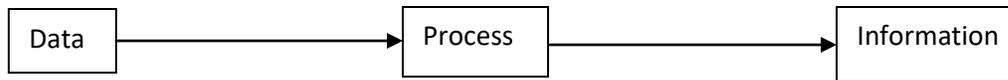


## Data, Information & Computer memory

A computer is an electronic device which accepts data given by the user, i.e. **input**. It then **processes** the data according to the given instructions and finally produces the result as **output**.



### Data and information:

Data is any collection of numbers, characters or other symbols that has been coded into a format that can be input into a computer and processed. Data on its own has no meaning. In other words, data can be defined as a representation of facts, concepts, or instruction collected for analysis. It is only after processing by a computer that data becomes information.

The main types of data that can be input into a computer are numeric, float, text, data, graphics and sound. Data is stored as a series of numbers inside the computer.

### Characteristics of a computer:

- (a) **Speed:** Computer can process millions of instructions in seconds. Some calculation that would have taken hours and day to complete can be completed in a few seconds using the computer. The speed of computer is calculated in terms of MIPS (Million of Instructions Per Second).
- (b) **Accuracy:** A computer provides a high degree of accuracy. Every calculation is performed with the same accuracy.
- (c) **Diligence:** Computer can work for hours without any break or boredom. It does not get tired.
- (d) **Storage capacity:** Computer can store very large amount of data. You have many storage devices like CD, DVD, flash derive, etc. to store your data.
- (e) **Versatility:** Computer can be used to perform different types of tasks. At one point of time, you can type a document, the next moment you can listen to a song or watch a video.

- (f) **Compactness:** With regular advancements in technology, the computer size is decreasing.
- (g) **Reliability:** Computer does not make mistakes. If the input is correct, then the computer always gives the relevant answer to the output.
- (h) **Power of remembering:** The data stored in the computer can be recalled at any time.

### **Limitations of a computer:**

Computer is a versatile machine and performs multiple functions, but it has the following limitations:

- **Lack of decision making ability:** A computer does not have a brain like human beings. It cannot take a decision on its own. It can only perform the tasks that are instructed by the human being.
- **Lack of intelligence:** A computer is not gifted with intelligence as human beings are. It can only work as per the instructions given by human beings.
- **Lack of feelings and emotions:** Computers are different from human beings. It does not process feelings and emotions like human beings. It cannot do any things on its own.
- **Time taken in planning and programming:** We have to first choose the jobs to be computerized, and then proper planning and development of programs can take days, months and sometimes even years.

## Working of a Computer:

A commonly used computer needs the following hardware to work:

- Input devices
- Output devices
- Storage devices
- Processing devices (CPU)

Along with the hardware, the computer requires software to work.

A set of instructions written in any computer language is known as a **program**. Programs are stored in the computer's memory.

## Input devices:

A computer accepts data and instructions from you through input devices. Data can be in the form of numbers, text, sound or graphics, Some of the input devices are:

### Keyboard:

A computer keyboard is the main input device for computers. You can press the keys on it to input data in the form of words and numbers.

A standard keyboard has 104 keys, which can be classified as follows:

- Alphanumeric keys (A-Z, a-z, 0- 9)
- Control keys (ctrl, Alt, Esc, etc.)
- Function keys (F1 to F12)
- Special keys (Caps Lock, Backspace, Spacebar, Arrow keys, Home, End, etc.)
- Punctuation keys (“, “, “-“, ; , etc.)

### Mouse:

It is a pointing device that allows you to put data into a computer by using the **point**, **click** and **drag and drop** commands. It controls the movement of the pointer on the screen. It is used to move and select icons, files and folders on your computer. It can also be used to draw pictures.

**Scanner** ( Hand held Scanner, Flatbed Scanner, Sheetfed Scanner).

**Web camera, Graphic Tablet, Joystick, Microphone, Touchscreen.**

### **Processing Device:**

Processing is done on the data entered into the computer, to convert it into meaningful information through a processor with the help of a CPU.

#### **CPU:**

CPU (Central Processing Unit) is a processor, sometimes called a microprocessor. It is the brain of the computer that does all the calculations, and runs all the programs. It manages all the operations and carries out the basic instructions which operate a computer. The three main components of CPU are:

- **ALU** (Arithmetic Logic Unit): Performs mathematical and logical operations.
- **CU** ( Control Unit): Directs all the operations of a processor.
- **Memory Unit**: Stores data and instructions.

The speed of a CPU is measured in Megahertz. Higher the value, faster is the information processed by the CPU.

### **Output Devices:**

The output devices are used to display the information and result of computation to the user. Some of the output devices are: Monitor, Printer, Speakers, etc.

**Mother Board:**

The motherboard is sometimes called the system board or main circuit board. Many electronic components are attached to the motherboard or are built into it. The motherboard contains the connectors or slots for attaching additional boards, CPU and memory.

At the back of the system unit, there are slots and holes called Ports. These ports are used to plug different computer devices like keyboard, monitor, mouse, external hard disk, pen drive etc.

**Computer Memory:**

The data and instructions that are entered into the computer using input devices are to be stored inside the memory. There are two types of memory:

- Primary Memory
- Secondary Memory

**Primary Memory:**

This is the main memory of the computer. CPU can directly access this memory. It is fixed on the motherboard of the computer.

Primary memory is further divided into two types:

- Random Access Memory (RAM)
- Read only Memory (ROM)

**Random Access Memory (RAM):** RAM is a temporary memory. The information stored in this memory is lost when the computer is turned off. That's why it is also called volatile memory. It stores data and instructions given by the user and also the results produced by the computer temporarily.

RAM can be of two types:

- Dynamic RAM (DRAM)
- Static RAM (SRAM)

**Dynamic RAM (DRAM)** requires continuous power to refresh the data stored.

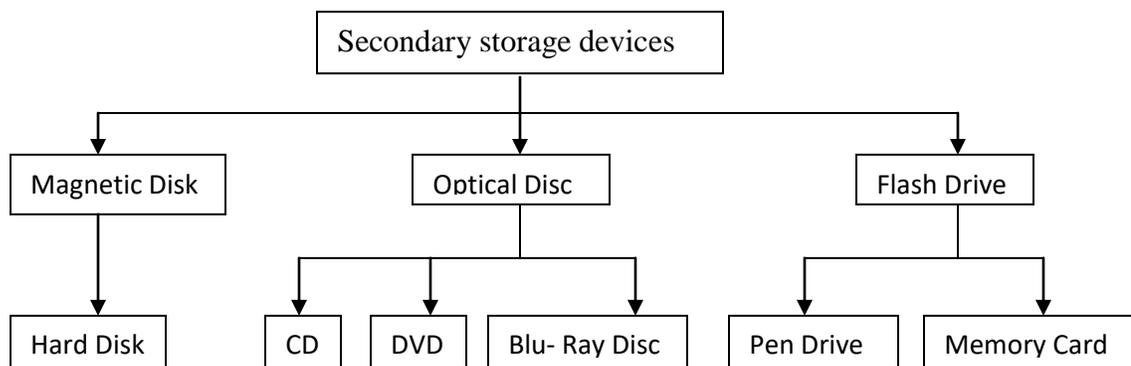
**Static RAM (SRAM)** also needs constant power to hold on to data, but it doesn't need to be continually refreshed the way DRAM does. However, SRAM is significantly faster and uses less power than DRAM.

### **Read only Memory (ROM):**

Information stored in ROM is permanent in nature, i.e., it holds the data even if the system is switched off. It holds the starting instructions that are required to start a computer. It is also called non-volatile memory.

### **Secondary Memory:**

This memory is permanent in nature and is not directly accessed by the CPU. It allows users to store data that may be easily retrieved. It is cheaper as compared to primary memory. Secondary memory devices are also called secondary storage devices. They are categorized into three types:



### **Magnetic Disk:**

A device, such as a hard disk is covered with a magnetic coating. You can record and erase data on a magnetic disk any number of times.

**Hard Disk:**

The hard disk consists of one or more magnetic disks called platters, Each disk in the pack has top and bottom surfaces on which data is recorded using magnetic head. It is permanently fixed in the system unit. It is usually used for permanent mass storage. The most important function of the hard disk is to store program files and data files. The hard disk comes in a variety of sizes with storage capacities as high as 5 TB (Tera bytes) or even more. The CPU accesses data stored on a hard disk much faster than it can access data on a CD.

**External Hard Disk:**

External hard disks are also available. They are the hard disks that can be connected to any computer with the help of USB port.

**Optical Disc:**

An optical disc is an electronic data storage medium that can be written to and read using a low powered laser beam.

**Compact Disc (CD):**

The CD drive reads information stored on a compact disk (CD). CD is an external storage device. The lifespan of optical disk is more than a magnetic disk. It can hold upto 700MB of data. CD drive is usually connected inside the CPU box but can also be connected using USB port. Types of CDs:

- **CD-ROM (Compact Disk Read Only Memory):** A CD-Rom is a CD containing data which has been written at the time of manufacturing. The data cannot be modified or erased.
- **CD-R (Compact Disk Recordable):** A CD-R can be used to write data by the user only once. This data cannot be changed or erased.
- **CD-RW (Compact Disk Rewritable):** A CD-RW can be used to write data again and again. The data can be erased and modified as many times as required.

Another optical disc is **Digital Versatile or Video Disc (DVD), Blu\_Ray Disc,**

**Flash Drive:**

The Flash drive is a small portable data storage device integrated with a USB (Universal Serial Bus) connector.

eg. **Pen Drive, Memory Card.**

**Measuring the computer's memory:**

The basic unit for measuring the memory of a computer is byte. A byte consists of a group of eight, for example, 10001011, i.e. 1 byte equal to 8 bits. A group of 4 bits is known as a nibble (half byte) for example, 1001, i.e. 1 nibble equal to 4 bits.

Other units for measuring the computer's memory are kilobyte, megabyte, gigabyte, terabyte, and so on.

- 1024 bytes = 1 KB
- 1024 KB = 1 MB (Megabyte)
- 1024 MB = 1 GB (Gigabyte)
- 1024 GB = 1 TB (Terabyte)
- 1024 TB = 1 PB (Petabyte)
- 1024 PB = 1 EB (Exabyte)
- 1024 EB = 1 ZB (Zettabyte)
- 1024 ZB = 1 YB (Yottabyte)

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