

Computer System

As you know computer is an electronic device built to recognise and follow a given set of instructions by retaining the instructions one by one and working on the data to produce results, often called output.

In short, we can say a computer is an electronic device with ability to:

- a) accept user-supplied data
- b) input, store and execute programmed instructions
- c) output results according to user's requirements.

This chapter includes

- ▶ Computer System
- ▶ Input Devices
- ▶ Output Devices
- ▶ Processing Devices
- ▶ Storage Devices
- ▶ Primary Memory
- ▶ Secondary Memory
- ▶ Measuring Memory
- ▶ Software

Computer System

All the components together combine to form a computer system. A computer system is a machine that is designed to follow a set of instructions known as program, to give the desired result known as output. Let us know how computer works in brief.

There are three stages to computer process: input, processing and output. Input requires specific devices, such as the mouse and keyboard which enable you to tell the computer to do something. This can range from opening a program to display the words that you typed. The operating system (OS) provides the interface and the tools so that a microprocessor and other components can carry out your request. The image on your screen or sound from the speakers tells you that the computer has processed your command and has given you a result. This process requires the interaction of many components of hardware and multiple softwares.

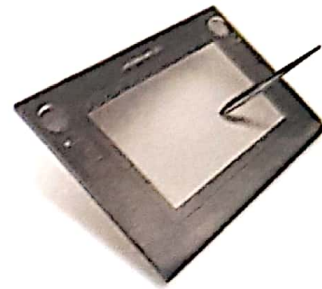
The four main components of computer are: Input devices, Output devices, Processing devices and Storage devices.

Input devices

Let us know some of the modern input devices.

Drawing Tablet

A graphics tablet or digitizer is a computer input device that enables a user to hand-draw images and graphics, in the similar way as a person draws images with a pencil and paper. These tablets may also be used to capture data or handwritten signatures. It can also be used to trace an image from a piece of paper which is taped or otherwise secured to the surface.



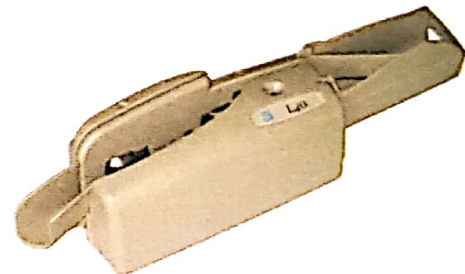
Touch screen

A touch screen is a computer display screen that is also an input device. The screens are sensitive to pressure; a user interacts with the computer by touching pictures or words on the screen. Touch screens are commonly used in ATMs and tablet PCs.



MICR (Magnetic ink character recognition)

Magnetic ink character recognition, or MICR, is an input device which is primarily used by the banking industry to facilitate the processing and clearance of cheques and other documents. It is located at the bottom of a cheque.

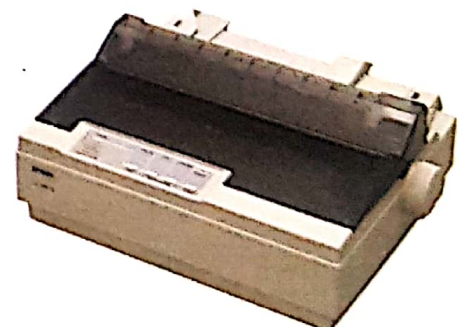


Output devices

An output device is used to communicate the results of data processing carried out by CPU of your computer system which converts the electronically generated information into hard copy.

Dot Matrix Printer

Dot matrix printing or impact matrix printing is a type of computer printing which uses a print head that runs back and forth or in an up and down motion, on the page and prints by impact, striking an ink-soaked cloth ribbon against the paper, similar to the print mechanism on a typewriter.



Inkjet Printer

Inkjet printing is a type of computer printing that creates a digital image by propelling droplets of ink onto paper. Inkjet printers are the most commonly used type of printer and range from small inexpensive consumer models to very large and expensive professional machines.



Laser printer

It is a type of printer that utilizes a laser beam to produce an image on a drum. The light of the laser alters the electrical charge on the drum wherever it hits. The drum is then rolled through a reservoir of toner, which is picked up by the charged portions of the drum. Finally, the toner is transferred to the paper through a combination of heat and pressure. This is also the way copy machines work.

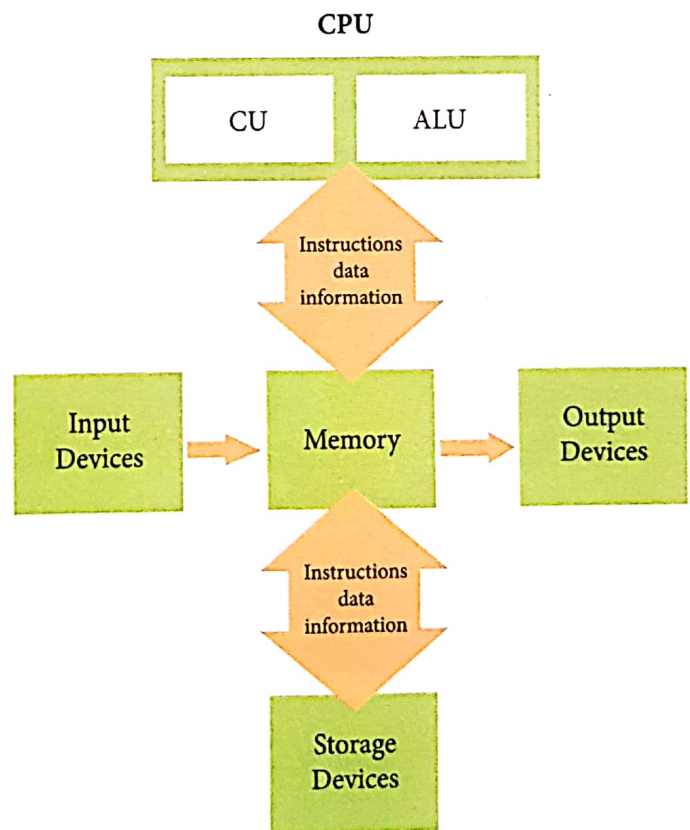


Processing devices

As we learnt earlier, the processing unit is the brain of the computer. Processing unit is commonly known as Central Processing Unit (CPU). This unit carries and performs all the calculations and operations that a computer system is subjected to. A CPU is further divided into three parts. Each part is allocated and designed to perform a specific kind of function. The parts are as follows:

ALU

ALU stands for Arithmetic Logic unit. As the name suggests, this unit of CPU is responsible for all the arithmetic and logical operations given to the computer such as addition and multiplication and all comparison operations. ALUs are designed to perform integer calculations. Therefore, besides adding and subtracting numbers, ALUs often handle the multiplication of two integers, since the result is also an integer. While the ALU is a fundamental component of all processors, the design and function of an ALU may vary between different processor models. For example, some



ALUs only perform integer calculations, while others are designed to handle floating point operations as well.

CU

CU stands for Control Unit. Justifying the name, CU works to coordinate all the other functions of the computer. In other words, a control unit is circuitry that directs operations within the computer's processor by directing the input and output of a computer system. The processor then controls how the rest of the computer operates (giving directions to the other parts and systems). A control unit works by gathering input through a series of commands it receives from instructions in a running program and then outputs those commands into control signals that the computer and other hardware attached to the computer carry out.

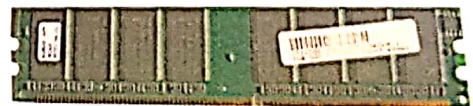
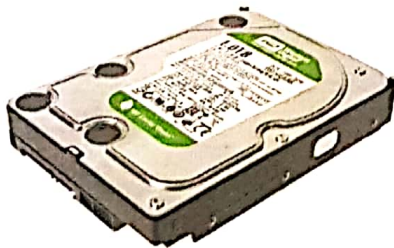
MU

MU stands for Memory Unit and forms an important component of CPU. As the name suggests, this unit is responsible to retain the memory of the computer. MU is responsible to hold, receive and deliver data that is given to the computer.

Storage devices

Storage devices can be divided in two parts:

- **Internal memory:** It means inside the computer like the hard drive and RAM.



- **External memory:** It means removable media like CDs/DVDs, external hard drives and pen drives which are outside the computer.



Internal memory means memory of computer. Let us enhance our knowledge about the memory of the computer.

Computer Memory

A computer is usually an electrical device, which understands only electricity on and electricity off. This is expressed by using two symbols i.e. 0 and 1 which are called binary digits or bits.

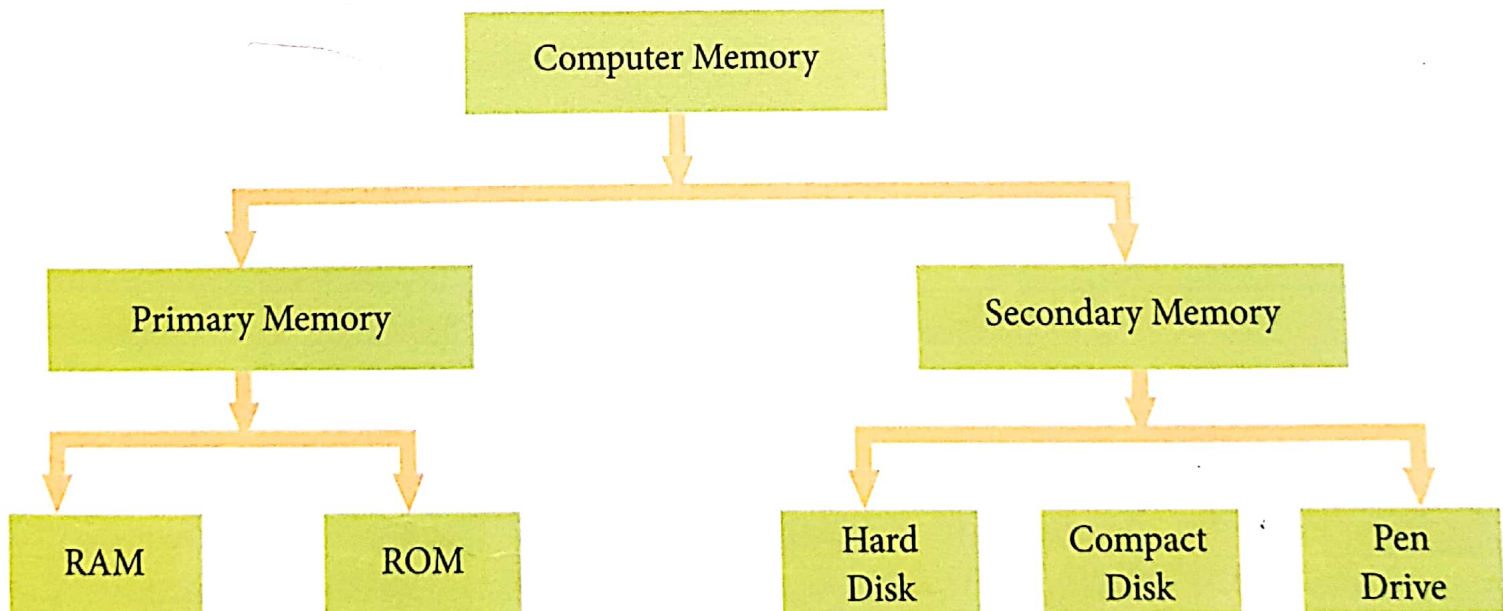
The Binary System

The binary numbering system is used in the computer to express numeric values in mathematical operations.

Despite having memory, a computer memory is different than that of a human. A computer stores data in form of "0" and "1". The memory is incompetent to understand any other data beyond 1 and 0. These are known as binary numbers. Therefore, no matter what information or data you are giving to the computer, irrespective of the language, subject, font, style, the computer converts the data in 1 and 0. Following the conversion, the data stored at various storing devices and places.

Bit

It is smallest data storage unit. Like a light weight object is expressed in grams and heavy weights in kilograms, the smallest memory unit in computers is expressed in bit. It is a single digit in a binary number (0 or 1).



In other words, a bit is the smallest unit of data transfer on a computer network. Bits represent the two binary values "on" or "off." Bits are often stored on computers as the digital numbers '1' and '0', but in networking, bits can also be "encoded" by electrical signals and pulses of light.

Byte

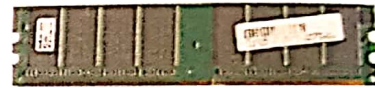
A byte is a unit of data that is eight binary digits long. A byte is the unit most computers use to represent a character such as a letter, number or typographic symbol. A byte can also hold a string of bits that need to be used in some larger unit for application purposes.

Primary memory

Primary memory is the main memory of the computer. However, the data stored in primary memory is for a short period of time. Primary memory retains the data only till the computer system is on. Once the system is shut down or restarted, the data stored in the primary memory gets lost. Primary memory can be further divided into two parts:

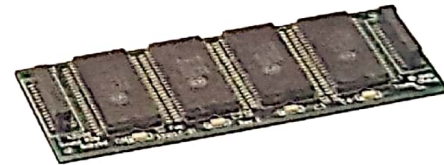
RAM

RAM stands for Random Access Memory. RAM is the most common type of memory found in computers and other devices, such as printers. A computer's RAM is the memory used to store data and programs on a temporary basis. The RAM is a short-term memory and stores input data, results, programs, applications and information that is actively used while the system is on. It can be read and written. It is a volatile memory that means all data will be lost when the power is turned off.



ROM

ROM stands for Read Only Memory. It is the permanent memory that is used to store important control programs and system software to perform a variety of functions such as booting up or starting a program. ROM is non-volatile, it means the contents are not lost when the power is switched off.



Secondary Memory

Secondary memory (or secondary storage) is the slowest and cheapest form of memory. It cannot be processed directly by the CPU. It must be copied first into RAM. Secondary memory devices include magnetic disks like hard drives and floppy disks ; optical disks such as CDs and CD ROMs ; and magnetic tapes, which were the first forms of secondary memory.

Measuring Memory

The computer has a unit of measurement to calculate its storage capacity. The memory of a

computer is measured in terms of bytes, kilobytes, megabyte, gigabyte and terabyte. Let us understand them with the help of following table:

Unit of Measurement	Equal to	Symbol
1 Byte	8 Bits	B
1 Kilobyte	1024 Bytes	KB
1 Megabyte	1024 Kilobytes	MB
1 Gigabyte	1024 Megabytes	GB
1 Terabyte	1024 Gigabytes	TB

Software

Software means computer instructions or data. Anything that can be stored electronically is software. Computer software or just software, is any set of machine-readable instructions (most often in the form of a computer program) that directs a computer's processor to perform specific operations.

Relation between hardware and software

The distinction between software and hardware is sometimes confusing because they are so integrally linked. Clearly, when you purchase a program, you are buying software. But to buy the software, you need to buy the disk (hardware) on which the software is recorded.

In order to produce useful output in a computer, its hardware and software must work together. Nothing useful can be done with the computer hardware on its own and software cannot be utilised without supporting hardware.

Following are the important points regarding the relationship between hardware and software:

1. Both hardware and software are necessary for a computer to do useful job. Both are complementary to each other.
2. The same hardware can be loaded with different software to make a computer system perform different types of jobs, just as different songs can be played using the same cassette player.
3. Except for upgrades, hardware is normally a one-time expense, whereas software is a continuing expense. Just as we buy new cassettes for the newly released songs or for songs whose cassettes we do not have, similarly one buys new software to run on the same hardware as and when need arises or funds become available.

Beyond the chapter

Gary Starkweather

Gary Keith Starkweather is an American engineer and inventor most notable for the invention of the laser printer and color management. In 1969, Starkweather invented the laser printer at Xerox's Webster research center.



Sam Hurst

The first touch sensor was invented in 1971 by Doctor Sam Hurst. But the first true touch screen was developed in 1974 by Sam Hurst and Elographics. The touch screen is one of the easiest to use and most intuitive of all PC interfaces, making it the interface of choice for a wide variety of applications.

Let's Summarise

- A computer system is a machine that is designed to follow a set of instructions known as programs to give the desired results known as output.
- There are three types of printers: Dot Matrix, Inkjet and Laser.
- Processing unit is commonly known as CPU. It carries and performs all the calculations and operations.
- CPU is divided in three parts: ALU, CU and MU.
- The binary system is used in the computer to express numeric values in mathematical operations.
- The computer has a unit of measurement to calculate its storage capacity:
1 byte = 8 bits; 1 KB = 1024 byte; 1 MB = 1024 KB; 1 GB = 1024 MB;
1 TB = 1024 GB.

Terms.....

MICR: Magnetic Ink Character Recognition.

Drawing Tablet: An input device used to draw images and graphics.

Binary system: Used to store data in 0 and 1.

Bit: Smallest data storage unit.

Byte: A unit of data equivalent to eight bits.

RAM: Random Access Memory.

ROM: Read Only Memory.

Exercise

I Fill in the blanks.

smallest data CPU electronically output sound

1. The computer processes the data
2. is also known as the brain of the computer.
3. Bits is the data storage unit.
4. Speakers are used to
5. Anything that can be stored electronically is

II Write T for true and F for false for the following statements.

1. The information stored in RAM is erased when the computer is turned off. ☐
2. Primary memory cannot be processed directly by the CPU. ☐
3. A mouse is a small device used to point to and select items on your computer screen. ☐
4. CPU is further divided into five units. ☐
5. CPU cannot perform all the calculation and operations of the system. ☐

III Value Based Question.

Your friend wants to purchase a new laptop. Suggest suitable hardware, input, output and storage devices required.

IV Group Discussion:

There are new devices launched by various companies these days. Discuss in class about some exciting and useful input, output or storage devices that they came across.

V Write one word for the following:

1. The storage unit which is equivalent to 8 bits.
2. Part of CPU which coordinates all the functions of the computer.
3. It prints by spreading tiny droplets of ink onto paper.
4. Permanent memory which stores control programs.

VI Write short answers:

1. Define a computer system.
2. What is software?