Unit 1 :

COMPUTER SYSTEM   **Dated – 30/03/2020**

Welcome children –

In class X, you had come across various Computer terminologies. Here we shall have a study of somewhat the same. At the end of the learning there will be questions for you to examine yourself.

No need to purchase any copy separately for these tasks. You can note down the important points in any blank pages and also learn.

Introduction :

Today's world is an information rich world and it has become a necessity for everyone to know about computers and the latest technology. Nowadays everything around us requires computer to operate or function like online shopping, e-banking, ATM's , e-ticketing, airlines, e-bills, diagnosis of the diseases or it could be just searching for your information and queries on the internet using Google.

The computer's capability to process, store and retrieve data and information has made it an integral part of all kinds of environment. So it is quite important to know every little thing about the working of a computer, its advantages and disadvantages also its internal structure.

Later I would like to know if you can recollect and think about the meaning of the term 'processing' which is very commonly used in the day to day working of the computer.

BASIC COMPONENTS OF A COMPUTER SYSTEM -

As you are aware computer is a combination of hardware and software. Hardware is the physical components of a computer like motherboard, memory devices, monitor, keyboard, printer, modem and many more , while software is a set of programs or instructions like tally, word, excel, powerpoint etc.

Both hardware and software together make the computer system functions.

Computer System

Hardware   Software
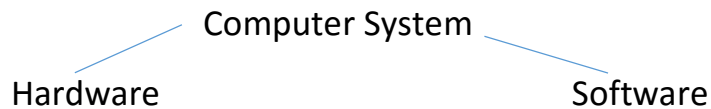
Every task given to a computer follows IPO cycle – i.e. – Input > Process > Output Cycle. After the input is received the desired output is generated after the processing is completed.

The processing task is done by the CPU – central processing unit of the computer also called the brain of the computer. The output is done by the output unit. There is a memory unit which holds the data and instructions while the processing is going on.

Input   Output

Data ——— Process ——— Information

Storage
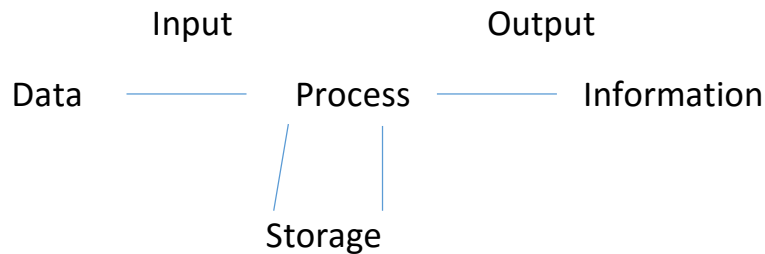
This is an IPO Cycle

The basic structure of the computer has been studied by you in lower classes. So it will be easy for you to understand the given below. It is also known as Von Neumann Architecture. The computer receives data or instructions through the "input devices" which goes through the CPU and the result or output is shown through "Output Devices". Can you tell what helps in storage of data in the computer. Yes – "Main/Primary Memory" and "Secondary/Auxiliary Memory" are used for this purpose.
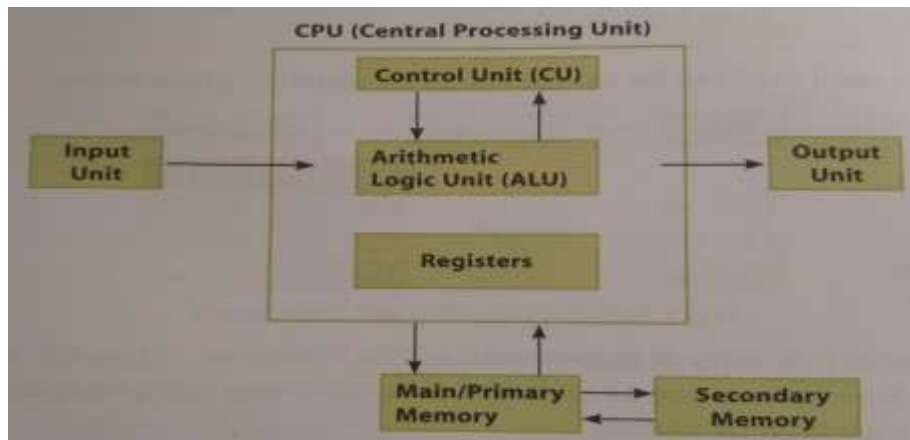
This is the Functional Components of a Computer System

- Input Unit - An input unit accepts or takes and converts it into binary form so that it can be understood by the computer. The computer input constitutes data and instructions.
The term binary means two states – On/Off or High/Low voltage or 2 bits or symbols i.e. 1 for On and 0 for Off.

  The most commonly used input devices are here –
  1. Keyboard – This device helps to directly enter data in the form of letters, digits and commands into the computer. A keyboard is more advanced than the typewriter, such as alphanumeric keys, directions keys, special and lock keys, the function keys.

  2. Mouse – A mouse is a pointing device with a roller at its base, used for moving a pointer on a computer monitor. It converts the movements of the user's hand into a unique set of binary digits representing the position of the mouse at a particular instant. When a user moves a mouse across a flat surface, the pointer moves in the direction of the mouse's movement.

  3. Light Pen - A light pen is a pointing device that can be used to select anything on the computer screen by simply pointing at it or for drawing figures directly on the screen. It has a Photocell mounted on a pen shaped tube and is capable of sensing a position on the screen when its tip touches the screen. Do you know how the clicking is performed ? – by pressing the pen on the screen !!

4. Optical Mark Reader (OMR) – An OMR is capable of recognizing a pre-specified type of mark made with a dark pencil or ink. Special pre-printed forms are designed with boxes that can be marked with a dark pencil or ink. Such a document is read by an OMR, which transcribes the marks into electrical pulses that are transmitted to the computer. This technology is called Optical Mark Recognition (OMR).
   It is used for grading specially designed MCQ answer sheets and in areas where responses are one out of a small number of alternatives and the volume of data to be processed is large.

5. Bar Code Reader - A bar code is a collection or a sequence of lines of different heights and widths that are printed on various type of products. The Bar code reader is the machine that reads these bar codes.

   The optical impulses are translated into electrical signals. It has a light source, a lens and a light sensor.

6. Biometric Sensor – It is an input device that is used to uniquely identify a person on the basis of physical or behavioral traits. It can scan human characteristics, such as eyes, fingerprints and even DNA. GREAT !!!
   It is very common now in offices and institutions for marking attendance of employees or students. It is very popular in banks and other security places to provide restricted entry of only certain known people.

7. Touch Screen - It is a type of display screen which allows interaction with computer through a touch-sensitive transparent panel covering the entire screen without any intermediate device. The touch screen uses a technology that enables the users to touch the screen with fingers to select objects. This facility is mostly found in public places like Automated Teller Machine, shopping malls, parks, airports, railway stations and in mobile devices.

8. Microphone - This device is an input device used to provide audio data to a computer. It works with a sound card and is mainly used for sound recording.

- Central Processing Unit (CPU) -

  The CPU also called the brain of a computer. It controls all the processing tasks taking place inside the computer. It consists of two components – ALU and CU that are responsible to perform special operations.
  - Arithmetic Logic Unit(ALU) – All kinds of calculations and comparisons are made by ALU. It performs the arithmetic (+, - , *, /) and other logical (>, <, >=, <=, <>) operations, sent from the memory and the result is returned to the memory. The result is either a true or a false which helps the computer to take the decision.
  - Control Unit (CU) – This controls the flow of data from input devices to memory and from memory to output devices. It does not actually process the data instead it sends control signals to ALU and memory for carrying out the required operations.
  - Registers – These are high speed temporary storage areas found in the CPU. Registers work as per the instructions given by the CU the control unit. IT works according to the instructions given by the CU. Registers can be of different sizes (16 bit, 32 bit, 64 bit and so on) and each register inside the CPU has a specific function like storing data, storing an instruction, storing address of a location in the memory etc.
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- Memory Unit (MU) – Memory unit (Primary / Main Memory) is used as a storage unit for program as well as data. There are two types of memory – primary and the secondary.
  The main memory is responsible to store information (data and instructions). The memory unit is or main memory is divided into : Random Access Memory (Ram) and Read Only Memory (ROM).

  * RAM – It is read/write memory as it is possible to both read from and write to location within RAM. It is used for primary storage in computers to hold active information of data and instructions. It is volatile and loses its contents the moment the computer is switched off.

* ROM – It is read only memory i.e. the data and the instructions are placed in the ROM at the time of its manufacturing and can't be changed thereafter.
Do you know that the ROM is slower than the RAM ?!
*Cache memory – This is a small memory that operates much faster than the primary memory or Ram. When the CPU requires certain data present in RAM it first sends the request to the cache.
It is placed between the CPU and the main memory.
*Units of Memory – The elementary unit of memory is a bit. A bit stands for binary digit i.e., either 0 or 1. The combination of these 0's and 1's together are used to store data and instructions. Eight bits form 1 byte and a group of four bits form a nibble.

Given here are the Computer Memory Units :

S. No.	Unit	Description
1.	Binary Digit	1 Bit
2.	Byte	1 Byte = 8 Bits
3.	Kilo Byte (KB)	1 KB = 1024 Bytes
4.	Mega Byte (MB)	1 MB = 1024 KB
5.	Giga Byte (GB)	1 GB = 1024 MB
6.	Tera Byte (TB)	1 TB = 1024 GB
7.	Peta Byte (PB)	1 PB = 1024 TB
8.	Exa Byte (EB)	1 EB = 1024 PB
9.	Zetta Byte (ZB)	1 ZB = 1024 EB
10.	Yotta Byte (YB)	1 YB = 1024 ZB
11.	Bronto Byte (Brontobyte)	1 Bronto Byte = 1024 YB
12.	Geop Byte (Geopbyte)	1 Geop Byte = 1024 Brontobytes

- Output Unit – The output unit is formed by the output devices attached to the computer. It produces the output generated by the CPU.
Lets have a reading –

The commonly used output devices are explained as under:

- **Visual Display Unit (VDU)/Monitor:** The monitor, popularly known as screen, is the most common device for displaying the output of the computer-processed information. It displays information in the same way as it is seen on a television screen. The monitor is also called Visual Display Terminal (VDT) or Visual Display Unit (VDU). Its display may be CRT (Cathode Ray Tube), LCD (Liquid Crystal Display), Plasma or touch-sensitive.

CTM: A monitor is termed as an Input as well as an Output device.

- **LCD Screen (Television):** A Liquid Crystal Display (LCD) is smaller and lighter in weight as compared to a CRT monitor and, hence, ideal for use in laptops, palmtops and other portable devices.

- **Printer:** A printer is an output device which is used to generate hard copies (printout) of the output generated by the computer system. The printer can generate both text and images on paper.

  Printers are classified as **Impact** (there is a mechanical contact between printer head and paper) and **Non-impact Printers** (no mechanical contact between printer head and paper). The various types of printers are as follows:

  (i) **Dot Matrix Printer:** A dot matrix printer (also known as Serial printer) prints one character at a time. It uses dots to create an image. This printer prints characters by striking an ink-soaked ribbon against the paper and, hence, is termed as Impact Printer. These printers have low operating costs and can be used to generate carbon copies also.

  (ii) **Inkjet/DeskJet/Bubble Jet Printers:** An inkjet printer is the most common type of low-cost printer. It uses the technique of spreading quick dry ink on paper. The ink is stored in the form of cartridges of different colours (red, green, black and yellow). These printers generate high quality prints and are ideal for small offices and homes.

  (iii) **Laser Printers:** These printers use laser technology to produce printed documents. They are very fast and are used for high quality prints.

- **Speakers:** A speaker is a type of output device that generates sound as an output. For a speaker to produce sound, a special device called sound card is required to be installed in the computer system.

- **Plotters:** Plotters are output devices that are used for producing good quality images and drawings. Unlike printers, they support printing of large-sized papers. They are mainly used in computer-aided design (CAD).

- <u>Secondary Memory</u> -

Secondary storage devices are used to store a large amount of data permanently, which is not possible by using the primary or main memory. The amount of data a disk can hold is defined as Disk Capacity, which is measured in terms of bytes, kilobytes (KB), megabytes (MB), and so on. Some of the common secondary storage devices are as follows:

(a) **Hard Disk:** A hard disk is a non-volatile, high capacity storage device ranging from 1GB to several terabytes. It consists of solid rounded disks, packed on one another, made up of a magnetic material and sealed inside a case. It does not get lost or damaged by mishandling, as a hard disk is generally fixed inside the computer.

Data is stored on the platters in **tracks**, **sectors** and **cylinders** to keep it organized and to make it easier to find.
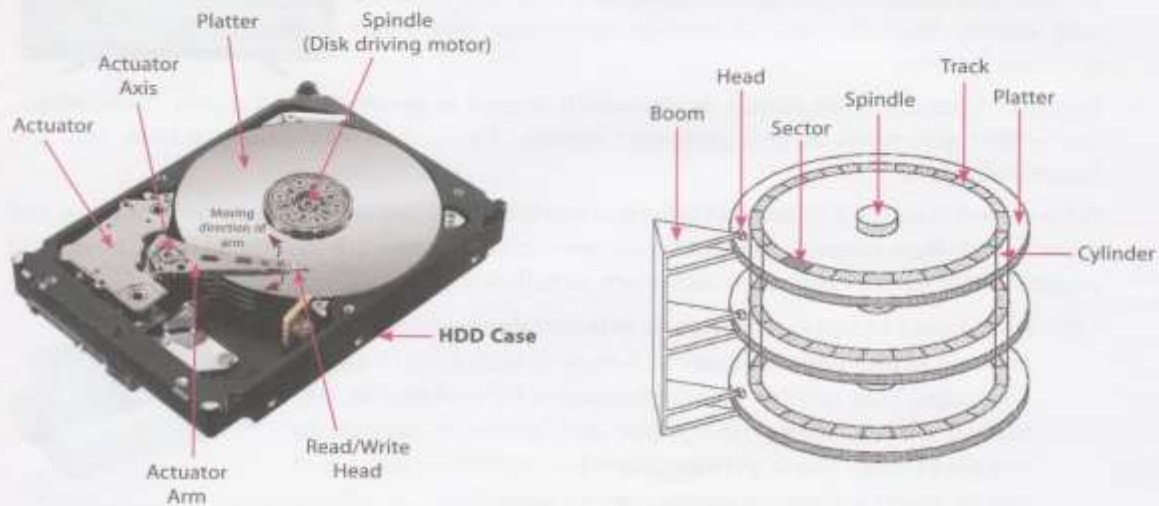

Fig. 1.8: Hard Disk and its Major Components

- **Track:** Each platter is divided into concentric rings called "tracks". There are thousands of tracks on each platter. A track is divided into segments of **sectors** which is the basic unit of storage.

- **Sector:** Each track is divided into sectors. A sector, as a rule, holds 512 bytes of data.

- **Cylinder:** A cylinder consists of a set of tracks described by all the heads (on separate platters) at a single seek position. Each cylinder is equidistant from the centre of the disk.

(b) **Blu-ray Disk:** A Blu-ray Disk (BD) is a high-capacity optical disk medium developed for recording, rewriting and playing back high definition video. It can store large amounts of data and was designed to supersede the DVD. Blu-ray disks support higher resolutions and more advanced video and audio formats as compared to DVDs.

(c) **Compact Disk (CD):** It is a thin optical disk which is commonly used to store audio and video data. The capacity of standard 120mm CD is 700MB. Transfer speed is mentioned as a multiple of 150 KB/s, *for example*, 4X means 600 KB/s.

- **CONCEPT OF OPERATING SYSTEM –**

An operating system is a program that acts as an interface between the user and hardware of the computer as shown in Fig. 1.10. The OS helps to manage resources of the computer and optimize its performance. An OS is the first program to be executed on a computer after the BIOS. OS performs all basic tasks such as identifying basic input/output devices, accepting input from the input devices, sending results to the output devices, keeping track of files and directories on the disk, and controlling other peripheral devices such as disk drives and printers.
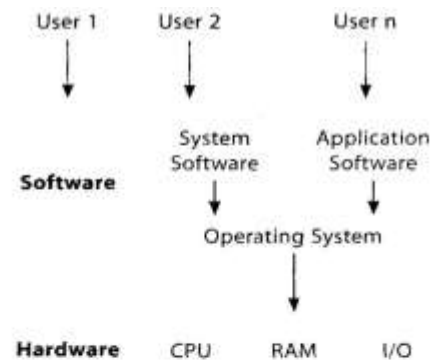

Fig. 1.10: Operating System

CTM: An operating system is an integrated set of specialized programs that is used to manage the overall operations of a computer. It acts as an interface between the user, computer hardware and software.

Every computer must have an operating system to run other programs. DOS (Disk Operating System), UNIX, LINUX and Windows are some of the commonly-used operating systems.

Need for an Operating System

The operating system is an essential component of the system software inside a computer system. The need for an operating system is described below:

1. **User Interface:** Operating system provides instructions to prepare user interface, *i.e.*, the way to interact with the user either through GUI (Graphical User Interface) or command prompts.

2. **Program Execution:** Operating system loads necessary programs into the computer memory which are required for its proper functioning.

3. **Resource Allocation:** Operating system controls and allocates the system resources like CPU time, memory (RAM), etc.

4. **Manipulation of File System:** Operating system manages the method/format in which information is stored on and retrieved from the hard disk.

5. **I/O Operations:** Operating system handles all the input-output (I/O) operations.

6. **Error Detection:** Operating system performs the crucial function of error detection and handling.

7. Operating system controls the various system hardware and software resources and allocates them to the users or programs as per their requirement.

Operating system, therefore, performs several functions such as Process Management, Memory Management, File Management and Device Management.

OS as a Resource Manager

Operating system is responsible for allocating resources to specific programs to complete their task.

When a computer has multiple users, the need for managing and controlling the resources (like memory, file, devices, etc.) is even greater. Operating system keeps track of who is using

which resources , grants request and handles the same from different users and programs.

Thus OS as a resource manager manages and protects multiple computer resources – CPU, Processor, Internal external memory, applications, users, communication channels and many more.

In short OS is a great manager.

*************** End ****************