Computer Fundamental

ANISH RAJ

Introduction:

What is Computer?

The term computer is derived from the word compute. In simple words, a computer is an electronic device, which takes input from the user in form of data and instruction. Once the computer obtains the data, it waits for the user's instructions to go ahead and start processing the data. On receiving the instructions from the user, the computer process the data generates some output and display to the user.

A Computer is an Electronic device that manipulates information, or data. It has the ability to Store, Retrieve, and Process data.

Computer (कम्प्यूटर)

C – Common
O – Operating
M – Machine
P – Particularly
U – Used for

T – Technical
E – Education
R – Research

It is Known that analytical engine was the first computer which was invented by **Charles Babbage** in 1837.
Before that he was also invented a difference engine in 1822, because of that he has been called father of computer

Data and information

By data we mean any un-useful or meaningless text, number, audio video, and images, which do not provide any help to the user. When computer process data and convert it into a form that is useful and meaningful for the user, it becomes information.

Data	Information
a, b, c, d, e, f, g, h……	Rakesh Kumar
1, 2, 3, 4, 5, 6, 7, 8, 9……	8877556644
Machine computer an is electronic The.	The computer is an electronic machine.

How does a Computer Work

Input: Sending the data and command to the computer to the computer is known as input.

Processing: Work done by the computer with the help of processing hardware and software to produce result is known as processing.

Output: Any information that has been processed and comes from a computer or computer device is considered output.

Storage: A place to save result inside the computer is known as storage.

Input → Process → Output → Storage

Types of Computer

(कम्प्यूटर के प्रकार)

According to their work.

1. Analog Computer
2. Digital Computer →
3. Hybrid Computer

By size

1. Micro Computer
2. Mini Computer
3. Main Frame Computer
4. Super Computer

Analog Computer

An analog computer is a device that performs computations using continuous physical variables which are analogs of the actual items being computed. Analog computers might, for example use the continuous rotation of gears or the angular movements of mechanical or electromechanical parts to perform computations.

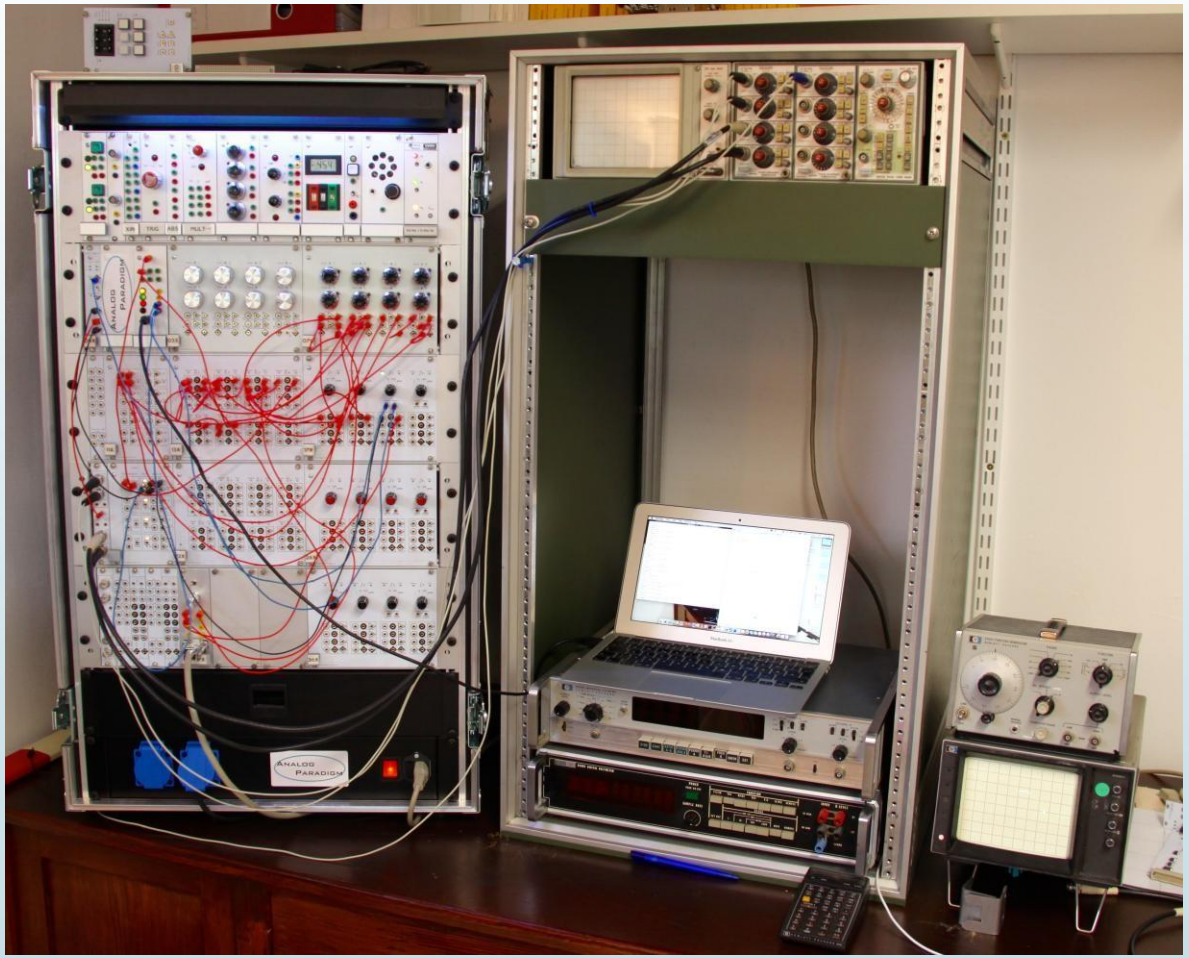
Digital Computer

Digital computers process information which is essentially in a binary or two state forms namely Zero and one. When talking about computers, we mostly refer to the digital type of electronic machine.

Digital computers fall into ranges called Microcomputers, Mini computers, Mainframe and Super computer, classified in ascending order of size – small, medium, large and very large.

Hybrid Computer

Hybrid computer are a combination of both **digital** and **analog** computers, In this type of **computers**, the digital segments perform process control by **conversion** of analog signals to digital ones,



Micro Computer

A computer with a microprocessor and its central processing unit is known as a microcomputer. They do not occupy space as much as mainframes do. When supplemented with a keyboard and a mouse, microcomputers can be called personal computers. A monitor, a keyboard and other similar input-output device, computer memory in the form of RAM and power supply unit come packaged in a microcomputer. These computer can fit on desks or tables and prove to be the best choice for single-user tasks.

Micro computer is also called Personal computer, Desktop or Laptop

Desktop computer

A desktop computer is intended to be used on a single location. The spare parts of a desktop computer are readily available at relatively lower costs. Power consumption is not as critical as that in laptops. Desktop computers are widely popular for daily use in the workplace and households.

Laptop

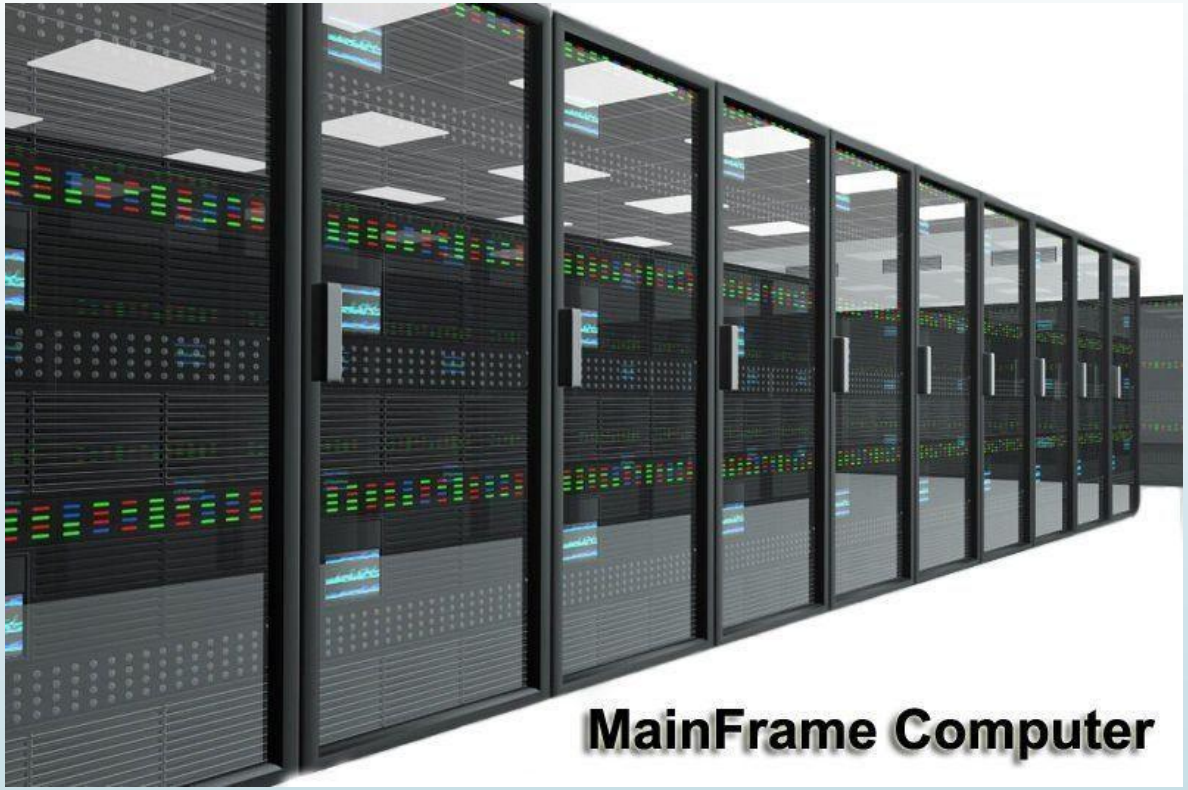
Similar in operation to desktop computers, laptop computers are miniaturized and optimized for mobile use. Laptop run on a single battery or an external adapter that charges the computer batteries. They are enabled with an inbuilt keyboard, touch pad acting as a mouse and a liquid crystal display. Their portability and capacity to operate on battery power have proven to be of great help to mobile users.

Mini Computer

In terms of size and processing capacity, minicomputers lie in between mainframes and microcomputers. Minicomputers are also called mid-range systems or workstations. The term began to be popularly used in the 1960s to refer to relatively smaller third generation computers. They took up the space that would be needed for a refrigerator or two and used transistor and core memory technologies. The 12-bit PDP-8 minicomputer of the Digital Equipment Corporation was the first successful minicomputer.

Main Frame Computer

Large organizations use **mainframes** for highly critical applications such as bulk data processing and **ERP**. Most of the mainframe computers have capacities to host **multiple** operating systems and operate as a number of virtual machines. They can substitute for several small **servers**.



Super Computer

Supercomputer

The Highly calculation-intensive tasks can be effectively performed by means of supercomputers. Quantum physics, mechanics, weather forecasting, molecular theory are best studied by means of supercomputers. Their ability of parallel processing and their well-designed memory hierarchy give the super computers, large transaction processing powers.

First Generation of Computer

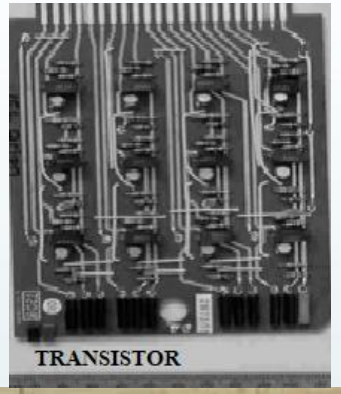
The first electronic computer was developed about the year 1945 by U.S. Army Research unit and was called ENIAC (Electronic Numerical Integrator & Calculator). It was primarily used to calculate the trajectories of missiles. ENIAC took about 200 microseconds to add two digits and 2800 microseconds to multiply. It was, however, monstrous installation It used thousands of Vacuum tubes (18000), weighted 30 tons, occupied a number of rooms, needed great amount of electricity and emitted excessive heat. The main features of ENIAC can be summarized as:

Second Generation of Computer

The second generation of Computers started with the advent of transistors. A transistor is a two state device made from silicon. It is cheaper, smaller and dissipates less heat than vacuum tubes but can be utilized in a similar way as that of vacuum tubes. Unlike vacuum tubes, transistors do not require wire, metal glass capsule and vacuum, therefore, is called a solid state device. The transistors were invented in 1947 and had launched the electronic revolution in 1950.

Some examples of second generation computers are as follows.

IBM 1401, HONEY WELL 800, IBM 1620 etc.



Third Generation of computer

A single self contained is called discrete component. In 1960s', the electronic equipment were made from the discrete components such as transistors, capacitors, resistors and so on. These components were manufactured separately and used to be soldered on circuit boards which then can be used for making computers of the electronic components.

Since computer can contain around 10,000 of these transistors, therefore, the entire mechanism was cumbersome.

Then started the era of micro-electronics (small electronic) with the invention of Integrated Circuit (Ics). Used of Ics in computer defines the third generation of computers.

The introduction of IBM-360 series of computers in 1965 marked the beginning of third generation of computers.

Fourth Generation of Computer

Integration techniques improved tremendously within a short time and 70's saw thousand of transistors packed into a single chip.

The forth generation saw the advent of LSI chip. Medium scale integrated circuit have yield to large and very large scale integrated circuits techniques with over 1,00,000 transistors in the single silicon chip.

Fifth Generation of Computer

Fifth generation computers are in developmental stage which is based on the artificial intelligence. The goal of the fifth generation is to develop the device which could respond to natural language input and are capable of learning and self- organization, Quantum computation and molecular and nanotechnology will be used in this technology. So we can say that the fifth generation computers will have the power of human intelligence.

Generation	Year	Electronic component	Storage Device	Software
First	1949 to 1955	vacuum tubes	Magnetic Drums Memory (1kB)	Machine & Assembly
Second	1956 to 1965	Transistors	Magnetic core main memory, tape, disk peripheral (Memory 100 KB)	Fortran, Cobol
Third	1966 to 1975	Integrated Circuit	High speed magnetic cores, large disks (Memory 1MB)(storage 100 MB)	Fortran IV, Cobol-68
Forth	1975 to 1989	LSI, VLSI	Semi conductors memory, Winchester disk (Memory 10 MB) Storage 1000MB)	Pascal, COBOL-74, BASIC etc.
Fifth & Later	1989 to present	ULSI (Ultra Large Scale Integration	Single IC in ULSI	Programming Language

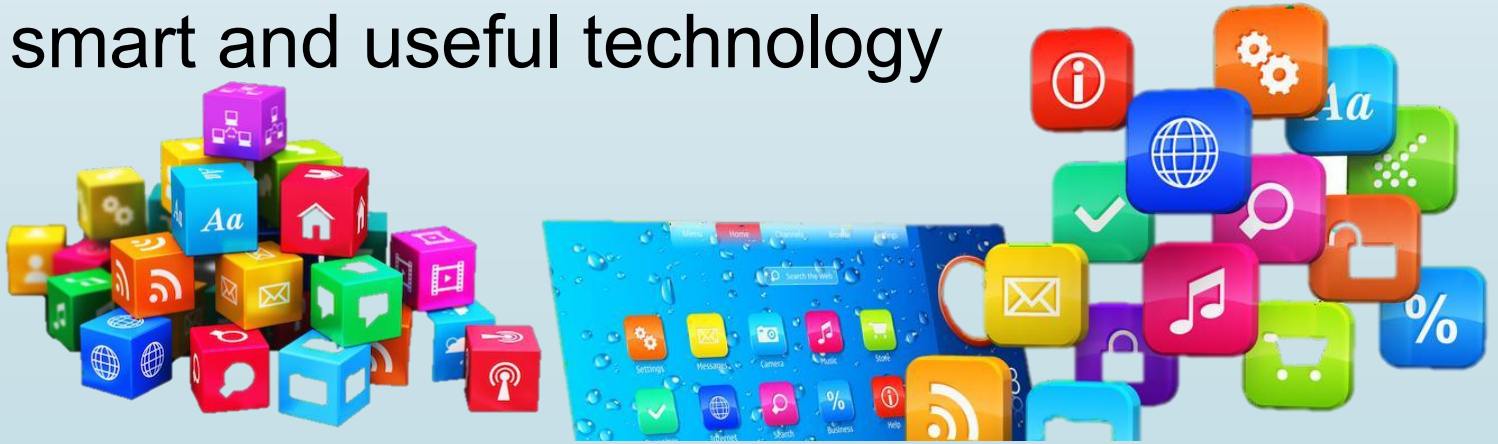
Software

Software is a collection of command that help users to **communicate** with the computer or help the computer perform specific tasks for them. Without any type of software the computer would be of **no use**.

1. System software
2. Application Software
   i. Utility Software

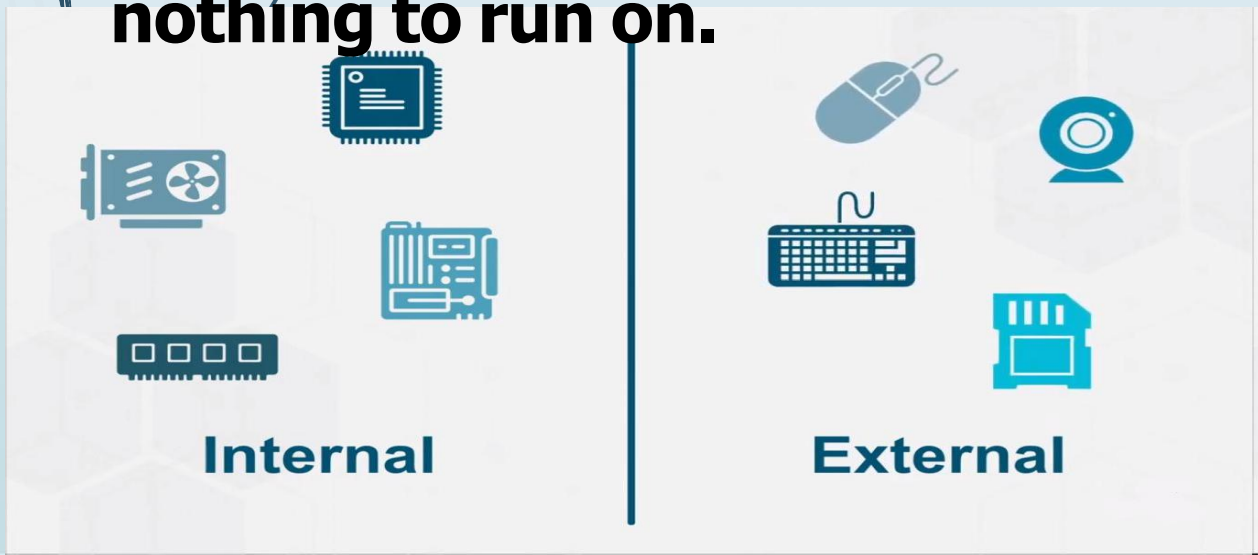
Language

A **programming language** is a way to give instructions to a computer. It works like a bridge between humans and machines. With programming languages, we can create software, websites, mobile apps, and games. Every language has its own rules and syntax, which tell the computer how to follow the instructions. Popular programming languages include C, C++, Java, Python, and JavaScript. The main purpose of programming is to solve problems and make tasks automatic. In today's digital world, programming is a very important skill that helps us build smart and useful technology



Hardware

Anything that you see and fell is known as hardware. In computer terminology there are two broad categories of hardware device- Input Device and Output Device. Hardware is best described as a device that is physically connected to your computer or something that can be physically touched A CD-ROM, Monitor Printer, and video card are all example of computer hardware. Without any hardware your computer would not exist and software would have nothing to run on.



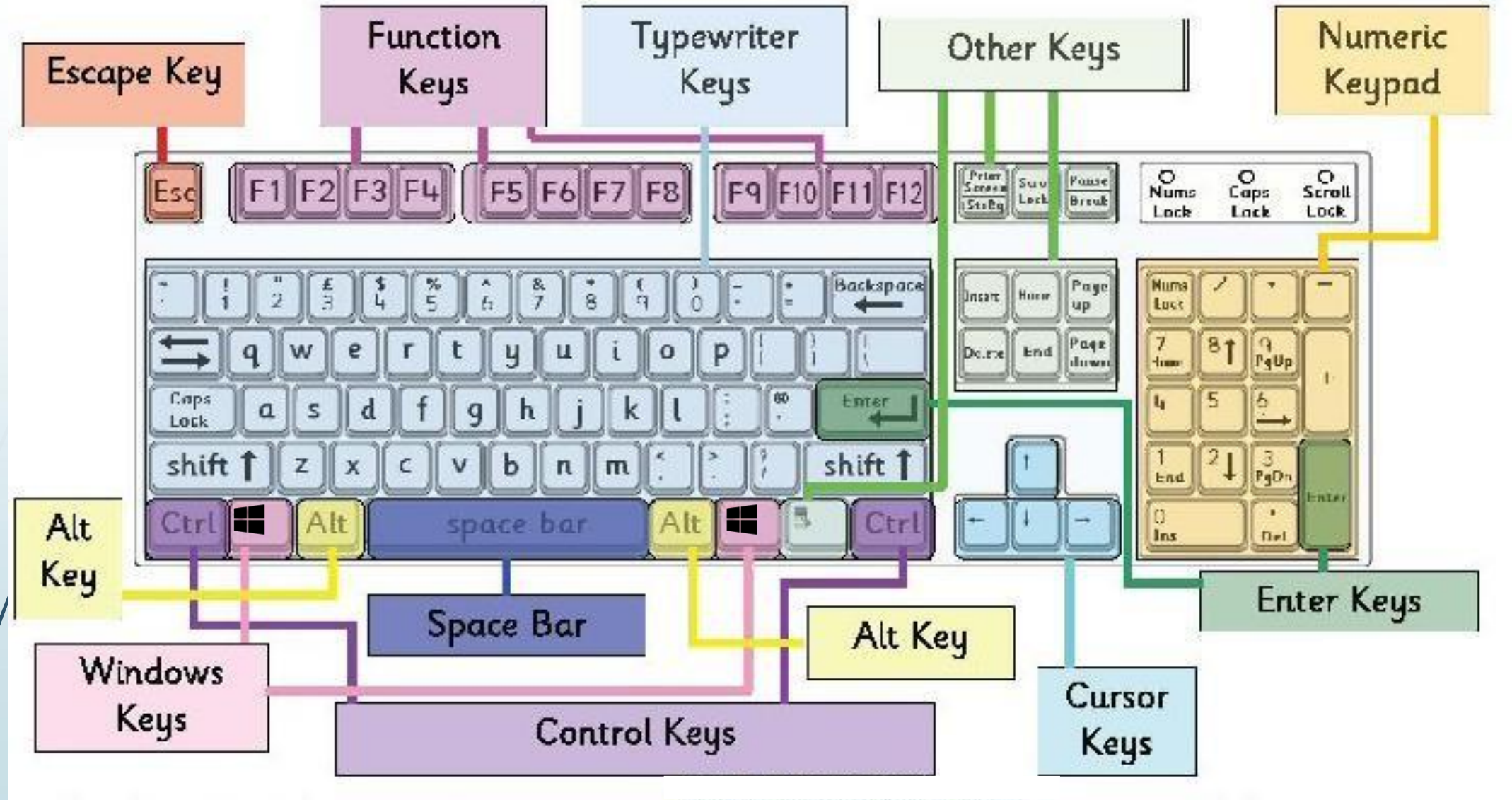
Input device

An **input device** is a hardware component used to enter data or commands into a computer. It helps users communicate with the system. Common input devices include keyboard, mouse, microphone, scanner, webcam, and touchscreen. These devices send information to the computer so it can process and respond

Keyboard

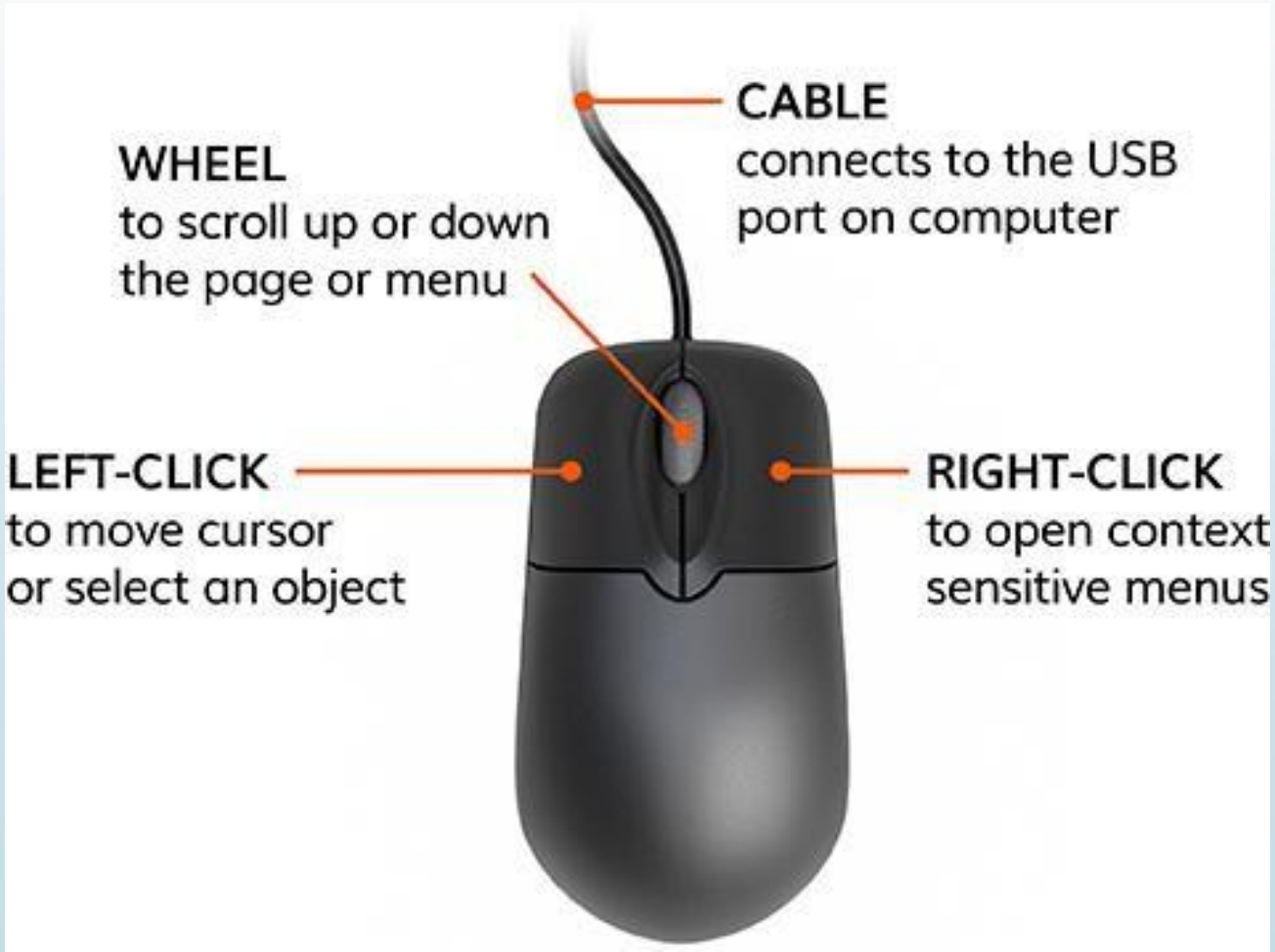
- ✓ **The keyboard is used to type information into the computer or input information. The standard keyboard has 101 keys. Notebooks computer have embedded keys accessible by special keys or by pressing key combination. (CTRL Command and P for example to print option).**
- ✓ **Ergonomically designed keyboards are designed to make typing easier. Hand held devices have various and different keyboard configuration and touch screens.**
- ✓ **used to type data into the computer.**
- ✓ **Most common input device today.**

Keyboard Layout and Keys



Mouse

Most modern computers today are run using a mouse controlled pointer. Generally if the mouse has two buttons.



Common input devices

Scanner

Pointing Device

Joystick

Barcode scanner

Microphone

A device that converts sound waves into analogous electrical waves. Usually called a “mike,”

Web Cam or Digital Camera

Digital cameras allow you to take digital photographs. The images are stored on a memory chip or disk that can be transferred to your computers. Web Cam is used in video calling or online classes.

Output deivce

An **output device** is a hardware part that shows the result of computer processing. It helps users receive information from the computer. Common output devices are monitors, printers, speakers, projectors, and headphones. These devices display text, images, sound, or video so users can understand the computer’s work

Monitor or Display

The monitor shows information on the screen when you type. This is called outputting information. When the computer needs more information it will display a message on the screen usually through a dialog box. Monitors come in many types and sizes. The resolution of the monitor determines the sharpness of the screen. The resolution can be adjusted to control the screen's display. Most desktop computers use a monitor with a cathode tube or liquid crystal display. Most notebook use a liquid display monitor or LED.

Printer

Dot – matrix printers

Uses metal pints to strike an inked ribbon to make dots on a piece of paper.
Can see the dots that make up the letters or images.

Ink jet printers

Use drops of magnetic ink to produce dots on a page to produce text or images.
For producing color documents, it has the highest quality at a reasonable price.

Laser printers

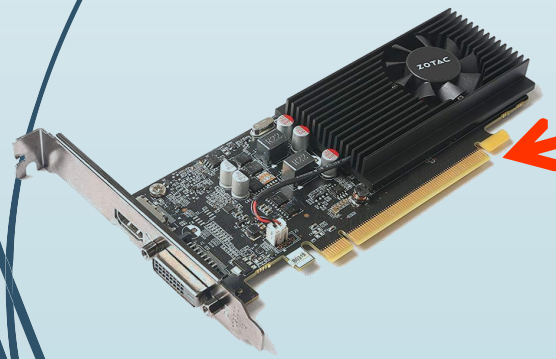
Produces the highest quality printout.
For black and white printouts

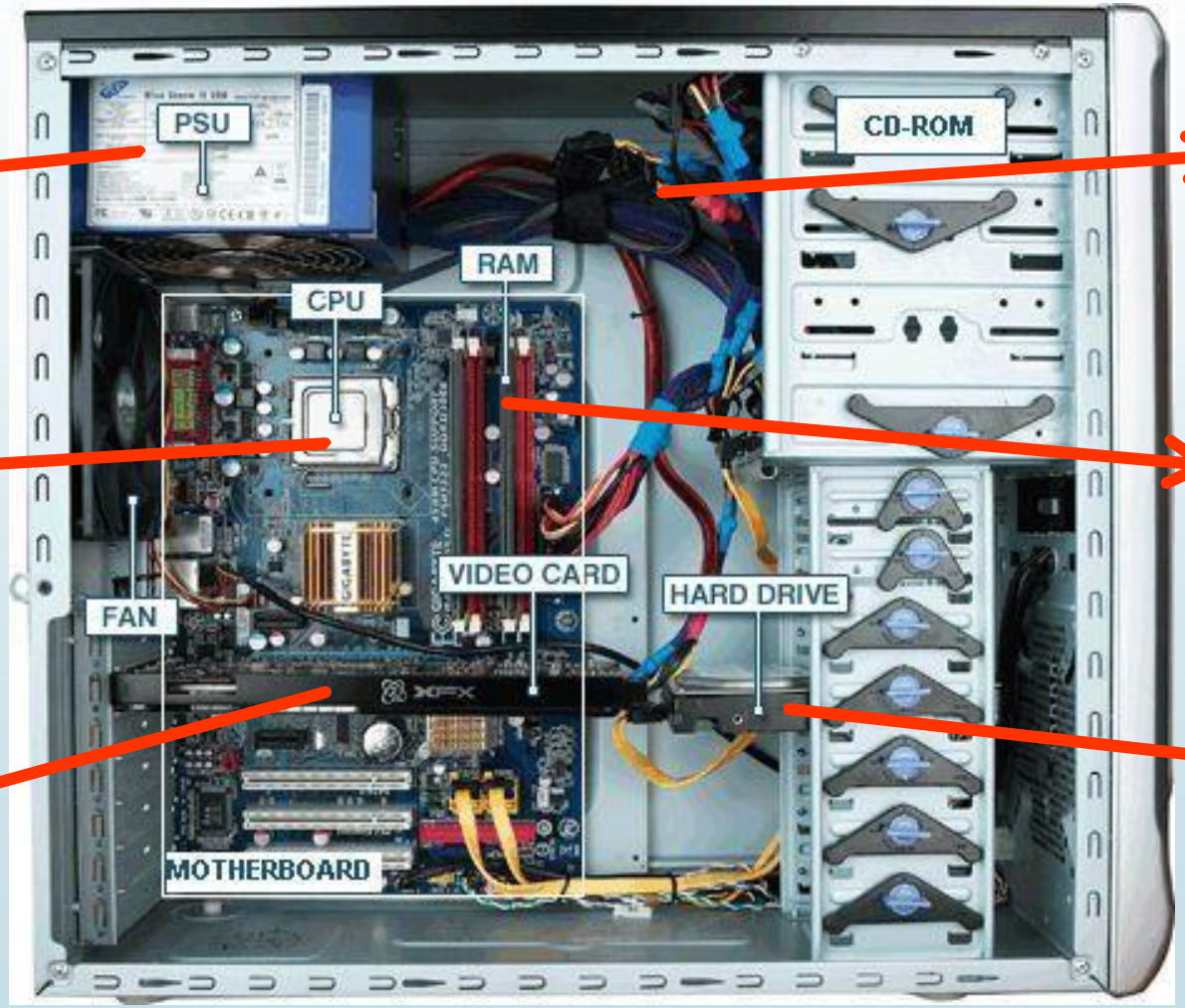
Speakers

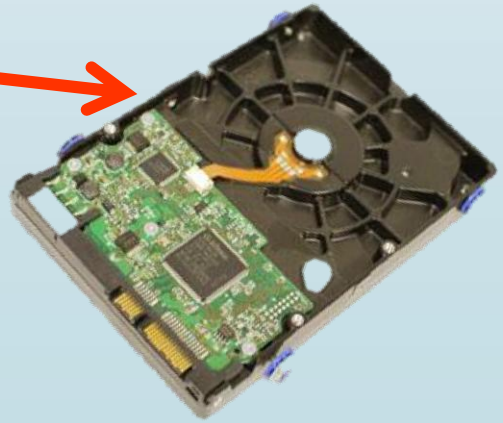
Speakers are one of the most common output devices used with computer systems. ... Regardless of their design,
the **purpose** of **speakers** is to produce audio output that can be heard by the listener. **Speakers** are transducers that convert electromagnetic waves into sound waves

System Unit

A computer system unit contains many parts.

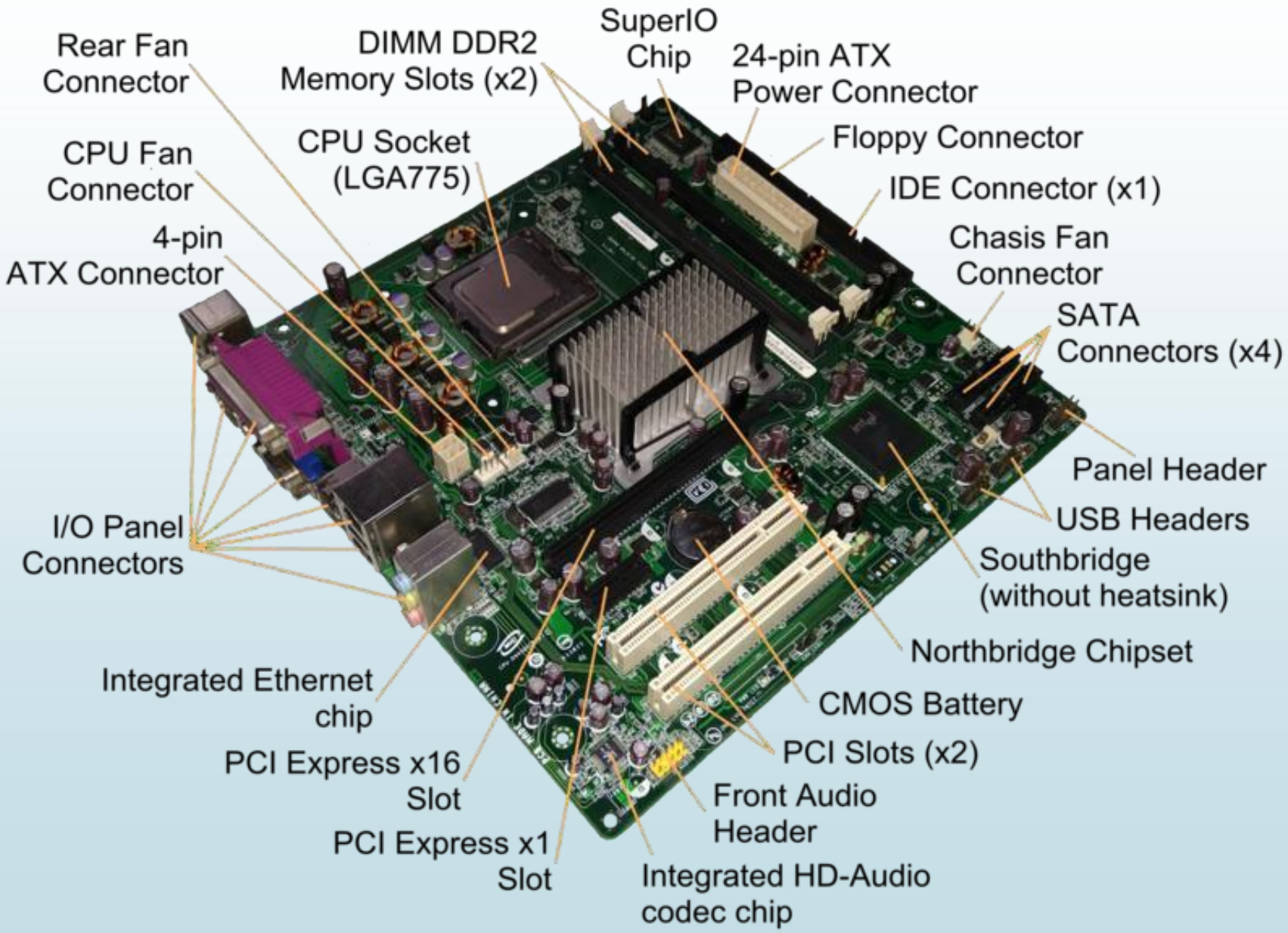






Motherboard

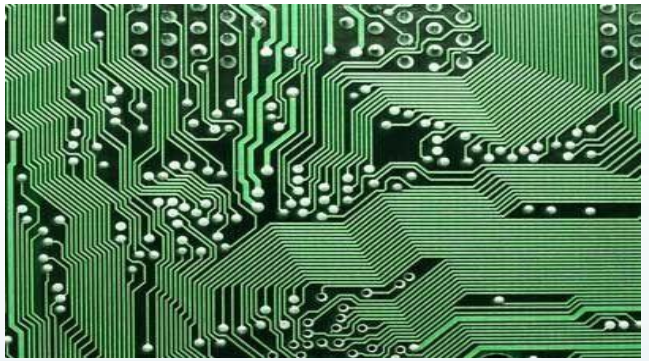
The motherboard is the main circuit board of a microcomputer. It is also known as the main board or system board.



BUS, Graphics Card, Sound Card

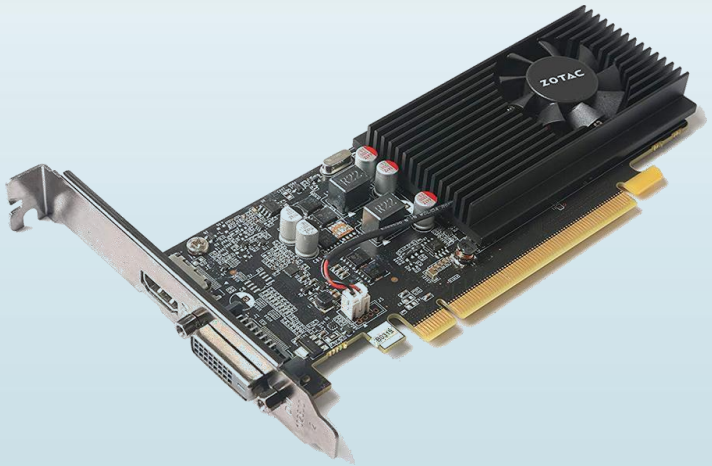
Bus- **A bus is an electronic line that allows 1s and 0s to moves from one place to another.**

Sound card- **A sound card lets a computer play and record high quality sound.**

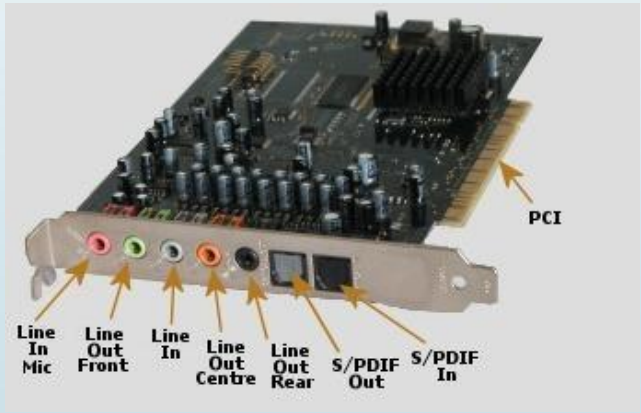


BUS

A **Graphics Card** is a piece of computer hardware that produces the image you see on a monitor. The Graphics Card is responsible for rendering an image to your monitor, it does this by converting data into a signal your monitor can understand.

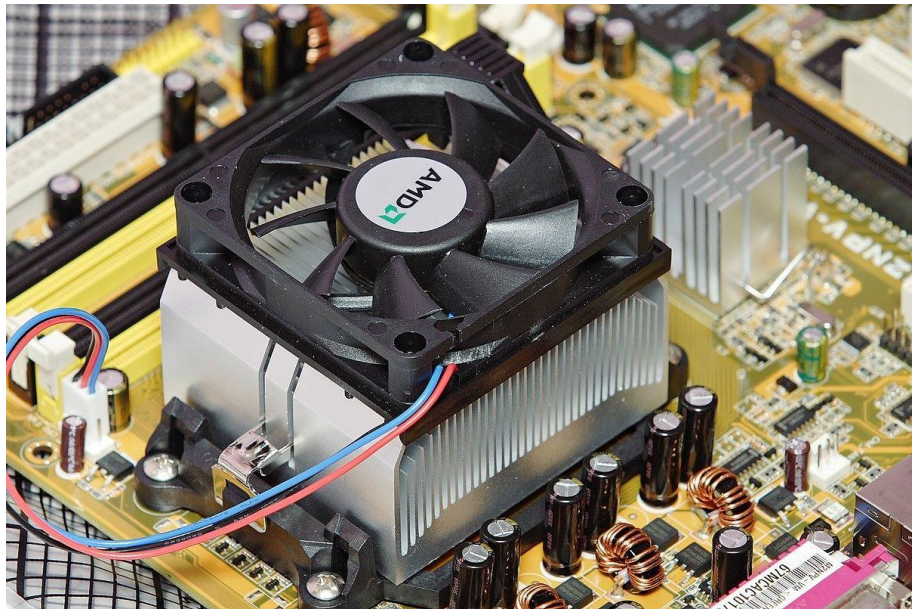


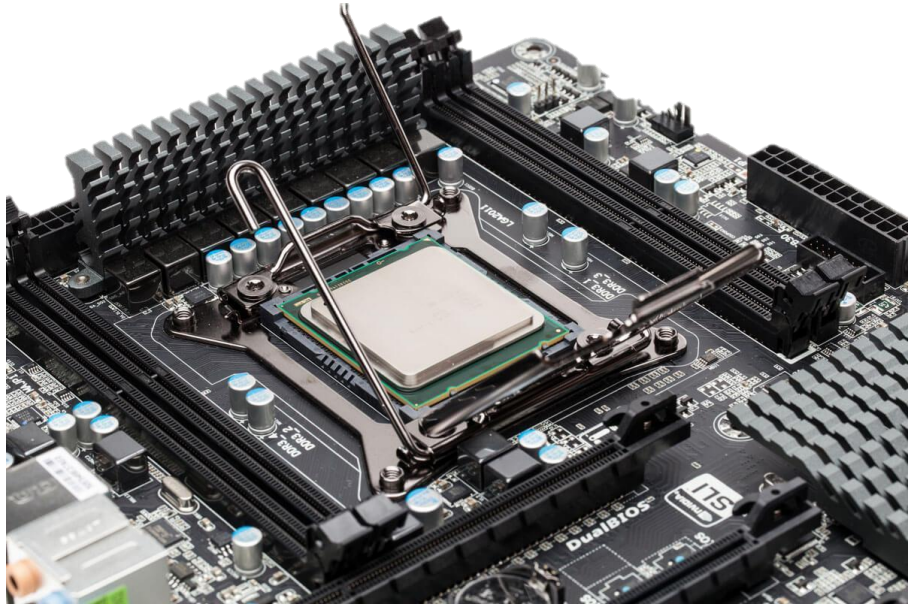
GRAPHICS CARD



SOUND CARD

CPU Unit on Motherboard





CPU Unit on Motherboard

CPU- The CPU is the central electronic chip that determines the processing power of the computer, and does all of the work for the computer

CPU have three basic parts

The Arithmetic Logic Unit(ALU)

Does all of the mathematics in computer.

Does all of the logic comparisons of values.

Some common logic comparison symbols.

The control unit

Directs the flow of information into the CPU and/or memory or storage.

Controls which instruction the CPU will do next.

Registers

Used to store data and instructions inside the processor.

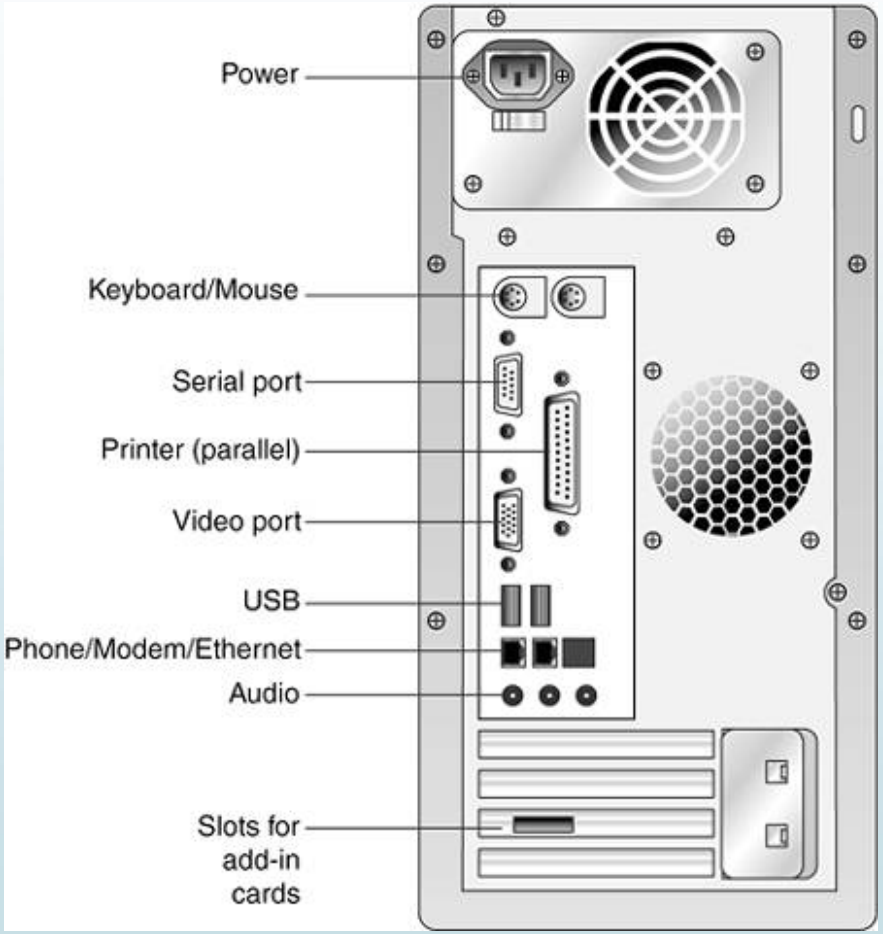
Size of the registers can affect the speed and performance of the processor.

UPS (uninterruptable power Supply)

Uninterruptible Power Supply. Acts as both a surge suppresser (to prevent high-power spikes) and a power leveler to provide the computer with a constant source of power. Can even provide power during a power failure or interruption (although the duration deepens on the UPS and the computer's power consumption) so that the user can safely save data before shutting down.

Computer case (ATX cabinet) Computer

CPU Unit Front and Back side



Modem

A modem is used to translate information transferred through telephone lines, cable or line-of- site wireless. The term stands for modulate and demodulate which changes the signal from digital, which computers use, to analog which telephones use and then back again. Digital modems transfer digital information directly without changing to analog.

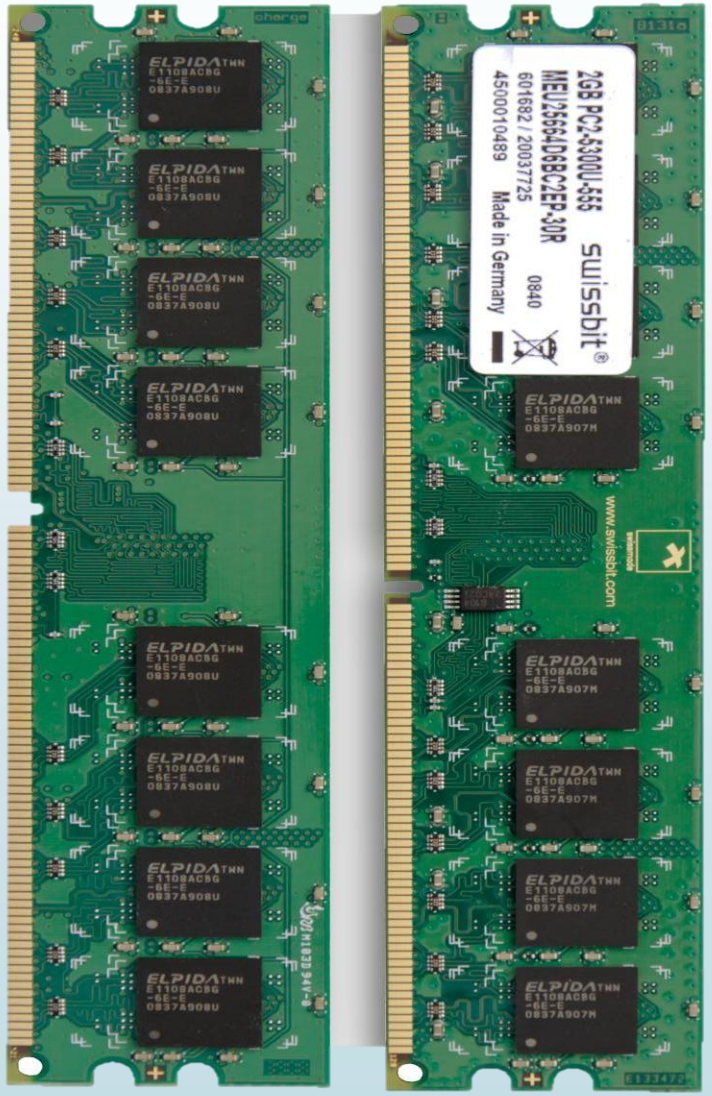
Memory

Primary Memory (RAM) stores data temporarily for fast processing.
Secondary Memory (HDD/SSD) keeps data permanently.
Cache Memory speeds up CPU operations.
ROM stores permanent instructions for system boot.
Virtual Memory uses storage as extra RAM when needed.
These memory types improve speed, storage, and overall system performance

RAM “Random Access Memory”

Random Access Memory (RAM)

This is the same as main memory. When used by itself, the term RAM refers to read and write memory that is, you can both write data into RAM and read data from RAM



Secondary Memory

Secondary Memory is the computer's **long-term storage**.
It is like a **big cupboard** where you keep all your files, photos, videos, software, and documents safely for future use.
Unlike RAM, the data in secondary memory **does not erase** when the computer is turned off.
It includes devices like **HDD, SSD, Pen Drive, Memory Card** etc.
It is **slower than RAM**, but it stores a **huge amount of data permanently**.






Rom Memory "Basic input output system"

ROM कंप्यूटर की **permanent memory** होती है।
इसमें वो जरूरी instructions रहती हैं जो कंप्यूटर को **start (boot)** करने में मदद करती हैं।
ROM में जो data होता है, वो **change नहीं होता**

- Computer **on होते ही सबसे पहले ROM पढ़ता है**
- ROM के बिना computer **start ही नहीं हो सकता**

Simple example:
ROM = computer की *instruction book*
जैसे किताब में लिखी बातें बदली नहीं जातीं, वैसे ही ROM की instructions भी fixed होती हैं।
इसीलिए ROM कंप्यूटर के लिए बहुत जरूरी होती है 😊

The End