Introduction to Computers and its applications

Introduction

What is computer system?

A computer system is defined as programmable electronic device that can be programmed to accept some inputs in terms of data, then process this data as per the program instructions and provide the output in the desired format that can be used for some meaningful works.

Computer is a useful tool for all organizations, production units, space research, medical science, banking system and also individuals like an artist, a housekeeper, a student etc. It is an incredibly powerful and flexible tool.

Characteristics of Computer

Speed, accuracy, diligence, storage capability and versatility are some of the key characteristics of a computer.

A brief overview of these characteristics are -

Speed:

The computer can process data very fast, at the rate of millions of instructions per second. Some calculations that would have taken hours and days to complete otherwise, can be completed in a few seconds using the computer. For example, calculation and generation of salary slips of

thousands of employees of an organization, weather forecasting that requires analysis of a large amount of data related to temperature, pressure and humidity of various places, etc.

Accuracy:

Computer provides a high degree of accuracy. For example, the computer can accurately give the result of division of any two numbers up to 10 decimal places.

Diligence:

When used for a longer period of time, the computer does not get tired or fatigued. It can perform long and complex calculations with the same speed and accuracy from the start till the end.

Storage Capability:

Large volumes of data and information can be stored in the computer and also retrieved whenever required. A limited amount of data can be stored, temporarily, in the primary memory. Secondary storage devices like floppy disk and compact disk can store a large amount of data permanently.

Versatility:

Computer is versatile in nature. It can perform different types of tasks with the same ease. At one moment you can use the computer to prepare a letter document and in the next moment you may play music or print a document. Computers have several limitations too. Computer can only perform tasks that it has been programmed to do. 10 Computer cannot do any work without instructions from the user. It executes instructions as specified by the user and does not take its own decisions.

Working of computer system.

Any digital computer carries out broadly five functions:

- Takes the data as input
- Stores the data/ instructions in its memory and use them when required.
- Process the data and convert it into useful information
- Generates the output
- Controls the above four steps.

Any kind of computers consists of **HARDWARE and SOFTWARE.**

Hardware:

Computer hardware is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.

Software:

Software is a program written in computer language for processing of input data and producing some useful outputs results. Software is divided into two major categories:

System software - that provides the basic non task-specific functions of the computer. Ex. - Windows, Linux etc.

Application software - which is used by users to accomplish specific tasks. Ex. - Excel, Photoshop, Access, Word etc.

Input Devices

Input device is any device/part/assembly (piece of computer hardware equipment) to provide input data and to an information processing system such as a computer.

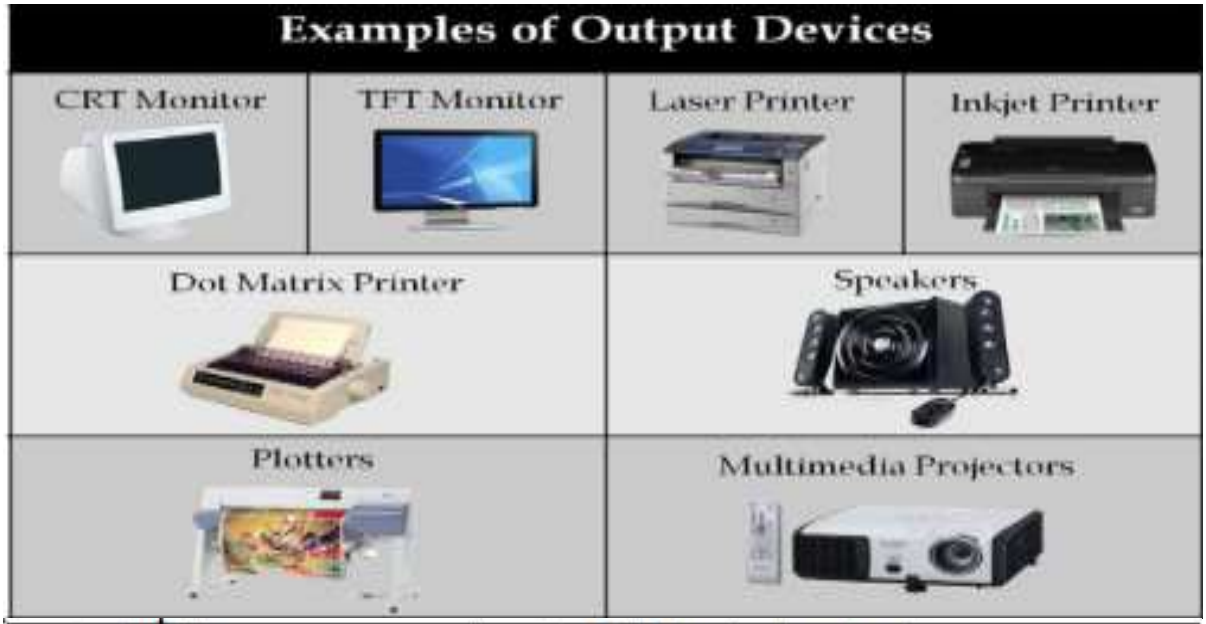
Input device Translate data from form that humans understand to one that the computer can work with. Most common are keyboard and mouse

Example of Input Devices:-

1. Keyboard	2. Mouse (pointing device)	3. Microphone
4. Touch screen	5. Scanner	6. Webcam
7. Touchpads	8. MIDI keyboard	9.
10.Graphics Tablets	11.Cameras	12.Pen Input
13.Video Capture Hardware	14.Microphone	15.Trackballs
16.Barcode reader	17.Digital camera	18.Joystick
19.Gamepad	20.Electronic Whiteboard	21.

Output devices

An output device is any device/piece/part of computer hardware equipment used to communicate the results of data processing carried out by an information processing system (a computer) which converts the electronically generated information into human readable form.



1. Monitor	2. LCD Projection Panels
3. Printers (all types)	4. Computer Output Microfilm (COM)
5. Plotters	6. Speaker(s)
7. Projector	

Central Processing Unit (CPU)

A CPU is brain of a computer. It is responsible for all functions and processes. Regarding computing power, the CPU is the most important element of a computer system. The CPU is comprised of three main parts:

Arithmetic Logic Unit (ALU):

It executes all arithmetic and logical operations. Arithmetic calculations like as addition, subtraction, multiplication and division. Logical operation like compare numbers, letters, or special characters.

Control Unit (CU):

It controls and co-ordinates computer components.

1. Read the code for the next instruction to be executed.
2. Increment the program counter so it points to the next instruction.
3. Read whatever data the instruction requires from cells in memory.
4. Provide the necessary data to an ALU or register.

5. If the instruction requires an ALU or specialized hardware to complete, instruct the hardware to perform the requested operation.

Registers:

It Stores the data that is to be executed for next operation. It is a "very fast storage area".

Computer memory

Broadly computer system has two types of memory

Primary memory

Secondary memory

Primary Memory:

Primary memory is divided into two parts-

RAM

ROM

1. RAM: (Random access memory)

Random Access Memory (RAM) is a memory scheme within the computer system that is responsible for storing data on a temporary basis, so that it can be promptly accessed by the processor as and when needed. It is volatile in nature, which means that data will be erased once supply to the storage device is turned off. RAM stores data randomly and the processor accesses these data randomly from the RAM storage. RAM is considered "random access" because you can access any memory cell directly if you know the row and column that intersect at that cell.

2. ROM (Read Only Memory):

ROM is a permanent form of storage. ROM stays active regardless of whether power supply to it is turned on or off. ROM devices do not allow data stored on them to be modified.

Secondary Memory:

Secondary memory stores data and programs permanently: it retains data after the power is turned off. Some of secondary memory devices are as follows-

Hard drive (HD):

A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive," that store and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces.

Optical Disk:

An optical disc drive (ODD) is a disk drive that uses laser light as part of the process of reading or writing data to or from optical discs. Some drives can only read from discs, but recent drives are commonly both readers and recorders, also called burners or writers. Compact discs, DVDs, and Blu-ray discs are common types of optical media which can be read and recorded by such drives. Optical drive is the generic name; drives are usually described as "CD" "DVD", or "Blu-ray", followed by "drive", "writer", etc. There are three main types

of optical media: CD, DVD, and Blu-ray disc. CDs can store up to 700 megabytes (MB) of data and DVDs can store up to 8.4 GB of data. Blu-ray discs, which are the newest type of optical media, can store up to 50 GB of data. This storage capacity is a clear advantage over the floppy disk storage media (a magnetic media), which only has a capacity of 1.44 MB.

Unit of Measurements (Storage measurements):

The basic unit used in computer data storage is called a bit (binary digit). Computers use these little bits, which are composed of ones and zeros, to do things and talk to other computers. All your files, for instance, are kept in the computer as binary files and translated into words and pictures by the software (which is also ones and zeros). This two number system, is called a “binary number system” since it has only two numbers in it. The decimal number system in contrast has ten unique digits, zero through nine.

Bit	BIT	0 or 1
Kilobyte	KB	1024 bytes
Megabyte	MB	1024 kilobytes
Gigabyte	GB	1024 megabytes
Terabyte	TB	1024 gigabytes

Speed measurement:

The speed of Central Processing Unit (CPU) is measured by Hertz (Hz), which represent a CPU cycle. The speed of CPU is known as Computer Speed.

CPU SPEED MEASURES	
1 hertz or Hz	1 cycle per second
1 MHz	1 million cycles per second or 1000 Hz
1 GHz	1 billion cycles per second or 1000 MHz

Computers classification

Computers can be generally classified by size and power as follows-

Personal computer:

A small, single-user computer based on a microprocessor. In addition to the microprocessor, a personal computer has a keyboard for entering data, a monitor for displaying information, and a storage device for saving data.

Workstation:

A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and a higher-quality monitor.

Minicomputer:

A multi-user computer capable of supporting from 10 to hundreds of users simultaneously.

Mainframe:

A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.

Supercomputer:

An extremely fast computer that can perform hundreds of millions of instructions per second.