# Introduction to Computers

### Computer System

A computer is a fast electronic device that processes the input data according to the instructions given by the user and provides the desired information as an output.

A complete computer installation including the central processing unit, the peripherals such as hard disk drives, floppy disk drives, monitor, printer, mouse and operating system which are designed to work and interact with each other and with the user is called a computer system.

## Components of a computer system

A computer system has following three main components:

    (a) Input/ Output Unit
    (b) Central Process Unit
    (c) Memory Unit
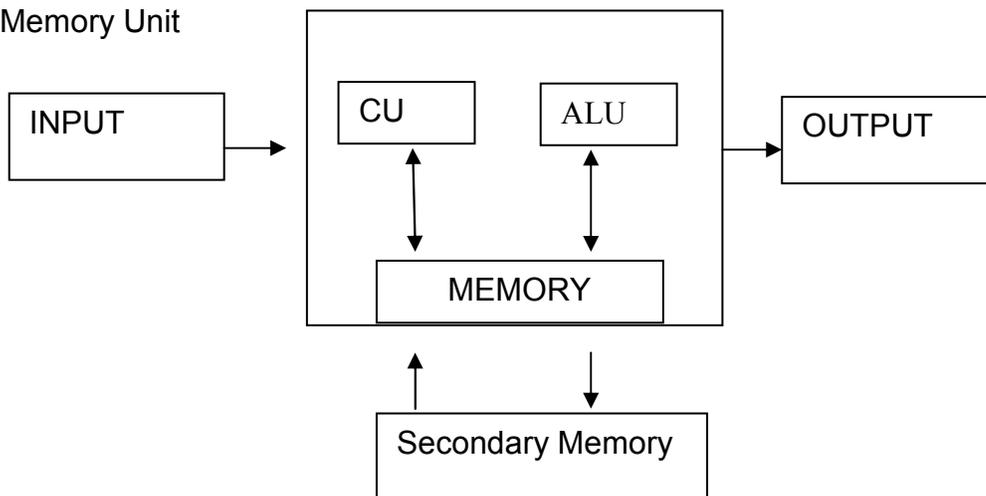


***Input/output Unit:*** We know that the computer is a machine that processes the input data according to given set of instructions and gives the output. Before a computer does processing, it must be given data and instructions. After processing, the output must be displayed or printed by the computer. The unit used for getting the data and instructions into the computer and displaying or printing output is known as an Input/output Unit (I/O Unit).

The Input Unit is used to enter data and instructions into a computer. There are many peripheral devices, which are used as input/output units for the computer. The most common form of input device is known as a terminal. A terminal has a electronic typewriter like device, called keyboard along with a display screen, called Visual Display Unit (VDU) or monitor. Keyboard is the main input device while monitor can be considered both as an input as well as an output device. There are some other common input devices like mouse, punched card, type, joystick, scanner, modem etc., which are explained in later part of this chapter. Monitor, printer and plotter are the main peripheral devices used as output units for the computer.

***Central Processing Unit:*** Central Processing Unit (CPU) is the main component or "brain' of a computer, which performs all the processing of input data. Its function is to fetch, examine and then execute the instructions stored in main memory of computer. In microcomputers, the CPU is built on a single chip or Integrated Circuit (IC) and is called as Microprocessor. The CPU consists of following distinct parts:

1. **Arithmetic Logic Unit (ALU)**: The arithmetic and logic unit of CPU is responsible for all arithmetic operations like addition, subtraction, multiplication and division as well as logical operations such as less then, equal to and greater than. Actually, all calculations and comparisons are performed in the arithmetic logic unit.

2. **Control Unit (CU):** The control unit is responsible for controlling the transfer of data and instructions among other units of computer. It is considered as a "Central Nervous System" of computer, as it manages and coordinates all the units of computer. It obtains the instructions from the memory, interprets them and directs the operation of the computer. It obtains the instructions from the memory, interprets them and directs the operation of the computer. It also performs the physical data transfer between memory and the peripheral device.

3. **Registers**: Registers are the small high speed circuits (memory locations) which are used to store data, instructions and memory

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addresses (memory location numbers), when ALU performs arithmetic and logical operations.  Registers can store one word of data (1 word = 2 bytes & 1 byte = 8 bit; details of BITS AND BYTES are discussed in later part of this chapter) until it is overwritten by another word.  Depending on the processor's capability the number and type of registers vary form one CPU to another. Registers can be divided into six categories viz.  General Purpose Registers, Pointer Registers, Segment Registers, Index Registers, Flags Registers and Instruction Pointer Registers, depending upon their function.  The detailed functions of each and every register are beyond the scope of this book.

4. **Buses**: Data is stored as a unit of eight bits (BIT stands for Binary Digit i.e. 0 or 1) in a register.  Each bit is transferred from one register to another by means of a separate wire.  This group of eight wires, which is used as a common way to transfer data between registers, is known as a bus.  In general terms, bus is  a connection between two components to transmit signal and Address Bus.  The data bus is used to move data, address bus to move address or memory location and control bus to send control signals between various components of a computer.

5. **Clock**: Clock is another important component of CPU, which measures and allocates a fixed time slot for processing each and every micro-operation (smallest functional operation). In simple terms, CPU is allocated one or more clock cycles to complete a micro-operation (smallest functional operation). In simple terms, CPU is allocated one or more clock cycles to complete a micro-operation. CPU executes the instructions is synchronization with the clock pulse.

The clock speed of CPU is measured in terms of Mega Hertz (MHz) or Millions of Cycles per second.  The clock speed of CPU varies from one model to another in the range 4.77 MHZ (in 8088 processor) to 66 MHz (in Pentium).CPU speed is also specified in terms of Millions of Instructions Per Second (MIPS) or Million of Floating Point Operations Per Seconds (MFLOPS).

***Memory Unit:*** Memory Unit is an important component of a computer system, which is used to store the data, instructions and information before, during and after the processing by ALU. It is actually a work area (physically a collection of integrated circuits) within the computer, where the CPU stores the data and instructions.  It is also known as a Main/Primary/ Internal Memory.  It is of following three types:

(a)     Read Only Memory (ROM pronounced as "Ra-om")

(b)     Random Access Memory (RAM pronounced as "R-aem")

(c)     Complementary Metal Oxide Semiconductor Memory (CMOS)

(a)     **Read Only Memory**: Read Only Memory is an essential component of the memory unit.  We know that the computer, being a machine, itself has no intelligence or memory and requires the instructions, which are given by man.  Whenever the compute is switched on, it searches for the required instructions.  The memory, which has these essential instructions, is known as Read Only Memory (ROM). This memory is permanent and is not erased when system is switched off.  As appears with its name, it is read type of memory i.e. it can be read and only and not be written by user/programmer. The memory capacity of ROM varies from 64 KB TO 256 KB (1 Kilobyte= 1024 bytes) depending on the model of computer.

ROM contains a number of programs (set of instructions).  The most important program of ROM is the Basic Input Output System (BIOS, pronounced as "bye-os"), which activates the hardware (physical components of computer) such as keyboard, monitor, floppy disk etc. in communicating with the system and application software (set of instructions or programs)
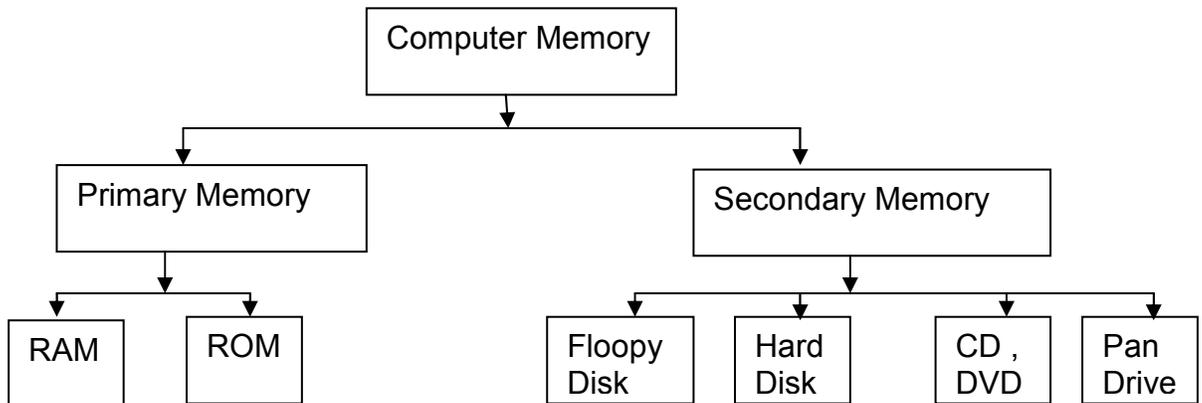
There are many types of ROM available for microcomputers like Mask ROM, PROM, EPROM, EEPROM and EAPROM. **Mask ROM** is the basic ROM chip. In this type of ROM, the information is stored at the time of its manufacturing. So, it cannot be altered or erased later on. **PROM**

stands for Programmable Read Only Memory. In this type of ROM, the information is stored by programmes after its manufacturing. It cannot be altered or erased later on. **EPROM** stands for Erasable Programmable Read Only Memory. It is similar to PROM, but its information can be erased later on by ultra violet light and it can be reprogrammed. **EEPROM** stands for Electrically Erasable Programmable Read Only Memory. It is similar to EPROM, but using a high voltage current can erase its information. **EAPROM** stands for Electricity Alterable Read Only Memory. As compared to EPROM and EEPROM, the information stored in EAPROM can be altered later.

(B) **Random Access Memory**: Random Access Memory (RAM) is another important component of Memory Unit. It is used to store the data and instructions during the execution of programme. Contrary to ROM, RAM is temporary and is erased when computer is switched off. RAM is read write type of memory and, thus can be read and written by user/programmer. As it is possible to randomly use any location of this memory, therefore, this memory is known as random access memory. The memory capacity of RAM varies from 640 KB to several megabytes (1 Megabyte= 1024 KB) with different models of PC.

There are two types of RAM used in PC –Dynamic and Static RAM. The information stored in **Dynamic RAM (DRAM)** has to be refreshed after every few milliseconds otherwise it is erased. DRAM has higher storage capacity and is cheaper than Static RAM. The information stored in **Static RAM** need not be refreshed, but it remains stable as long as power supply is provided. SRAM is costlier but has higher speed than DRAM.

(b) **Complementary Metal Oxide Semiconductor Memory**: Complementary Metal Oxide Semiconductor (CMOS) memory is used to store the system configuration, date, time and other important data. When computer is switched on, BIOS matches the information of CMOS with the peripheral devices and displays error in case of mismatching.

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                    ┌──────────────────┐
                    │ Computer Memory  │
                    └──────────────────┘
             ┌─────────────┴─────────────┐
    ┌─────────────────┐         ┌──────────────────┐
    │ Primary Memory  │         │ Secondary Memory │
    └─────────────────┘         └──────────────────┘
      ┌──────┴──────┐      ┌──────┬──────┬──────┐
   ┌──────┐   ┌──────┐  ┌──────┐┌──────┐┌──────┐┌──────┐
   │ RAM  │   │ ROM  │  │Floopy││ Hard ││ CD , ││ Pan  │
   └──────┘   └──────┘  │ Disk ││ Disk ││ DVD  ││Drive │
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**Hardware and Software components of a Microcomputer:**

In today's computer industry, a wide variety of hardware components are available for microcomputers. Managers must be aware of the working and uses of different hardware components, so that they can make good decisions about purchase of computer systems. The **hardware** components of microcomputer can be classified into following types:

(A) Motherboard

(B) Input Devices

(C) Output Devices

(D) Storage Devices

(E) Cards

(F) Ports and Cords

(G) Power Supply

The following table clarifies the meaning of the components:

| Sr. No. | Name | Meaning | Examples |
|---|---|---|---|
| 1. | Motherboard | Motherboard, also called as System Board, is the most important hardware component of a microcomputer. | A motherboard contains the CPU chip, Memory chip (ROM and RAM chips), I/O interface, expansion slots and many other logic circuits. |
| 2. | Input Devices | Input devices are used to input data, information and instructions into the RAM. | Keyboard, Trackball, Light Pen, Touch Screen, Joystic, Digitiser, Scanner, Optical Mark Reader (OMR), Optical Character Reader (OCR), Bar Code Reader, |

| | | | Magnetic Ink Character Recognition (MICR), Voice-Input Devices. |
|---|---|---|---|
| 3. | Output Devices | Output devices are hardware components which are used to display or print the processed information. | Monitor, Printer, Plotter |
| 4. | Storage Devices | To Store the data, instructions and information. There are two types of Storage devices Primary Memory and Secondary Memory | Floppy Disk, Hard disk, Compact Disk, Magnetic Tape, Video Disk, Magneto Optical Drive , DVD RAM/ROM Disk. |
| 5. | Cards | Cards are the printed circuit boards used to hold the chips (integrated circuits) | Video Card, Sound Card, I/O Card, Controller Card and Memory Card. |
| 6. | Ports and Cords | The rear of a PC has many empty holes or external sockets called ports or connectors. Cords are the cables used to plug into the ports. | Serial Port, Parllel Port, Game Port and Video Port. Keyboard Cords, power cords, monitor cords and printer cords. |
| 7. | Power Supply | Power Supply is considered as the 'Heart' of a PC. Power supply is that important hardware, which provides the power source to a computer. | UPS, CVT |

## (B) SOFTWARE

Software relates to a set of Program. The software control the computer hardware parts and makes them operational. In other words, it governs the operations of a computer system.

(a) System Software

(b) Application Software

| Sr. No. | Name | Definition | Examples |
|---|---|---|---|
| 1. | System Software | Software, which are required to control the working of hardware and aid in effective execution of a general user's application are called system software. For e.g. Windows, Linux, MAC OS | (i) System Management Software (Operating Systems ) (ii) System Development Software (Language Translators, Application Generators, CASE Tools) (iii) System Software Utilities such as Windows, Linux |
| 2. | Application Software | Software which are required for general and special purpose applications like database management, word processing, accounting etc, are called as application software. For e.g. MS-Office | (I) General Purpose Application Software (Database Management Packages, Word Processors, Spreadsheets, Office Automation Packages) (II) Special Purpose Application Software (Desktop Publishing, Multimedia, Business Applications) |

**Accessing Computer Memory:**

Primary memory can be directly accessed by the CPU but secondary memory cannot be accessed directly. Data from secondary memory is first transferred to the primary memory and then from the primary memory to the CPU.

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        ┌─────────────────┐
        │   Processing    │
        └─────────────────┘
          ▲            │
          │            ▼
        ┌─────────────────┐
        │  Primary Memory │
        └─────────────────┘
          ▲            │
          │            ▼
        ┌─────────────────┐
        │ Secondary Memory│
        └─────────────────┘
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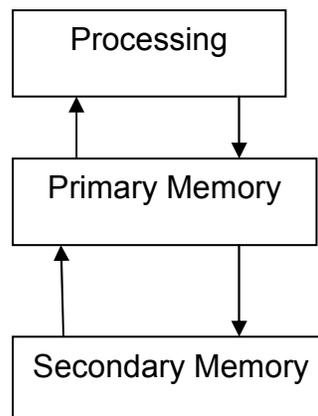
**Pictorial Representation of Hardware and Software**

Hardware

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System Software

↓

Application Software

↓

User
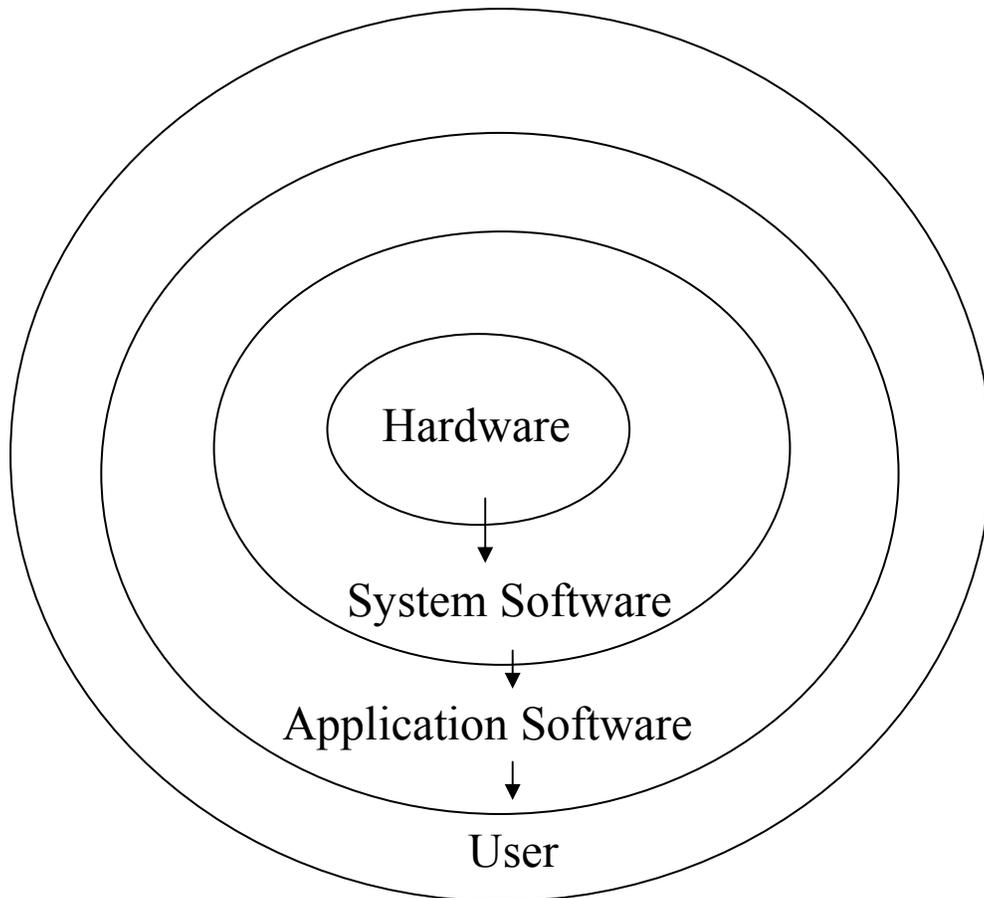
**Virus**

A **computer virus** is a [computer program](#) that can copy itself and infect a computer. The term "virus" is also commonly but erroneously used to refer to other types of [malware](#), including but not limited to [adware](#) and [spyware](#) (S**pyware** is a type of malware that can be installed on [computers](#), and which collects small pieces of information about users without their knowledge. The presence of spyware is typically hidden from the user, and can be difficult to detect.) Typically, spyware is secretly installed on the user's [personal computer](#) programs that do not have the reproductive ability. A true virus can spread from one computer to another (in some form of executable [code](#)) when its host is taken to the target computer; for instance because a user sent it over a network or the Internet, or carried it on a removable medium such as a [floppy disk](#), [CD](#), [DVD](#), or [USB drive](#).[2]

Types of Viruses

There are many types of computer viruses:

- **File virus** : Most viruses fall into this category. A virus attaches itself to a file, usually a program file.
- **Boot sector virus** : These viruses infect floppy and hard drives. The virus program will load first, before the operating system.
- **Macro Virus** : This is a new type of virus that use an application's own macro programming feature to distribute themselves. Unlike other viruses, macro viruses do not infect programs; they infect documents.
- **Virus Hoax** : Although there are thousands of viruses discovered each year, there are still some that only exist in the imaginations of the public and the press - known as virus hoaxes. These viruses hoaxes DO NOT EXIST, despite

  **The Types Of Computer Viruses**

  **There are six broad categories or types of computer viruses:**
  **1. Boot Sector Virus**
  **2. File Infection Virus**
  **3. Multipartite Virus**
  **4. Network Virus**
  **5. E-mail Virus**
  **6. Macro Virus**

  **Boot Sector Viruses**


  Viruses that aim at the boot sector of a hard drive are infecting a very crucial component of the boot process. The boot sector holds critical information that controls the hard drive and also the part of the operating program that is in

charge of the whole boot process. These types of computer viruses go a long way toward the assurance they will be successful in their mission by absolutely loading into the system memory while the boot cycle is starting.

Unlike other viruses the boot virus does not affect files, instead it goes after the drive itself on which the virus is saved and this is part of the reason that it is no longer as big a threat as it used to be. Since the advent of CDs and DVDs and the drives that carry them it is not possible to infect the programs that they carry. In the days of floppy drives the virus could spread quite quickly from computer to computer via the disks but since it is not possible to infect a CD or DVD this virus has become almost a non threat. Another reason this types of computer viruses have become less common is that now operating systems stand guard over the boot sector and that makes it very hard for the virus to have any effect.

**File Virus**

File viruses are coded so that they will attach themselves to exe files, compressed files like zip files and driver files. The can be set into actions when the program they are attached to is started. Then after the virus is set into motion it will attach itself to other programs and system files and start along its intended path for which it was written. So you see it is a two prong approach. First depending on the types of computer viruses it will duplicate and then go about its intended mission. The virus will search through the programs in the system and find places to infect with the code and then it will activate when that program is run next time. It will continue to duplicate until it is all over the computer and probably any computer that is attached to the original system.

Often these viruses will harbor special code that causes them to be activated when certain events take place. The event often is a date or some other trigger event that is easily defined on any computer system you may have.

**Multipartite Viruses**

That which has been termed the multipartite virus are the **types of computer viruses** that are both a file virus and a boot sector virus. They enter the computer via various sorts of media and then embed themselves in the system memory. They then go into the hard drive and infect the boot sector. Once installed in the boot sector these types of computer viruses infect executable files and spread themselves in the system.

This is another virus that has past its prime for various reasons but in times past these types of computer viruses were responsible for many infections because they combined characteristics of two different viruses into one.

**Network Viruses**

A virus that is especially made for networks is uniquely created to quickly spread throughout the local area network and generally across the internet as well. Most of the time is moves within shared resources like drives and folders. Once it finds entry into a system it will search for vulnerable computers in the network and likewise infect that system and do the same again and again always on the hunt for new vulnerable systems.

**E-Mail Viruses**

Most of the time a e-mail virus is one of those types of computer viruses that is generally a macro virus and it will multiply itself by seeking out the other contacts in a e-mail address book and then send itself to those addresses in hopes that they will activate the virus too. Thus it spreads over and over again exponentially. There are even times an email virus can spread by only previewing it in the mail client. One that was very successful in spreading worldwide was the ILOVEYOU virus and it was destructive too.

**Macro Viruses**

Macro viruses as the name implies, will infect files of programs that use macros in the program itself. The most common of these are the Microsoft Office files created in Excel spreadsheets, Word documents, Access databases, Powerpoint presentations and these type of files from AmiPro and Corel Draw and others.

These **types of computer viruses** are programmed using the language that the application understands and not in the language of the operating system thus they are operating in a way that is independent of the operating system so it can infect any kind of system be it Mac, PC or even Linux just as long as the computer is running the application that understands the macro virus. As the macro language has become more and more powerful the threat of these types of computer viruses has graduated to more critical types of computer viruses. These viruses have been around since 1995 and the first was found to infect Microsoft Word but now have moved to other programs and they number in the thousands.

One should always be on the lookout for these types of computer viruses and should take every precaution to avoid them. Be ever watchful of every file you open or else you may be looking for my next hub on how to remove these *types of computer viruses*.

**How to create a folder**

1.  Select the location where you want to create a folder for e.g Desktop, hard disk
2.  Click on Mouse Right Button
3.  Go to New- folder(Click mouse left button)
4.  Type the name of folder

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┌──────────────┐      ┌──────────────┐      ┌──────────────┐      ┌──────────────────────┐
│ Select the   │ ───> │ Click        │ ───> │ Go to        │ ───> │ Go to Folder and     │
│ location     │      │ mouse right  │      │ New          │      │ click left button of │
│              │      │ button       │      │              │      │ mouse                │
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       ┌──────────────┐      ┌──────────────┐
  ───> │ Type the     │ ───> │ Click        │
       │ Name of      │      │ outside      │
       │ folder       │      │ the box      │
       └──────────────┘      └──────────────┘
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