Lecture 1: Computers Components

A computer is an electronic device **that stores**, **retrieves,** and **processes data**, and can be **programmed with instructions**. It is composed of hardware and software. Hardware components and software components are also called computer systems. The computer system includes all hardware and software parts working as one complement to another.

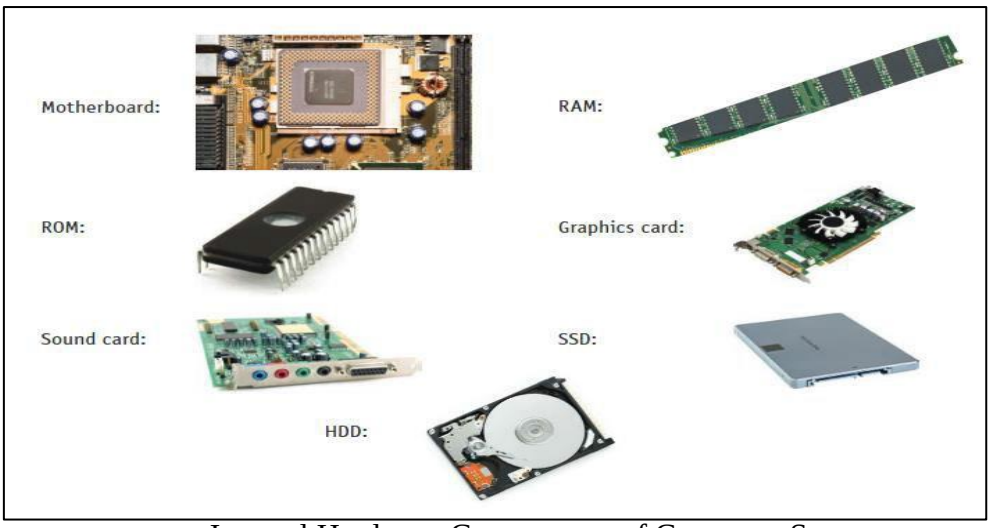
1. Hardware and Software

1.1 Software

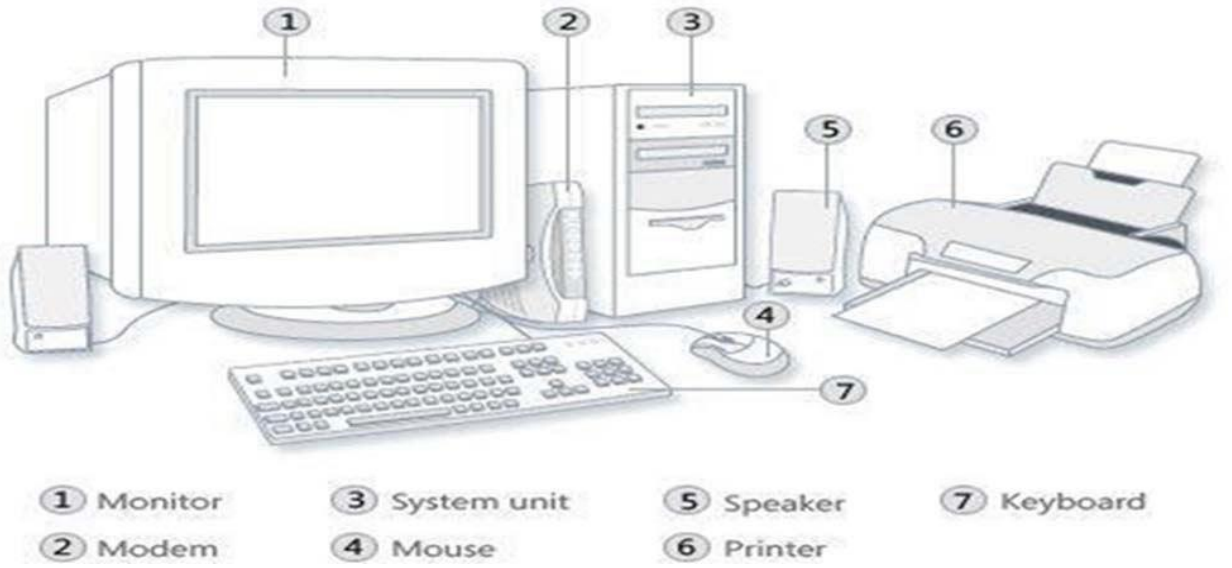
Software represents all the programs and systems that work in the computer. The software includes the operating systems (Windows, Linux, Android), the application programs (word, Excel, etc.), the programming languages and systems (Python, Visual Basic, MATLAB, etc.), remote control systems, and others.

1.2 Hardware

Hardware represents physical components and is categorized into external components such as (Keyboard, Mouse, Monitor, Printer), and internal components such as (Motherboard, Central Processing Unit (CPU)/processor, Random access memory (RAM), Read-only memory (ROM), Graphics Card, Sound Card, Network Interface Card (NIC), Internal Storage Devices (HDD and SSD)).



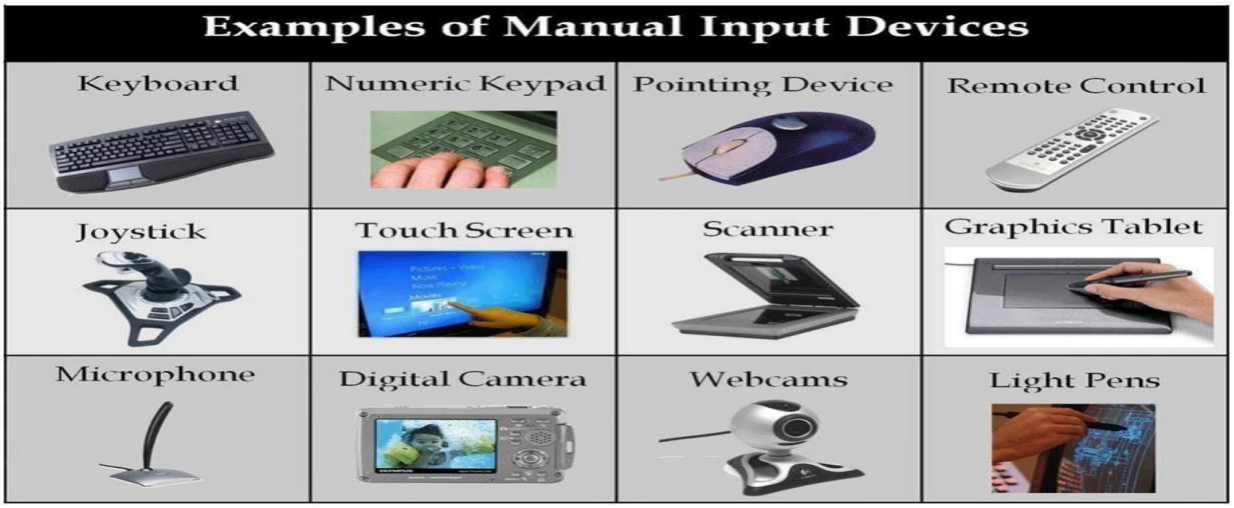
Internal Hardware Components of Computer System



External Hardware Components of the computer System

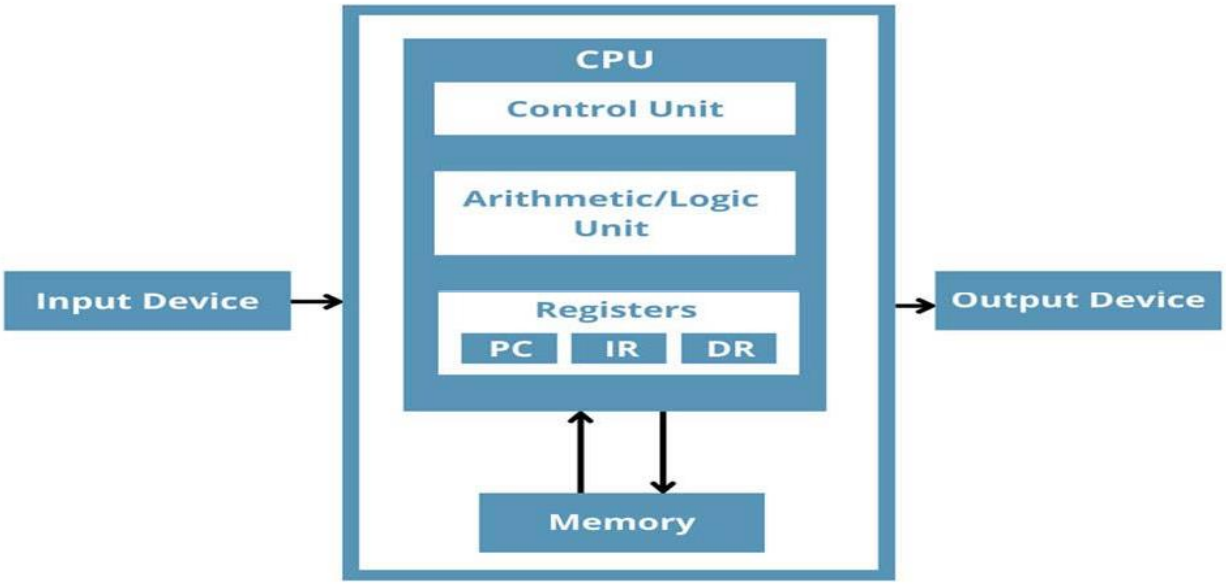
Input Units

The input device is any peripheral (a piece of computer hardware equipment to provide data and control signals to an information processing system such as a computer or other information appliance). Input device Translate data from a form that humans can understand to a form that a computer can handle. Most commonly are keyboard and mouse.



Central Processing Unit (CPU)

A CPU is the <u>brain of the computer</u>. It is responsible for all functions and processes. Regarding computing power, the CPU is the most important element of a computer system.

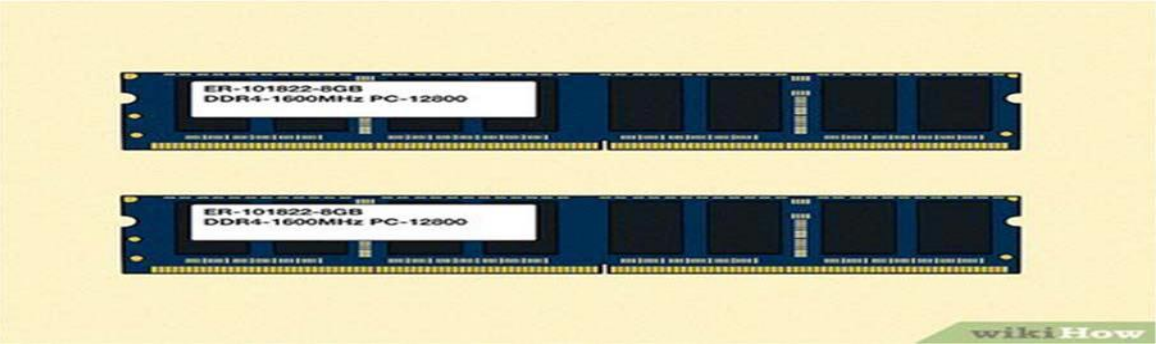


Main Memory Unit (MMU)

Data and instructions are stored in this unit, and there are two types of memory**.**

- **ROM (Read Only Memory): ROM is a permanent form of storage.** ROM stays active regardless of whether the power supply to it is turned on or off. ROM devices do not allow data stored on them to be modified.
- **RAM (Random Access Memory):** This **is a memory system inside the computer. system responsible for storing data temporarily**, so that it can be promptly accessed by the processor a sand when needed.

It is volatile in nature, which means that data will be erased once the supply to the storage device is turned off. RAM stores data randomly, and the processor accesses these data randomly from the RAM storage.



Secondary Memory

Stores data and programs permanently; it is retained after the power is turned off. It may be a Hard Disk, Tape, Floppy Disk, Compact Disk, USB memory (Flash memory).

Comparison between Main memory (RAM) and Secondary Memory (Hard disk)

RAM	Hard Disk (Hard Drive)
Memory	Storage
Smaller amount (typically 500 MB-6 GB)	Much larger amount (typically 80GB to 1000 GB)
Temporary storage of files and programs	Permanent storage of files and programs
A little like your real desktop - has only your current work on it (which could be ruined by a spill of Coke or coffee!)	Like a file cabinet - has long-term storage of work (it's safe from spills!)
Contents disappear when you turn off power to the computer and when the computer crashes	Contents remain when you turn off the power to the computer (they don't disappear unless you purposely delete them), and when the computer crashes
Consists of chips (microprocessors)	Consists of hard disks (platters)
When you want to use a program, a temporary copy is put into RAM and that's the copy you use	Holds the original copy of the program permanently

Output Unit

An output device is any piece of computer hardware equipment used to communicate. the results of data processing carried out by an information processing system (such as a computer), which converts the electronically generated information into human- readable form.

Comparison of input and output devices

Input devices	Output devices
➢ An input device is any hardware device that allows a user to enter data or instructions into a computer directly.	➢ An output device is any hardware device that takes the output data from a computer and puts it into a human- readable format or uses it to control another device.

➢ An input device can send data to another device, but it cannot receive data from another device.	➢ An output device is capable of receiving data from another device in order to generate an output, but it cannot send data to another device.
➢ Input devices are necessary for a computer to receive commands from its users and data to process.	➢ Output devices are needed by a computer so it can share the results of its processing with a human; output devices are under the control of the computer.
➢ Input devices can be fairly complicated because they have to ensure that the user can interact with the computer correctly.	➢ Output devices are less complex than input devices because they only have to turn computer signals into an output.