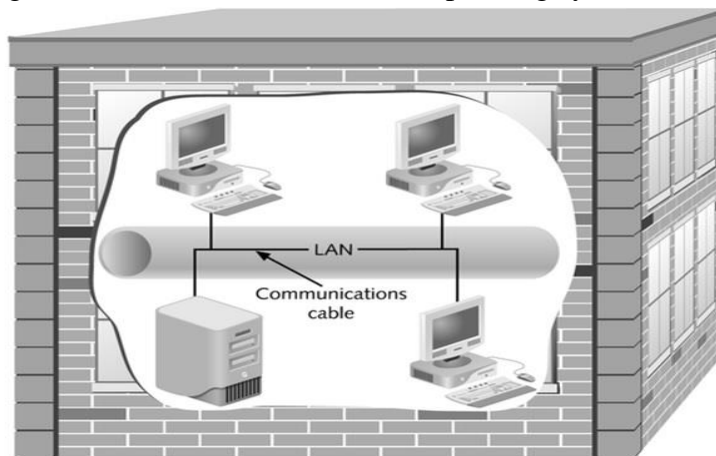
In a networked environment the data is backed up with duplicate storage. Adequate security measures are also put in place to protect the data.

CLASSIFICATION OF NETWORK

The networks can be classified into three; local area network (LAN), metropolitan area network (MAN) and wide area network (WAN). They are explained in the following sections:

1. Local Area Network (LAN)

- The LAN is an interconnection of computers that need to communicate with each other in a limited geographical area.
- LAN works in restricted geographical area such as within a large building or offices within a few kilo meters.
- A LAN is a system of interconnected microcomputers, sharing common resources like disks, printers etc., and links a number of computers workstations together to allow many people to use the same software and data files.
- Each user in such a multi-user environment accesses the resources through his microcomputer workstation.
- The network may have other sharable devices attached such as fax, laser printers and copiers.
- The network includes a central facility with huge storage capacity for the requirements of the organization. It also has a network operating system for managing the network.



LAN in a chemistry building

2. Wide Area Network (WAN)

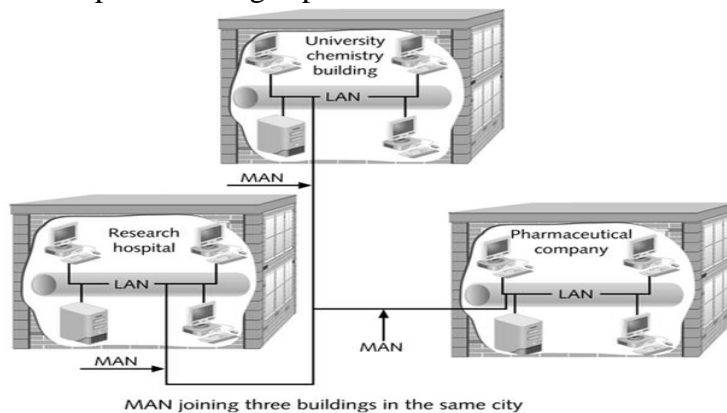
- WAN is made up of number of autonomous computers distributed over a wide geographical area.
- WAN spans large geographic distances. It is also called long-haul network. WAN is usually operated at lower speeds than MAN and involves delay.
- WANs were originally developed in the late 1960s to enable communication between computer centers and sharing of hardware, software and other communication facilities.

- WAN can be implemented using private or public networks. In a private network an organization takes on leased telephone lines to connect their web sites into a network. Public networks are installed by the Government owned telecommunication agencies.



3. Metropolitan Area Network (MAN)

- Metropolitan area network covers a wider area than a local area network.
- Usually MAN covers a large metropolitan city and is a scaled down version of wide area network.
- It operates at high speeds over distances sufficient for a metropolitan area.



NETWORK COMPONENTS

Network interfaces

Network interfaces connect clients, servers, and peripherals to the network. Most network interfaces consist of a small circuit board called Ethernet card that you insert into one of your computer's internal *slots*. Alternatively, modern computers sometimes include the network interface as part of their main circuit boards (motherboards).



Ethernet card

Each network interface is associated with a unique address called its *media access control (MAC)* address. The MAC address helps route information within your local area network and is used by switches and bridges. The MAC address is just one of several network addresses assigned to each networked client, server, or peripheral.

Another network address is the device's Internet, or TCP/IP, address. This address helps route information between networks. Every networked device maintains multiple, simultaneous network addresses which are used for different purposes.

Hubs

A hub connects individual devices on an Ethernet network (Local Area Network) so that they can communicate with one another. The hub operates by gathering the signals from individual network devices, optionally amplifying the signals, and then sending them onto all other connected devices. You should use a hub or a switch on your Local area network if the network includes more than two clients, servers, or peripherals.



Switches

Like a hub, a *switch* is a device that connects individual devices on local area network so that they can communicate with one another. But a switch also has an additional capability; it momentarily connects the sending and receiving devices so that they can use the entire bandwidth of the network without interference. If you use switches properly, they can improve the performance of your network by reducing network interference.

Switches have two benefits:

1. They provide each pair of communicating devices with a fast connection; and
2. They segregate the communication so that it does not enter other portions of the network. (Hubs, in contrast, broadcast all data on the network to every other device on the network.)

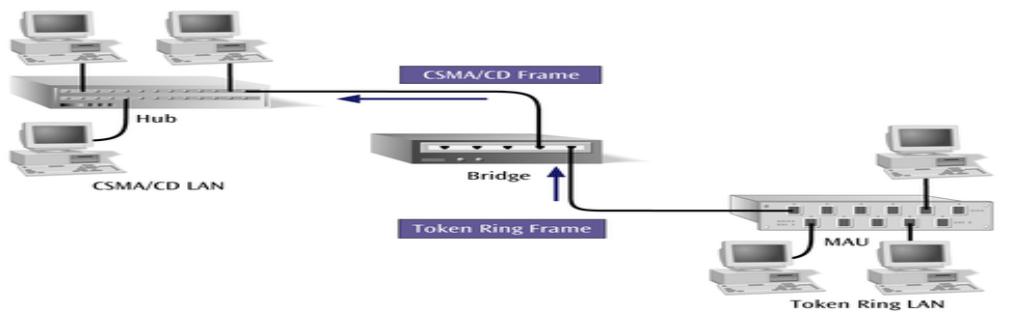


Bridges

A bridge connects two or more networks, or segments of the same network. These networks may use different physical and data link protocols. For example, you can install a bridge to connect a small lab of Macintosh computers using Local Talk to the school's main Ethernet network.

Bridges filter network traffic. They examine each set of data, transmitting only appropriate data to each connected segment. Bridges help reduce overall network traffic.

Bridges are relatively simple and efficient traffic regulators.



Routers

Like bridges, routers connect two or more networks. However, routers are much more powerful than bridges. Routers can filter traffic so that only authorized personnel can enter restricted areas.

They can permit or deny network communications with a particular Web site. They can recommend the best route for information to travel. As network traffic changes during the day, routers can redirect information to take less congested routes.

Routers are generally expensive to purchase and difficult to configure and maintain.



PROTOCOLS

- set of rules for acceptable behaviour (how communication should take place in)
- Specifically:
 - ✓ the set of rules used by communicating parties for that communication to be successful
 - ✓ Suite of protocols cover all required behaviour
 - ✓ Mostly implemented in Software

INTERNET

The word Internet is derived from two words: Interconnection and Networks. Internet is a worldwide system of computer networks, that is, a network of networks.

Basic Internet Terms

Webpage: A webpage is an electronic document written in a computer language called HTML (Hypertext Mark-up Language). These web pages are linked together through a system of connections (called hyperlinks), which enable the user to jump from one web page to another by clicking on a link.

Website: A website is a set of related web pages, published by an organization or individual.

Homepage: Homepage is the starting point or a doorway to the website. Like the table of contents of a book, the home page usually provides an overview of what could be found at the website.

Browser: A browser is a computer program that accesses web pages and displays them on the computer screen. It is the basic software that is needed to find, retrieve, view, and send information over the internet. (Example: Internet Explorer, Netscape Navigator)

Uniform Resource Locator (URL): Each webpage has a unique address, called a Uniform Resource Locator (URL) that identifies its location on the internet. Web browsers utilize the URL to retrieve a file from the computer on which it resides. Example, <http://www.xyz.com/tutor/start/main.html>. The structure of this URL is:

- ❖ Protocol: http
- ❖ Host Computer Name: www
- ❖ Domain Name: xyz

- ❖ Domain Type: com
- ❖ Path: tutor/start/
- ❖ File Name: main.html

Hypertext: Hypertext refers to the text that connects to other documents. These texts are known as hypertext link or hyperlinks. A hyperlink is used to jump to another part of the same page or to load a different web page.

Internet Service Provider (ISP): An internet Service Provider (ISP) is an organisation that provides the required software, which is used to connect to the internet. For a monthly fee, the ISP provides the user software package, username, password, and access phone numbers.

Web server: A server is a computer equipped with server software, which provides a specific kind of service to client software running on other computers. A web server is a computer that answers requests from user's computers. It serves images and static content, such as web pages, to fill client's requests.

Download and Upload: Download refers to the activity of moving or copying a document, program or other data from internet to local computer. Upload refers to the activity of moving or copying a document, program or other data from his/her computer to the Internet.

Online and Offline: The term online is commonly referred to as connected to the World Wide Web via internet. When you connect to the internet, you are online or live. Offline means the user is not connected, via telecommunications, to another computer or a network like the internet. Hence, offline means that the user is no longer connected to a remote computer.

Getting connected to Internet

The basic requirements for getting online (Internet) are,

- ❖ A TCP/IP enabled computer with a web browser
- ❖ An account with an ISP
- ❖ A telephone line plugged to a suitable socket
- ❖ A modem to connect the computer to the telephone line

The computer: The computer must have at least 836-microprocessor chip with a minimum of 16MB RAM. In addition, a colour monitor, with at least 640 X 480 resolutions and a capability of displaying a minimum of 256 colours. The system should also possess a hard disk, with at least 200MB of free space, to store internet software and temporary internet files.

Modem: A modem (modulator – demodulator) is a hardware, which converts digital data into analog signals (that is, modulation) that can be sent over an analog telephone line and convert the

analog signal back into digital data (that is, demodulation). Thus, when the modem receives the data from a web server via phone system, it reconstitutes the analog signal into digital form so that the computer can understand it.

Types of Internet Connections

- ❖ **Dial-up:** A dial-up connection is the access method that uses telephone lines to connect to the internet. It is the most common way that individuals who use home computers to the internet.
- ❖ **ISDN:** It stands for Integrated Services Digital Network and is more common in business and commercial use. It was the first high-speed alternative to regular analog phone modems.
- ❖ **Cable Modem:** A cable modem connects the user to the internet through a cable television line. Nowadays, many cable companies offer internet along with television accessibility.
- ❖ **Leased Line:** Usually leased lines facility can be provided via a fibre optic or copper lines. Leased line service provides a consistent amount of bandwidth. Example 2.4 Kbps to 45 Mbps.
- ❖ **DSL:** Digital Subscriber Line service is provided through the existing phone line, but it works differently than regular analog modem dial-up access. DSL operates over normal telephone lines and it can be used simultaneously with the telephone.
- ❖ **Broadband:** This type of access is good for remote locations, where ISDN, cable or DSL are not available. Satellite connection is expensive but sometimes is the only fast option for people who are beyond the service area of cable and DSL providers.

Internet Software

TCP/IP: TCP/IP, or Transmission Control Protocol / Internet Protocol, is the basic communication protocol of the Internet. It allows programs on user's computer to communicate properly over the internet.

1) **Dialer Software:** This software is provided by the ISP to instruct the modem to dial the phone number, and to identify the user's machine to the access provider's system for access to the network.

2) **Browser:** To use the internet, a web browser is essential. This program allows the user to view the information available on the World Wide Web.

Internet Applications

World Wide Web (WWW)

The World Wide Web is one of the most popular services available on internet. It is a subset of the internet and it presents text, images, animation, video, sound, and other multimedia in a single interface. The web is a part of the internet and it refers to a system of internet servers that supports hypertext using a specific internet protocol called HTTP on a single interface.

Electronic Mail (e-mail)

Electronic mail, or e-mail, is a fast, easy, and inexpensive way to communicate with other internet users around the world. It is one of the basic and earliest services of the internet and the most used application on the internet too. E-mail overcomes most of the problems and delays of getting a physical document from one person to another. Each user of e-mail has a mailbox address to which messages are sent and the mailbox can be accessed from anywhere and at anytime. Not only this, e-mail can also be used to send documents, images, audio, video, and son on as an attachment along with the mail.

Chatting and Instant Messaging

Chat programs allow users on the internet to communicate with each other by typing in real time. They are sometimes included as a feature of a website, where users can log into chat rooms to exchange comments and information about the topics addressed on the site.

A variation of chat is instant messaging where a user on the web can contact another user currently logged in and type a conversation. To avail this internet service, the user must have software called instant messenger installed on the system. There are various products out there for instant messaging such as MSN Messenger and Yahoo Messenger.

The other major internet applications are as follows:

File Transfer Protocol (FTP)

FTP or File Transfer Protocol is a system of rules and a software program that enables a user to log on to another computer and transfer information between it and his/her computer. It was the first service developed for the internet so that government and educational institutions could easily exchange files. FTP allows the user to get access to the files stored in the directory of a remote computer that is connected to the internet.

Internet Telephony

Internet telephony is the use of the internet rather than the traditional telephone company infrastructure, to exchange spoken or other telephonic information.

Video Conferencing

A video conferencing system has two or more parties in different locations, which have the ability to communicate using a combination of video, audio, and data

Commerce through Internet (E-Commerce)

Today business is taking place through electronic telecommunication media. Nowadays, various organisations offer the facility of shopping online. This type of business model is known as Electronic Commerce or E-commerce.

Data Base Management System

Introduction:

Data

Data is collection of facts and figures which can be processed to produce information. For example Name of a student, age, class and her subjects can be counted as data for recording purposes.

Data base

The collection of data, usually referred to as the database, contains information relevant to an enterprise. Enterprise it means an activity, a scheme, a project or an organization.

Data base Management system:

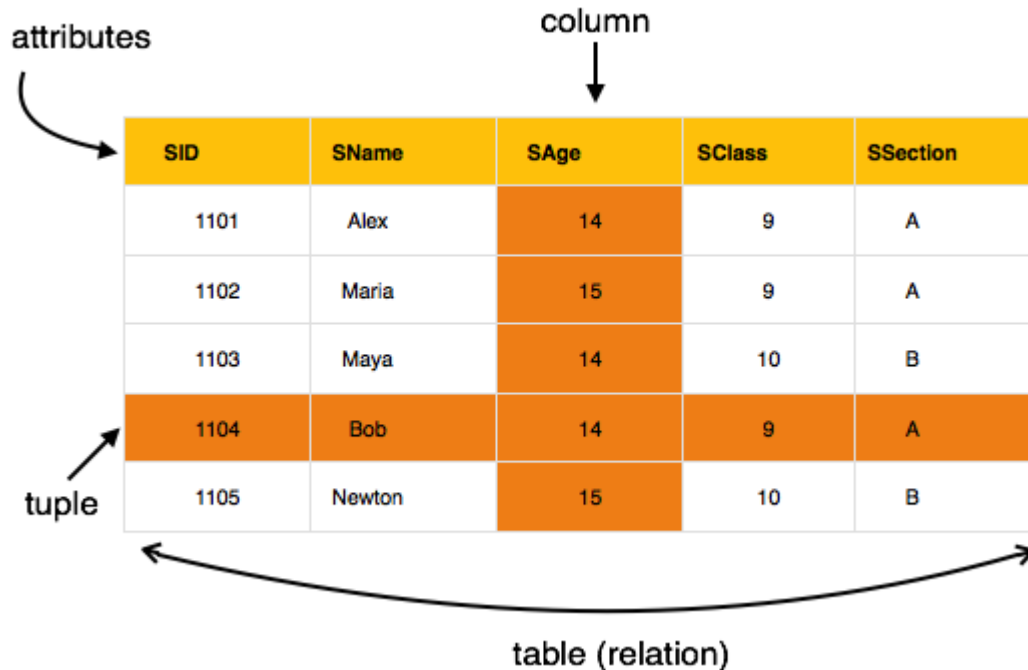
A database-management system (DBMS) is a collection of interrelated data and a set of programs to access those data.

Aim:

- The primary goal of a DBMS is to provide a way to store and retrieve database information that is both convenient and efficient.
- The secondary goal of a DBMS is designed to manage large bodies of information.

Data Base Terminology

- **Entity:** what is this table about? students
- **Attribute (Field):** What items of information are necessary to keep concerning this entity?
ID, name, department, year, advisor
- **Record(Tuple):** A set of values for each attribute for one item
20027654 Ali CAA 2 Ahmet Durukal
- **Key:** The attribute used to define a required item
who is the advisor of Ali?



Database-System Applications:

Databases are widely used. Here are some representative applications:

Banking: For customer information, accounts, loans, and banking transactions

Airlines: For reservations and schedule information. Airlines were among the first to use databases in a geographically distributed manner.

Universities: For student information/ course registrations, and grades.

Credit card transactions: For purchases on credit cards and generation of monthly statements.

Telecommunication: For keeping records of calls made, generating monthly bills, maintaining balances on prepaid calling cards, and storing information about the communication networks.

Finance: For storing information about holdings, sales, and purchases of financial instruments such as stocks and bonds.

Sales: For customer, product, and purchase information.

Manufacturing: For management of supply chain and for tracking production of items in factories, inventories of items in warehouses/stores, and orders for items.

Human resources: For information about employees, salaries, payroll taxes and benefits, and for generation of pay checks.

Purpose of Data base systems:

To allow users to manipulate the information, the system has a number of application programs that manipulates the files, Store the files and retrieve the files.

The typical file-processing system is supported by a conventional operating system. The system stores permanent records in various files, and it needs different application programs to extract records from, and add records to, the appropriate files.

Keeping our information in a file-processing system has a number of major disadvantages.

Data redundancy and inconsistency: Since different programmers create the files and application programs over a long period, the various files are likely to have different structures and the programs may be written in several programming languages. Moreover, the same information may be duplicated in several places (files).

Difficulty in accessing data: the conventional file-processing environments do not allow needed data to be retrieved in a convenient and efficient manner. More responsive data-retrieval systems are required for general use.

Data isolation: Because data are scattered in various files, and files may be in different formats, writing new application programs to retrieve the appropriate data is difficult.

Integrity problems: The data values stored in the database must satisfy certain types of consistency constraints.

Atomicity problems: A computer system, Like any other mechanical or electrical device, is subject to failure. In many applications, it is crucial that, if a failure occurs, the data be restored to the consistent state that existed prior to the failure. It is difficult to ensure atomicity in a conventional file-processing system.

Concurrent-access anomalies: To guard against this possibility, the system must maintain some form of supervision. But supervision is difficult to provide because data may be accessed by many different application programs that have not been coordinated previously.

Security problems: Not every user of the database system should be able to access all the data.

These difficulties, among others, prompted the development of database systems.

Advantages of a DBMS

Using a DBMS to manage data has many advantages:

Data independence: Application programs should be as independent as possible from details of data representation and storage. The DBMS can provide an abstract view of the data to insulate application code from such details.

Efficient data access: A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently. This feature is especially important if the data is stored on external storage devices.

Data integrity and security: If data is always accessed through the DBMS, the DBMS can enforce integrity constraints on the data.

Data administration: When several users share the data, centralizing the administration of data can offer significant improvements.

Concurrent access and crash recovery: A DBMS schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time. Further, the DBMS protects users from the effects of system failures.

Reduced application development time: Clearly, the DBMS supports many important functions that are common to many applications accessing data stored in the DBMS. This, in conjunction with the high-level interface to the data, facilitates quick development of applications.

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UNIT VI - INTRODUCTION TO MULTIMEDIA

INTRODUCTION: Multi means more than one; media means a form of communication. Multimedia means the integration of at least two media. These media can include text, photos, graphics, sound, music, animation and full motion video. Interactive elements can include: voice commands, mouse manipulation, text entry, touch screen, video capture of the user, or live participation.

Multimedia tends to imply relatively more expense in both production and presentation of simple text-and-images. Multimedia presentations are possible in many contexts, including the web, CD-ROMS and live theater. Since any website can be viewed as a multimedia presentation, however any tool that helps develop a site in multimedia form can be caused as multimedia software and the cost can be less than for standard video productions.

DEFINITION : Multimedia is the media that uses multiple forms of information content and Information processing (e.g. Text, audio, graphics, animation, video, interactivity) to inform or entertain the user. Multimedia also refers to the use of electronic media to store and experience multimedia content. Multimedia is similar to traditional mixed media in fine art, but with a broader scope. The term "rich media" is synonymous for interactive multimedia.

ELEMENTS OF MULTIMEDIA SYSTEM: Multimedia means that computer information can be represented through audio, graphics, image, video and animation in addition to traditional media (text and graphics). Hypermedia can be considered as one type of particular multimedia application. Multimedia is a combination of content forms: Audio --Video

CATEGORIES OF MULTIMEDIA: Multimedia may be broadly divided into linear and non-linear categories. **Linear** active content progresses without any navigation control for the viewer such as a cinema presentation. **Non-linear** content offers user interactivity to control progress as used with a computer game or used in self-paced computer based training. Non-linear content is also known as hypermedia content.

Multimedia presentations can be live or recorded. A recorded presentation may allow interactivity via a navigation system. A live multimedia presentation may allow interactivity via interaction with the presenter or performer.

FEATURES OF MULTIMEDIA: Multimedia presentations may be viewed in person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation. Broadcasts and recordings can be either analog or digital Electronic media technology. Digital on-line multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand.

Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an on-line network, or locally with an off-line computer, game system, or simulator.

Enhanced levels of interactivity are made possible by combining multiple forms of media content. But depending on what multimedia content you have it may vary. On-line multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end-user innovation and personalization on multiple forms of content over time. Examples of these range from multiple forms of content on web sites like photo galleries with both images (pictures) and title (text) user-updated, to simulations whose components, events, illustrations, animations or videos are modifiable, allowing the multimedia "experience" to be altered without reprogramming.

APPLICATIONS OF MULTIMEDIA: Multimedia finds its application in various areas including, but not limited to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial, temporal applications. A few application areas of multimedia are listed below:

CREATIVE INDUSTRIES: Creative industries use multimedia for a variety of purposes ranging from fine arts, to entertainment, to commercial art, to journalism, to media and software services provided for any of the industries. An individual multimedia designer may cover the spectrum throughout their career. Request for their skills, range from technical, to analytical and to creative.

COMMERCIAL: Much of the electronic old and new media utilized by commercial artists is multimedia. Exciting presentations are used to grab and keep attention in advertising. Industrial, business to business, and interoffice communications are often developed by creative services firms for advanced multimedia presentations beyond simple slide shows to sell ideas or live-up training. Commercial multimedia developers may be hired to design for governmental services and nonprofit services applications as well.

ENTERTAINMENT AND FINE ARTS: In addition, multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online. Some video games also use multimedia features. Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called Interactive Multimedia.

EDUCATION: In Education, multimedia is used to produce computer-based training courses (popularly called CBT-Computer Based Teaching and Training) and reference books like encyclopedia and almanacs. A CBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment.

ENGINEERING: Software engineers may use multimedia in Computer Simulations for anything from entertainment to training such as military or industrial training. Multimedia for software interfaces are often done as collaboration between creative professionals and software engineers.

INDUSTRY : In the Industrial sector, multimedia is used as a way to help present information to shareholders, superiors and coworkers. Multimedia is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technologies.

MATHEMATICAL AND SCIENTIFIC RESEARCH: In Mathematical and Scientific Research, multimedia is mainly used for modeling and simulation. For example, a scientist can look at a molecular model of a particular substance and manipulate it to arrive at a new substance. Representative research can be found in journals such as the Journal of Multimedia.

MEDICINE: In Medicine, doctors can get trained by looking at a virtual surgery or they can simulate how the human body is affected by diseases spread by viruses and bacteria and then develop techniques to prevent it.

MULTIMEDIA IN PUBLIC PLACES: In hotels, railway stations, shopping malls, museums, and grocery stores, multimedia will become available at stand-alone terminals to provide information and help. Such installation reduce demand on traditional information booths and personnel, add value, and they can work around the clock, even in the middle of the night, when live help is off duty.

A menu screen from a supermarket terminal that provide services ranging from meal planning to coupons. Hotel terminals list nearby restaurant, maps of the city, airline schedules, and provide guest services such as automated checkout. Printers are often attached so users can walk away with a printed copy of the information. Museum terminals are not only used to guide patrons through the exhibits, but when installed at each exhibit, provide great added depth, allowing visitors to browser though richly detailed information specific to that display.

CONVERGENCE OF MULTIMEDIA (VIRTUAL REALITY): At the convergence of technology and creative invention in multimedia is virtual reality or VR.

VIRTUAL REALITY: Virtual reality applications appear to be real, but not real. These are most effective applications that make you feel as if you are traveling through three-dimensional world. The recreation on a computer display of what appears to be physical is called virtual reality. To experience virtual reality the system must be equipped with data gloves, sensor seats, stereoscopic glasses and head mounted displays. The program processes the movements of the user and performs action.

The technology and methods for working with three-dimensional images and for animating them. VR is an extension of multimedia-it uses the basic multimedia elements of imagery, sound, and animation. Because it requires instrumented feedback from a wired-up person, VR is perhaps interactive multimedia at its fullest extension.

STAGES OF MULTIMEDIA APPLICATION DEVELOPMENT: A Multimedia application is developed in stages as all other software is being developed. In multimedia application development a few stages have to complete before other stages being, and some stages may be skipped or combined with other stages. Following are the four basic stages of multimedia project development:

DEFINING AUDIENCE: Understanding audience is more importance while designing a multimedia application. For example children need different kind of approach to follow the multimedia. To make it more effective you must take the right approach that suits your audience.

1. Planning and Costing: This stage of multimedia application is the first stage which begins with an idea or need. This idea can be further refined by outlining its messages and objectives. Before starting to develop the multimedia project, it is necessary to plan what writing skills, graphic art, music, video and other multimedia expertise will be required.

It is also necessary to estimate the time needed to prepare all elements of multimedia and prepare a budget accordingly. After preparing a budget, a prototype or proof of concept can be developed.

2. Designing and Producing: The next stage is to execute each of the planned tasks and create a finished product.

3. Testing: Testing a project ensures the product to be free from bugs. Apart from bug elimination another aspect of testing is to ensure that the multimedia application meets the objectives of the project. It is also necessary to test whether the multimedia project works properly on the intended deliver platforms and they meet the needs of the clients.

4. Delivering: The final stage of the multimedia application development is to pack the project and deliver the completed project to the end user. This stage has several steps such as implementation, maintenance, shipping and marketing the product.
