

# UNIT - 3 INTRODUCTION TO COMPUTER CONCEPTS

## COMPUTER

A computer is a electronic device or a machine which performs input, output operations and stores the data. The computer performs with high speed and accuracy.

## CHARACTERISTICS OF A COMPUTER

Some of the important characteristics are :-

### 1) Speed :-

Computer can process the data and solve the problems at fast rate extremely . i.e millions of instructions are executed per second. A computer can execute three millions of instructions per second.

### 2) Accuracy :-

A computer accuracy is very high. The level of accuracy depends on the instructions and the type of processor used in the computer.

### 3) Reliability :-

The output generated by the computers are very reliable because computers will never make mistakes of their own.

### 4) Versatility :-

The multi processing feature allows it to perform multiple tasks simultaneously with equal time , making it versatile.

### 5) Storage capacity :-

The computers are capable of storing huge amount of data that can be retrieved very quickly.

## 6) Diligence :-

The computers can work continuously for hours without a single error and it performs all the operation with same speed and accuracy.

## APPLICATIONS OF COMPUTER

The various applications of computers are:

### 1) Education :-

The computers are very much useful in teaching, learning process of education with a system known as computer based education (CBE). CBE involves control, delivery and evaluation of learning.

### 2) Business :-

The computers are used in business organisations for salary calculation, budgets calculations, sales analysis, managing employee data base, etc.

### 3) Banking :-

The computers are used in the various banks for providing online account facility to maintain the accounts of customers, used as ATM machines for providing money, etc.

### 4) Science :-

Due to high speed and accuracy the computers have immense ~~application~~ in the scientific field. Computers are used in the research field, study of earthquakes effects, for satellites based applications, weather monitoring, etc.

### 5) Military :-

Computers are used in the defence, modern tanks, missiles launching, automated weapons, etc. The military employs computerized control system used for military communication, operating and planning etc.

- 6) computers are also used in the various fields such as marketing, hospitals, Networking, Agriculture, Communication etc.

## GENERATIONS OF COMPUTER

The computers may be classified into 5 number of generations.

They are :-

- 1) 1st generation computer      vacuum tubes      (1945 - 1955)
- 2) 2nd generation computer      Transistors      (1955 - 1965)
- 3) 3rd generation computer      IC's      (1965 - 1980)
- 4) 4th generation computer      Micro processor      (1980 - 1989)
- 5) 5th generation computer      Micro processor      till date

## First generation computers

The first generation computers are univac (universal automated computers) from IVM. In this generation vacuum tubes were used. The machine can perform business data and process it, due to vacuum tubes. Vacuum tubes occupied huge space and more energy but slow in input and output. It suffered from heat and maintenance problem. It uses the machine language for programming.

## Second generation computers

\* To overcome the difficulties faced in the first generation computers due to vacuum tubes, transistors were used in the second generation computers.

\* Transistor is a small component made up of semi-conductor material, due to which the size was reduced.

\* The computers perform operation faster with improved storage capacity.

- \* This computers can work with high level language and also with machine level language.

### Third generation of computers

The third generation computers used integrated circuits instead of transistors, in which the circuits are fixed on a silicon chip

- \* As more number of components like transistors are moulded on the IC, the computers work, smaller, faster, and flexible in terms of input and output.
- \* As this computer satisfy the needs of small business, it became more popular as a mini computer

### Fourth generation of computers

The fourth generation computers used IC's like VLSI (Very large scale integration)

- \* Due to VLSI technology the computers were faster, smaller, reliable and it became more user friendly and widely used as a personal computer.
- \* The fourth generation computers also include super computers that are best in processing, speed, storage and cost. It can process upto billions of instructions per second.
- \* The fourth generation computers are used in the year (1988 - 1989).

## Fifth generation of computers

The fifth generation computer use more advanced technology with ultra large scale integration. These computers are portable, powerful variety of storage mechanisms and advanced software technology.

- \* The fifth generation computers includes desktops, notebooks (laptops), artificial intelligence that use pentium processor for processing.
- \* In future, the users can expect even more faster and advanced computer technology like nano technology.

## CLASSIFICATION OF COMPUTERS

The computers can be classified mainly into three groups. They are

- 1) Classification according to purpose
- 2) Classification according to data handling
- 3) Classification according to functionality

### 1) Classification according to purpose

Depending upon the purpose served the computers can be classified further into two types

- a) Specific purpose
- b) General purpose

The general purpose computers are designed to perform various tasks. They have the ability to store the large ~~problems~~ programs and data but lacks in speed and efficiency.

The specific purpose computers are designed to perform a single task or specific task. These computers are high in speed and efficiency.

## 2) Classification of according to data handling

Here computers are classified into three types

- a) Analog computers
- b) Hybrid computers
- c) Digital computers

### Analog computers

The analog computers work on the principle of measuring, in which the measurements obtained are translated into data. The analog computers are employed with voltage, resistances etc that represents quantities being manipulated. The accuracy is very less.

### Digital Computers

Digital computers are the computers which operates on digital data. This computers process the data into digital values that is 0's and 1's. They are fast and accuracy machines. Here millions of instructions are executed very fastly.

### Hybrid Computers

The hybrid computers combines the measuring features of analog computer and counting feature of digital computers. These computers uses the analog component for computational purpose and digital components for storage of data. It is used effectively for scientific and industrial applications.

### 3) Classification according to size and capability / functionality

The computers are classified based on size and capability. They are

- a) PC → Personal computers
- b) Palmtops
- c) Laptops
- d) Super Computers
- e) Mainframe computers
- f) Mini computers
- g) Server

#### PC

Personal computers are small and single user computer which is known as micro computers. These computers are used in the most of the organisations like business, offices, home etc. These computers are portable which has its own keyboard, mouse, storage data etc.

#### Palmtops

Palmtops are commonly called as personal digital assistance (PDA). They are lightly integrated computer which are small and light in weight.

#### Laptops

Laptops are nothing but notebook computers and they are portable.

#### Server

Server is a computer which provides service to other computer and especially used in networking.

## Mainframe Computer

Mainframe computers are integrated by using multiple of CPU. This computer supports hundred to thousand users simultaneously. This computers are used in small companies, institutions, scientific calculators and military operation.

## Minicomputer

Minicomputer is a multi user computer which supports many user at a time.

## Supercomputer

Super computers are very expensive which cause around mission declares. This computers are used in scientific, aerospace, robotic application and satellite communication.

## COMPONENTS OF COMPUTER

Computer system

Hardware

Software

### Hardware

The physical parts that make up a computer which are interconnected is called computer hardware.

Eg: Mouse, keyboard, CPU etc

### Software

A software is a collection of programmes where programme is a set of instructions given to the

computer to perform specific tasks or particular task. The software controls and operates the hardware to get desired output. Every action and the function of the hardware is given by hardware software.

## Types of software

The computer software is divided into two main types

- 1) System software
- 2) Application software

### \* System software

System software is a set of programmes which are required for controlling and managing the hardware components of a computer system. It should be loaded in the computer system before using the system to perform particular any task. In the absence of the software, the computer will be of no use.

Ex:- Operating system, Drivers, compiler, assembler

### \* Application software

The software that are designed to fulfill the requirements of user for performing specific tasks.

## Differences between system software and application software.

## System Software

- \* They are designed to manage the resources of the system like memory, process management etc.
- \* It is written in a low level language like machine language or assembly language.
- \* The system software is a general purpose software.
- \* It is capable of running independently.
- \* Users never interact with the system software as it functions in the background.
- \* The system software starts running when the system powered on and runs until the system is powered off.
- \* The system software is installed in the computer system at that time when the operating system is installed.

## Application Software

They are designed to fulfill the requirements of user for performing a specific task

High level language is used to write the application level software.

Ex:- Java, C++

The application software is a specific purpose software

It cannot run independently.

Users interact with the application software while using the specific applications.

The application software starts when the users begin and it ends when the user stops it.

Installed as per the requirements.

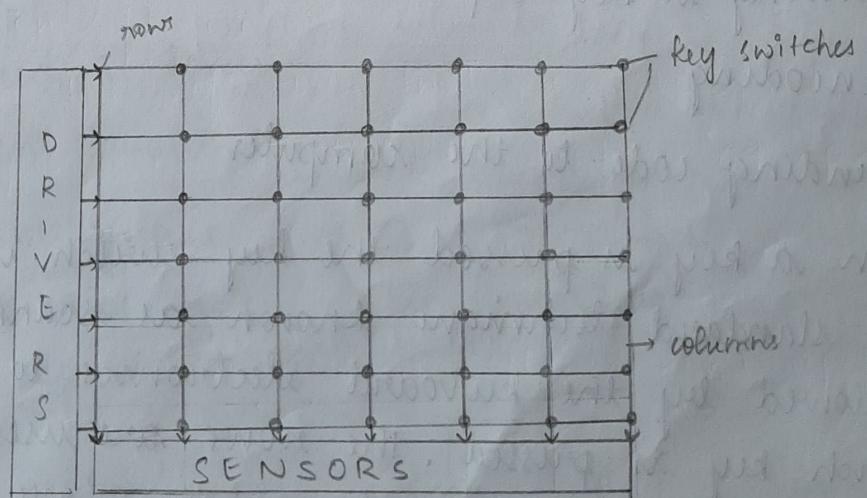
## E - Accessibility software (Electronic accessibility)

Electronic accessibility refers to the ease of use of information and communication technology such as the internet by the people with disability. Websites need to be developed so that the disabled users can access the information.

For example,

- 1) For people who are blind, websites need to be able to be interpreted by programmers which read the text aloud and describe any visual images
- 2) For people who have low vision, webpages need adjustable sized font and sharply contrasting colours.
- 3) For the people who are deaf, audio content should be accompanied with the text version of the dialogue.

## Working principle of keyboard.



Keyboard is an input device through which data, programmes and certain commands to a software can be keyed. It translates numbers, letters and symbols into a signal that can be interpreted by a computer. Most of the English key words are based on the "QWERTY" designed. The standard keyboard have ~~more~~ 102 to 114 keys. The functions can be programmed by the software designer. Many special keys are provided including right, left, and up, down keys, Shift key, enter key, Alter key, backspace, delete, homepage, insert, Print screen, number lock, scroll, caps lock, etc. Keyboard consists of key switches, there is one key switch for each letter, number, and symbols much like a type writer. Generally key switches are connected in a matrix of rows and columns.

The functions to be performed by the keyboard are

- \* Sensing a key depression
- \* Encoding
- \* Sending code to the computer

When a key is pressed the key switch is activated. The standard technique known as scanning is followed by the keyboard electronics to determine which key is pressed. The rows are used as input to the matrix. The columns are sensed by electronic circuits. The 8 bit code is generated and sent to the computer. Drivers are the external installed software. Any external device connected

to CPU needs drivers to be installed.

## Printer

A Printer is an electro mechanical device it has both electronic circuit and mechanical assemblies. The electronic circuits in a printer are usually referred to as printer electronics. A computer interface links the printer with the computer commands and data from the computer are sent to printer through this interface. The printer sends its status to the computer through this interface. The mechanical assemblies include print head assembly, print carriage motor, ribbon assembly, paper movement assembly, sensor assemblies etc. There are two types of printer

- 1) Impact printer
- 2) Nonimpact printer

Explain Impact printer with an example.

- \* It prints the character and image by striking printer hammer wheel against linked ribbon.
- \* Its speed is lower
- \* Its print quality is lower
- \* It normally uses continuous paper sheet while printing
- \* It generates noise during printing
- \* It is less expensive

Ex: Dot matrix printer, daisy wheel printer, drum printer, band printer and chain printer etc.

Explain Nonimpact printer with an example.

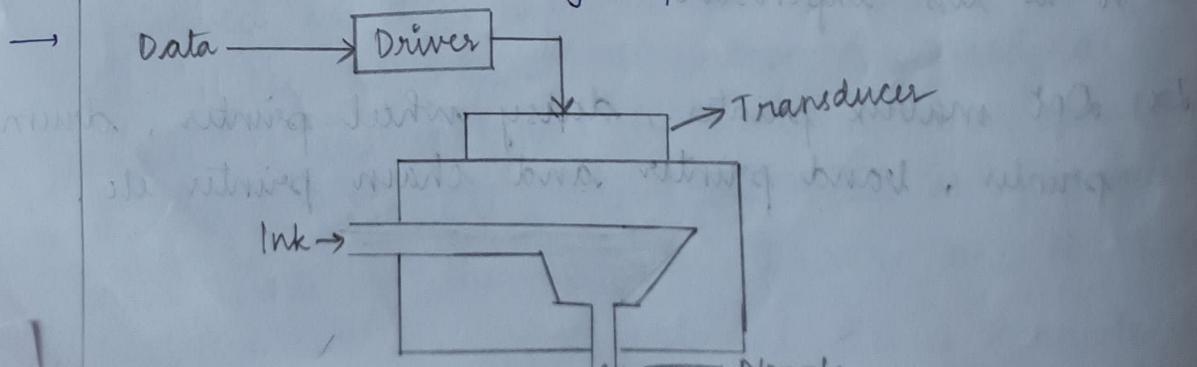
- \* It prints characters and images without ~~double~~ striking the paper.
- \* Its speed is faster
  - \* Its print quality is higher
  - \* It normally uses individual paper sheet while printing.
  - \* It does not generate noise during printing
  - \* It is more expensive

Ex:- Laser printer, Thermal printer, inkjet printer and electro static printer

Explain dotmatrix printer

- Dot matrix printer is an impact printer in which the character is formed by large space dots in the form of matrix. It uses tiny hammers in its prints. Dot matrix printers are relatively expensive and does not produce high quality output. However they can print carbon copies that something laser and inkjet printer cannot do. The printing quality is determined by no. of pins in the print head. It can vary from 9 to 24.

Write a note on inkjet printer



Inkjet printer is peripheral that produces hard copy by spraying the ink on the paper. The inkjet printer produces copy with a resolution of atleast 300 dots per inch. Instead of metal needles they use 100 of tiny guns to fire the dots of ink on the paper. In the inkjet printing mechanism has print head which has tiny nozzles called as jets. The principle advantage of ink jet printer is fast. Transduced converts the electrical energy into another form. There are two types of print head based on the transducer they are

- 1) Thermal
- 2) Piezo electric

## Laser Printer

The line, dot matrix, and <sup>ink</sup> jet printers need a head movement on a ribbon to print characters. This mechanical movement is relatively slow due to high inertia of mechanical elements. In laser printers these mechanical movements are avoided. In these printers, an electronically controlled laser beam traces out the desired character to be printed on a photoconductive drum. The exposed areas of the drum gets charged, which attracts an oppositely charged ink from the ink toner on to the exposed areas. This image is then transferred to the paper when it comes in contact with the drum with pressure applied by the pressure roller. The charge on the drum decides the darkness of the print. When charge is more, more ink is attracted and we get a dark print.

This pressure roller transfer the black toner onto the paper. Since the paper is moving at the same speed as the drum the paper picks up the image pattern precisely. Finally, the printer passes the paper through a pair of heated rollers called fuser. As the paper passes through these rollers the loose ~~toner~~ toner powder gets melted and fuses with the fibres in the paper. The paper is then brought out of the printer.

## Proprietary Software

Proprietary software is a software that is copy written, which means it can only be obtained by paying for a license. Proprietary software has many advantages like the product should be free of bugs. If bugs still exist, updates known as patches are often provided free of charge, which fix these bugs. Ex: Windows

## Open Source

The term open source refers to the software whose source code freely available on the internet. Ex: firefox, Open office, Gimp etc

Firefox - A free web browser that competes with Internet Explorer.

Open office - A competitor to Microsoft Office.

Gimp - A graphic tool with features found in Photoshop.

## Freeware software

Freeware is a software, most often proprietary that is distributed at no cost to the end user. There is no agreed upon set of rights, license, EULA that defines freeware unambiguously, every publisher defines its own rules for the freeware it offers.

Ex: Adobe reader, Free studio, Skype etc

## COMPUTER NETWORK CONCEPTS

A network can be defined as a group of computers and other devices connected in some ways so as to able to exchange data.

Each of this devices on the network can be thought of a node.

## CATEGORIES OR TYPES OF NETWORK

A computer network is mainly of four types

- \* LAN (Local Area network)
- \* PAN (Personal Area network)
- \* MAN (Metropolitan Area network)
- \* WAN (Wide Area network)

### LAN

A local area network (LAN) is the collection of devices that are connected together in one physical location, such as building, office or home.

### PAN

A personal area network (PAN) is formed when two or more computers are interconnected to one another wirelessly over a short range, typically less than about 30 feet

### MAN

Metropolitan area network (MAN) is a computer network that connects no. of LAN's to form larger network, so that computer resources can be shared. This type of network covers larger area than a LAN but smaller than the area covered by WAN.

MAN is specially designed to provide high speed connectivity to the user in which speed ranges in terms of MBPS

Examples of MAN are cable TV network, used in government agencies, University campus etc

## Protocol

A Protocol is the set of rules that governs the communication between computers on a network

### Protocols in Application Layer

TELNET - Telnet stands for telecommunication network. TELNET is a network Protocol used to virtually access the computer and to provide a two way, collaborative and text based communication channel between two machines.

FTP - FTP stands for File Transfer Protocol. It is the standard network protocol used for the transfer of computer files from a server to a client on a computer network

NFS - NFS stands for Network file system. It is a client server application that lets a computer user view and optionally store and update files on remote computer.

SMTP - SMTP stands for Simple mail transfer Protocol. It is the set of communication guidelines that allows software to transmit an electronic mail over the internet is called simple mail transfer Protocol

SNMP - SNMP stands for simple network management Protocol. This protocol uses UDP port no. 161/162. SNMP used to monitor the network, detect network faults and sometimes even it is used to configure remote devices.

### ADVANTAGES OF PROTOCOL

- Flexibility
- Less time to transfer files
- Transfers data to different systems
- Allows programmes to run on different systems
- High speed

### WAN

Wide Area Network is a telecommunication network it extends over a large geographical area for primary purpose of computer networking.

Eg: Internet

### DATA PROCESSING

Collection, manipulation and processing collected data for required use is known as Data Processing.

It's a technique normally performed by a computer

### METHODS OF DATA PROCESSING

The different method of Data Processing are

- 1) Single user Programming
- 2) ~~Multiple Programming~~
- 3) Real time Processing
- 4) Online Processing
- 5) Time sharing Processing

## 6) Distributed Processing

### Single user Programming

It is usually done by a single person for his personal use. This technique is suitable for small offices.

### Multiple Programming

- \* This technique provides facility to store and execute more than one programme in the central processing unit (CPU) simultaneously.
- \* Further, the multiple programming technique increases the overall working efficiency of the respective computer.

### Real time Processing

- \* This technique facilitates the user to have direct contact with the computer system.
- \* This technique made easy of data processing. This technique is also known as direct mode or the interactive mode technique and it is developed exclusively to perform one task. It is sort of online processing, which always remains under execution.

### Online Processing

- \* This technique facilitates the entry and execution of data directly, hence it does not store or accumulate first and last process. This technique is developed in such a way that reduces

the data entry user, as it validates data at various points and also ensures that only correct data is entered.

- \* This technique is widely used for online applications.

### Time Sharing Processing

- \* This is another form of online data processing that facilitates several users to share the resource of an online computer system.
- \* This technique is adopted when results are needed fastly.
- \* As the name suggest, this system is time based. Following are some of the major advantages of time sharing processing.
  - 1) Several users can be served simultaneously.
  - 2) All the users have almost equal amount of processing time.
  - 3) There is the possibility of interaction with the running programmes.

### Distributed Processing

- \* This is the specialised data processing technique in which various computers (which are located remotely) remain interconnected with a single host computer making a network of computer.

### COMPUTER SECURITY

- \* It is required for the following major reasons
  - 1) To prevent the damage of the hardware
  - 2) To prevent theft or damage of installed software

- 3) To Prevent theft or damage of store data and information
- 4) To Prevent the disruption of service

### TYPES OF THREAT

Following are the most common type of computer threats

- \* Physical damage - It includes fire, water, pollution etc.
- \* Natural events - It includes climatic, earthquake, volcanic activity etc.
- \* Loss of services - It includes electrical power, air conditioning, telecommunication etc.
- \* Technical failures - It includes problems in equipments, software capacity saturation etc.
- \* Deliberate type - It includes spying, illegal processing of data etc

### SOURCES OF THREAT

Possible sources of a computer threat maybe

- \* Internal - It includes employees, partners, contractors and vendors.
- \* External - It includes cyber criminals (professional hackers), non-professional hackers, activists, malware (virus) etc.

## COMMON TERMS

Following are the common terms frequently used to define computer threat - Virus threats

### Virus threat

A computer virus is a programme design to disrupt the normal functioning of the computer without the permission of the user.

### Spy ware threat

It is a computer programme that monitors the user's online activity or installs programmes without user's consent for profit or theft of personal information.

### Hackers

They are the programmers who put other on threats for their personal gain by breaking into computer systems with the purpose to steal, change or destroy information.

### Phishing threats

It's an illegal activity through which phishers attempt to steal sensitive, financial or personal data by means of fraud email or instant messages.