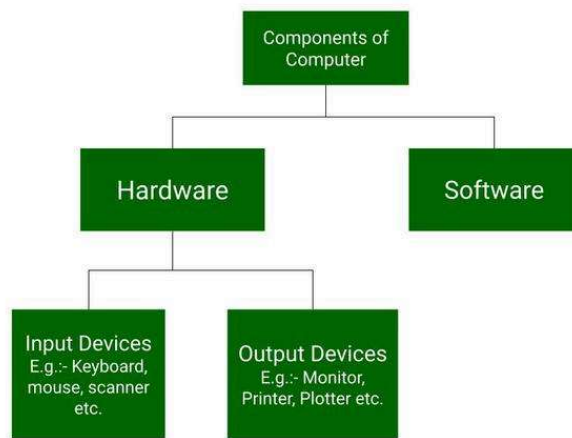# Computer Hardware

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Computer hardware includes the physical parts of a computer, such as a case, central processing unit (CPU), random access memory (RAM), monitor, and mouse which processes the input according to the set of instructions provided to it by the user and gives the desired output.

The computer has mainly has two major components:

1. Hardware
2. Software

In this article, we only discuss computer hardware.

What is Computer Hardware?

Computer hardware is a physical device of computers that we can see and touch. For e.g. <u>Monitor</u>, <u>Central Processing Unit</u>, <u>Mouse, Joystick</u>, etc. Using these devices, we can control computer operations like <u>input and output</u>.

Computer Hardware Parts

These hardware components are further divided into the following categories, which are:

1. Input Devices
2. Output Devices
3. Storage Devices
4. Internal Components

1. Input Devices

<u>Input devices</u> are those devices with the help of which the user interacts with the computer. Or, In other words, with the help of input devices, the user enters the data or information into the computer. This information

or <u>data</u> is accepted by the input devices and converted into a computer-acceptable format, which is further sent to the <u>computer system</u> for processing.

Now we discuss some input devices:

- **Keyboard:** It is the most common and main input device for computers. The data is inputted by typing on the keyboard. It consists of 104 keys in total. It contains numeric keys, alphabet keys, and different function keys as well. Earlier, it was connected to the computer via cable, now as technology has advanced, you can connect a keyboard using Bluetooth.
- **Mouse:** A mouse is a kind of pointing device which is rolled over to control the cursor on the screen and it has functional keys like left, middle, and right buttons. Using these functional keys, on by the click of which an object is selected or to open a file by just a click of a mouse. It also consists of a sensor inside which notifies its speed to the computer and according to which the cursor is moved on the screen.
- **Scanner:** As the name suggests, it scans images, documents, etc., and converts them into digital form and that can be further edited and used. It works just like a Xerox machine.
- **Track Ball:** It is a device much like an upside-down mouse. It does not use much space for movement like a mouse. As the trackball remains stationary and the user moves the ball in various directions, it affects the screen movements directly.
- **Light Pen:** It is a light-sensitive device and it is touched to the <u>CRT screen</u> where it can detect, a raster on the screen as it passes by and, with the help of this user can draw anything like lines, figures, or any objects.
- **Microphone:** It is a kind of voice input system that can be attached to a computer system to record sounds. It converts human speech or voice into <u>electrical signals</u>. This electrical signal is processed by the computer and the word is recognized.
- **Optical Character Reader:** It is used to detect alphanumeric characters that are written or printed on paper using a low-frequency light source. This light is absorbed by the dark areas and reflected by the light areas, now this reflected light is received by the photocells. It is like a scanner.
- **Bar Code Reader:** It is used to read bar codes and convert them into electric pulse which will further processed by the computer. Here, the <u>barcode</u> is data that is coded into white and black lines(or light and dark lines).

2. Output Devices

These are the devices that are used to display the output of any task given to the computer in human-readable form.

Now we discuss some output devices:

- **Monitor:** The monitor is the main output device. It is also called <u>VDU(visual display unit)</u> and it looks like a TV screen. The Monitor displays the information from the computer. It is used to display text, video, images, etc.
- **Printer:** A <u>printer</u> is an <u>output device</u> that transfers data from the computer in a printed format by using text or images on paper. There are both colored and black & white printers. Further, there are also different types

of printers, like <u>Laser Printer, Dot-matrix</u> printers, and Inkjet printers.

- **Plotter:** It is similar to a printer but potters are large in size. A plotter is used to generate large drawings, architectural blueprints, etc. on paper and these are high-quality images and drawings and large in size.
- **Speakers:** It is a very common output device and it gives sound as an output. Speaker is generally used to play music or anything having sound.

3. Storage Devices

There are some devices that are used for storage purposes and are known as secondary storage devices. Some of them were discussed below:

1. CD (Compact disc): A <u>CD</u> is circular in shape and made up of thin platted glass and plastic polycarbonate material. It has a storage capacity of 600 MB to 700 MB of data. It has a standard size of 12 cm with a hole in the center of about 1.5 cm and 1.2 mm in thickness. There are basically 3 types of CDs, which are:

- **CD-ROM (CD – Read Only Memory):** Contents of this type of CD cannot be erased by the user. Only the publisher is allowed to access the data imprinted on this CD. <u>CD-ROM</u> is basically used for commercial purposes like for a music album or any application package by a software company.
- **CD-R (CD-Recordable):** In this, content or data can be stored once. After that, they can be read many times but the data or content cannot be rewritten or erased. (Kind of one-time use)
- **CD-RW(CD-Rewritable):** As the name suggests, this type of CD is used to rewrite the content or erase previous content and again write new content many times.

2. DVD (Digital Video/Versatile Disc): A <u>DVD</u> is the same as a CD but with some more features. A DVD comes in single and dual-layer formats. It has much greater storage capacity in comparison to CD. The storage capacity of a DVD with one-sided single layer is – 4.7 GB, one-sided double layer – 8.5 GB, double-sided single layer – 9.4 GB, and double-sided double layer – 17 GB. There are also some types in DVDs, which are :

- **DVD-ROM:** In this type, the contents of the DVD cannot be written on or erased by the user. <u>DVD ROM</u> is used for applications and database for distributing them in large amounts.
- **DVD-R / DVD+R:** <u>DVD-R (DVD minus R) and DVD+R (DVD plus R)</u> are two different kinds of discs and they are once recordable format. Also, they have no difference virtually.
- **DVD-RW / DVD+RW:** This is a kind of rewritable disc and it allows up to 1,000 rewrites.
- **DVD-RAM:** <u>DVD RAM</u> is accessed like a hard disk. It provides high <u>data security</u> and storage capacity. This is a kind of rewritable disc and it allows up to 1,00,000 rewrites.

3. Hard Disk: An <u>hard disk</u> is a non-volatile storage device that uses its read/write heads to store digital data on a magnetic surface of a rigid plate. It is generally 3.5 inches in size for desktops and 2.5 inches in size for laptops. A hard disk can be classified further into 3 types, which are:

- **Internal Hard Disk:** It has a common storage capacity stated as GB or TB. A system case or cabinet is the place where it is located. It can perform faster operations and its storage is fixed. It is mainly used to store
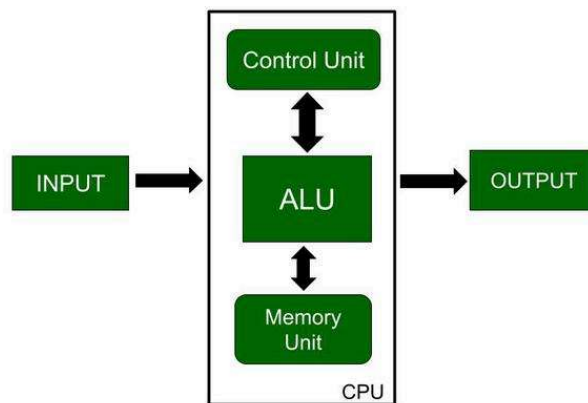
large data <u>files and programs</u>.

- **Internal Cartridges:** The Internal hard disk can't be removed from the system cabinet easily. To resolve this problem Internal Cartridges are introduced. So, Internal cartridges are easy to remove CDs. It has a storage capacity of 2 GB to 160 GB. It is used as an alternative to an internal hard disk.
- **Hard Disk Packs:** It is used by organizations such as banks, and government sector organizations to store large amounts of data. It has a storage capacity of a range of PB(Peta Bytes).

Hardware Components

Some important hardware devices known as the internal components are discussed below:

1. CPU (Central Processing Unit)

The CPU is also known as the heart of the computer. It consists of three units, generally known as the control unit, <u>Arithmetic Logical Unit (ALU)</u>, and the <u>memory unit</u>. Below is the block diagram of the CPU is given:

As shown in the diagram input is given to the CPU through input devices. This input goes to memory and the control unit gets instructions from memory. The control unit now decides what to do with the input or instructions and transfers it to ALU. Now, ALU performs various operations like addition, subtraction, multiplication, division, logical operations, etc. After that, the final result gets stored in memory and finally passed to output devices to give the output. So, this is how the CPU works.

2. Motherboard

It is the main circuit board inside a computer and it contains most of the electronic components together. All the components of the computer are directly or indirectly connected to the <u>motherboard</u>. It includes <u>RAM</u> slots, controllers, system chipsets, etc.

3. RAM (Random Access Memory)

It is also known as temporary or volatile memory. It holds the program and data, which are currently in process or processing. All the data is erased as soon as the computer is turned off or in case of a power failure. Data stored in this memory can be changed. There are two types of RAM:-

1. **SRAM (Static RAM):** SRAM basically consists of a flip-flop using a transistor or Mosfet (MOS). It is fast and has less access time. In this refreshing circuits are not required. But it is costly and requires more space. For e.g. cache memory.

2. **DRAM (Dynamic RAM):** DRAM consists of capacitors and the data is stored in the form of capacitors. Capacitors charge when data is 1 and don't charge if data is 0. It requires refreshing circuits, as leakage of current in the capacitor can occur, so they need to be refreshed to the data. It is slower and has a higher access time. It is cheaper in comparison with SRAM. For e.g. Main memory.

4. Video Graphics Array Port

A video input commonly used on computer monitors is called a video graphics array (VGA) port. Verifying that there isn't a loose connection, a damaged cable, or a broken display is one step in troubleshooting a VGA port. Compressed air can also be sprayed inside the VGA port by a computer expert to make sure it's dust-free.

5. Power Supply

All of a computer system's parts are powered by a power source. Typically, a power cord is used to connect a computer tower to an electrical outlet. By turning off the computer, unplugging and separating the power supply cord, or trying a different cord or socket, a technician can diagnose the power supply.

6. Cooling Fan

A computer's system to prevent overheating uses cooling fans. To aid customers who use their computers intensively, such as when streaming video or playing games, many computers contain more than one cooling fan. If a user detects their computer overheating, a computer expert might need to repair the cooling fan. The blades may be examined for any damage and cleared of any foreign objects. A technician's standard method of troubleshooting may involve replacing computer fans.

7. Hard Drive

On a computer system, files, programs, and other types of information are stored on hard drives, which are data storage devices. They utilise hard drives, which are magnetically coated discs used to store digital versions of information. A computer technician can suspect a corrupt hard disk when a hard drive dies.

Relationship Between Computer Hardware and Software

- Both the Hardware and software are mutually dependent on each other. Each should function properly so that the computer produces an output.

- Software utilization can not be done without supporting of the hardware.
- Relevant software should be loaded into the hardware to get the latest software.
- Hardware is a one-time expense while software is not.
- Software development is very expensive while hardware cant be developed if in use once.
- Many software applications and their sub-applications can be loaded on hardware to run different jobs.
- The software acts as an interface between the user and the hardware.