

# Rizvi College Of Arts, Science and Commerce

Subject : Bifocal Electronics

Standard : XII

Paper : II

Chapter : Computer Fundamentals

Topic : All topics Covered



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# CH:7 – PAPER: 2 – BIFOCAL ELECTRONICS

## × **COMPUTER FUNDAMENTALS**

- × The term **computer** is derived from the Latin term 'computare', this means to calculate or programmable machine. **Computer** can not do anything without a Program. ... The Word '**Computer**' usually refers to the Center Processor Unit plus Internal memory.

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- × An **Electronic machine** that can store, find and arrange information, calculate amounts and control other machines

# COMPUTER.... DEFINITION

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- ✘ A **computer** is a machine or device that performs processes, calculations and operations based on instructions provided by a software or hardware program. It is designed to execute applications and provides a variety of solutions by combining integrated hardware and software components

# HISTORY OF COMPUTER

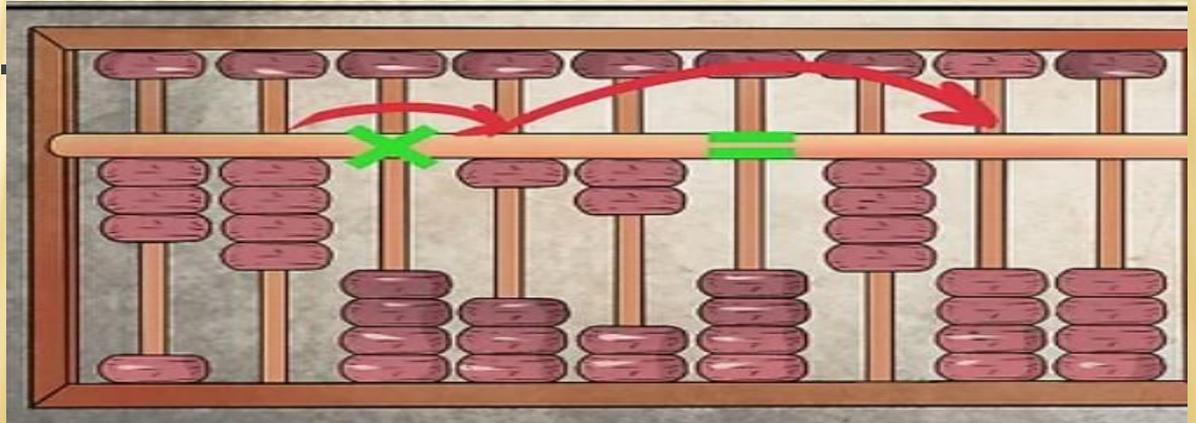
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- × **Charles Babbage**, an English mechanical engineer and polymath, originated the concept of a programmable **computer**. Considered the "father of the **computer**", he conceptualized and invented the first mechanical **computer** in the early 19th century.

# HISTORY

- ✘ We could argue that the **first computer** was the abacus or its descendant, the slide rule, **invented** by William Oughtred in 1622. But the **first computer** resembling today's modern machines was the Analytical Engine, a device conceived and designed by British mathematician Charles Babbage between 1833 and 1871.

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# 1<sup>ST</sup> COMPUTER

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- ✘ The **first** substantial **computer** was the giant ENIAC machine by John W. Mauchly and J. Presper Eckert at the University of Pennsylvania. ENIAC (Electrical Numerical Integrator and Calculator) used a word of 10 decimal digits instead of binary ones like previous automated calculators/**computers**.

# ENIAC ( ELECTRONIC NUMERICAL INTEGRATOR AND COMPUTER)

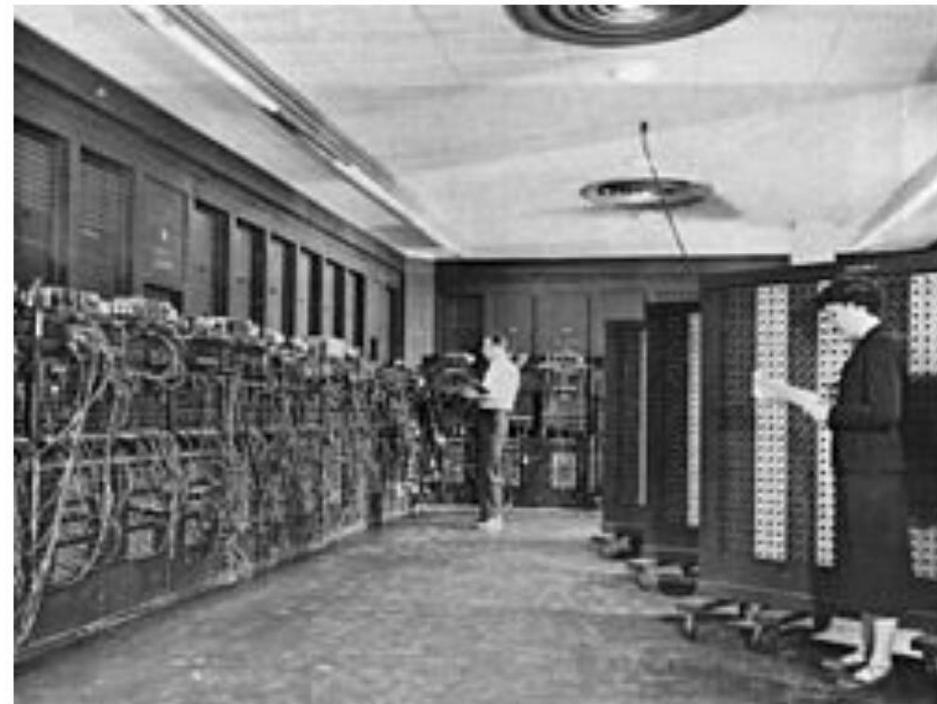
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## ENIAC

Pennsylvania Historical Marker

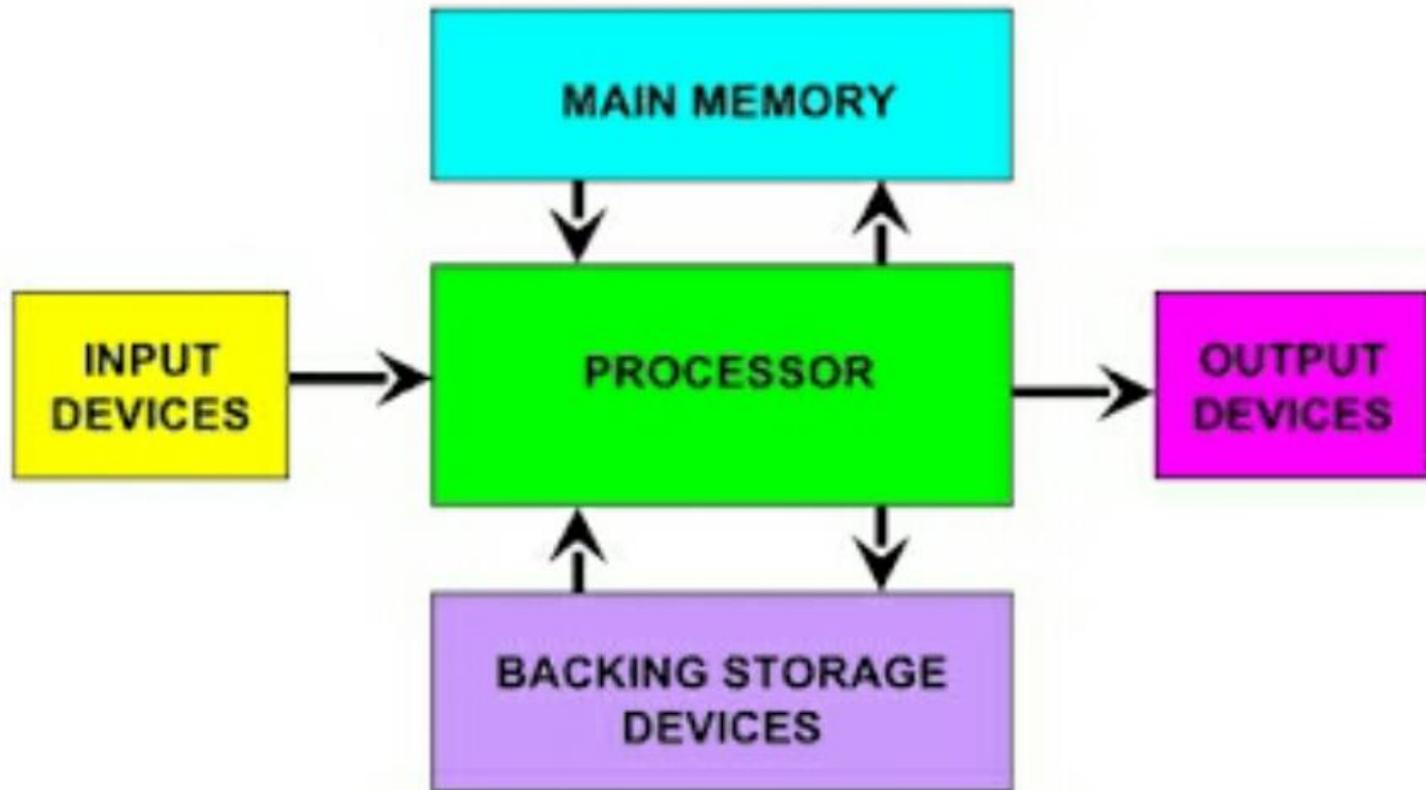


Four ENIAC panels and one of its three function tables, on display at the School of Engineering and Applied Science at the University of Pennsylvania

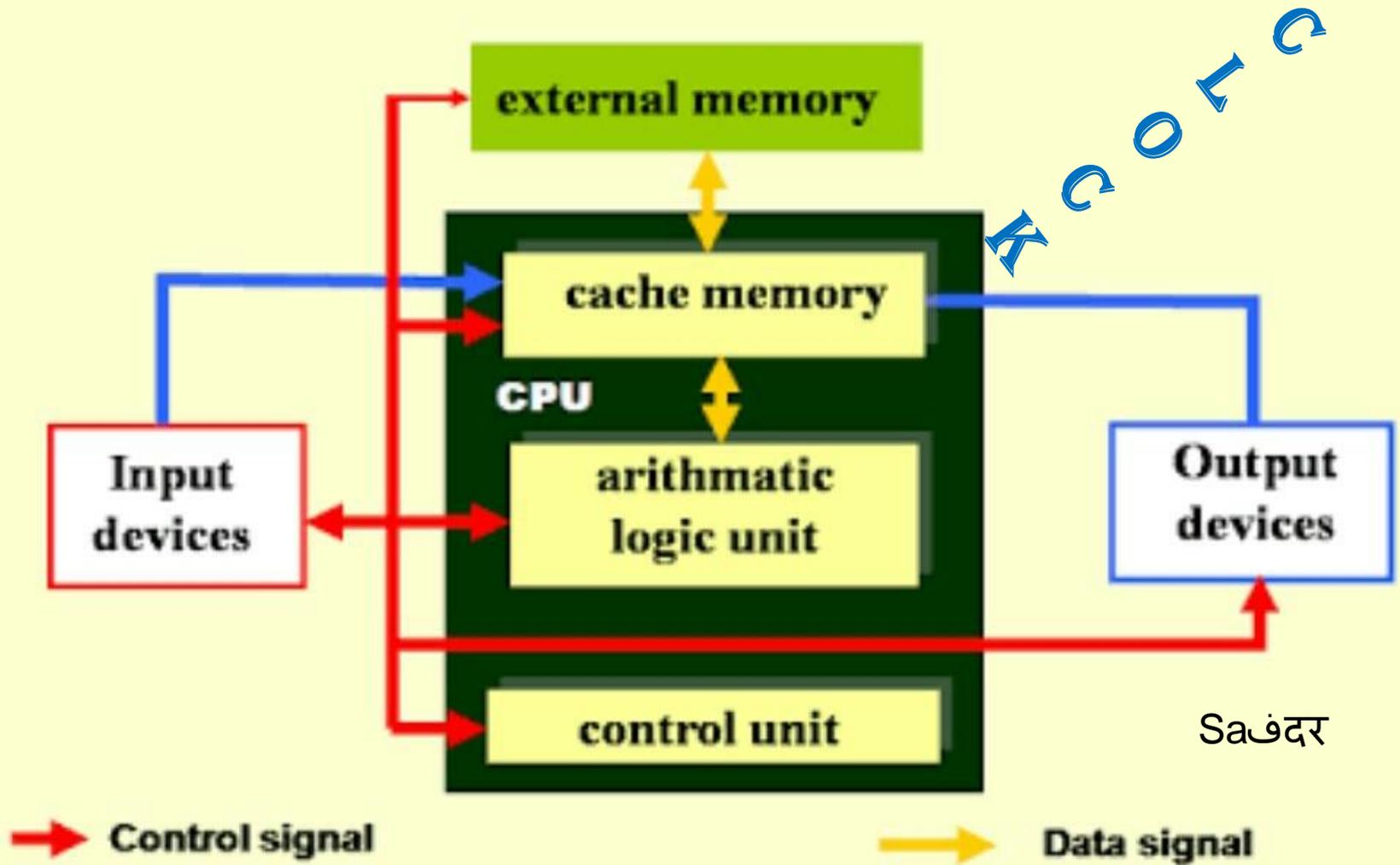


Glen Beck (background) and Betty Snyder (foreground) program ENIAC in BRL building 328. (U.S. Army photo, ca. 1947-

# SIMPLE BLOCK DIAGRAM OF COMPUTER



# BLOCK DIAGRAM OF DIGITAL COMPUTER



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ALL COMPUTER PERFORM THE FOLLOWING BASIC OPERATIONS FOR CONVERTING RAW INPUT DATA INTO USEFULL INFORMATION AND PRESENTING IT TO THE USER.

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**Five basic operations performed by computer are**

1. **Inputting**
2. **Processing**
3. **Storing ( Memory)**
4. **Controlling**
5. **Outputting**

**. A COMPUTER CAN PROCESS DATA, PICTURES, SOUND , GRAPHICS, COMPLICATED PROBLEMS QUICKLY AND ACCURATELY.**

## **INPUT UNIT**

Computers need to receive data and instruction in order to solve any problem. Therefore we need to input the data and instructions into the computers. The input unit consists of one or more input devices.

- **Keyboard** is the one of the most commonly used input device. Other commonly used input devices are the **mouse, CD/ DVD ROM, Obsolete devices like floppy disk drive, magnetic tape**, etc.

All the input devices perform the following functions.

- Accept the data and instructions from the outside world.
- Convert it to a form that the computer can understand.
- Supply the converted data to the computer system for further processing.

# STORAGE UNIT

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- ✘ The storage unit of the computer holds data and instructions that are entered through the input unit, before they are processed.
- ✘ It preserves the intermediate and final results before these are sent to the output devices.
- ✘ It also saves the data for the later use.

The various storage devices of a computer system are divided into two categories.

1. Primary Storage: Stores and provides very fast.

- ✘ This memory is generally used to hold the program being currently executed in the computer, the data being received from the input unit, the intermediate and final results of the program.
- ✘ The primary memory is temporary in nature. The data is lost, when the computer is switched off.

## Storage Cont....

In order to store the data permanently, the data has to be transferred to the secondary memory.

The cost of the primary storage is more compared to the secondary storage.

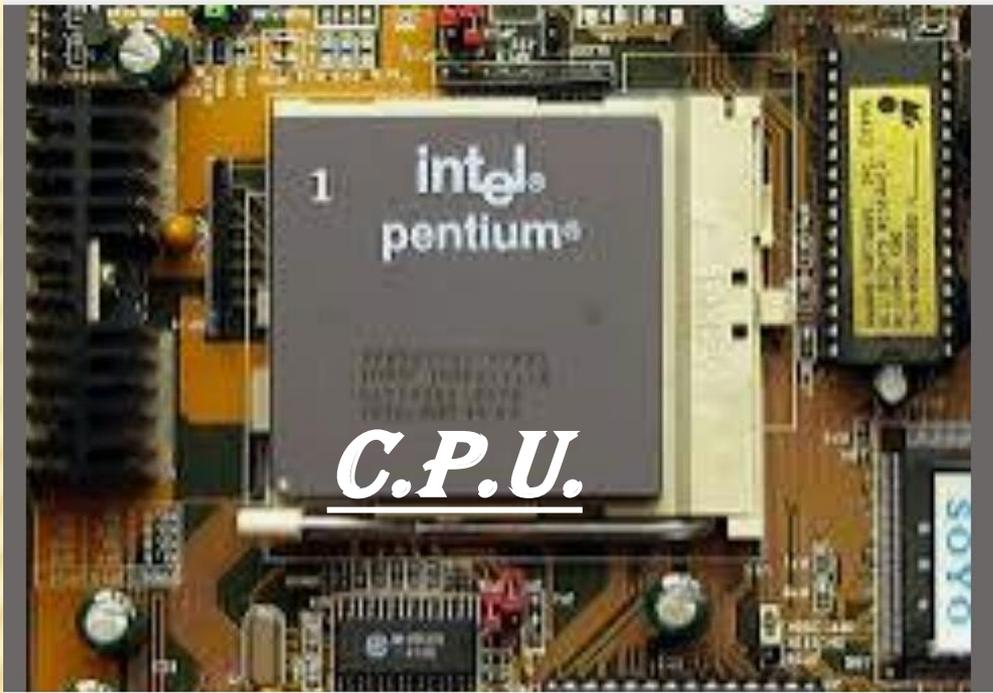
Therefore most computers have limited primary storage capacity.

### 2. Secondary Storage:

- Secondary storage is used like an archive.
- It stores several programs, documents, data bases etc.
- The programs that you run on the computer are first transferred to the primary memory before it is actually run.
- Whenever the results are saved, again they get stored in the secondary memory.
- The secondary memory is slower and cheaper than the primary memory.
- Some of the commonly used secondary memory devices are Hard disk, CD, DVD, Pen drive, Micro SD card etc.,

## Comparison

<b>Primary Storage</b>	<b>Secondary Storage</b>
Main memory or internal memory	Auxiliary memory, external memory, or secondary memory
RAM, ROM, cache, PROM, EPROM	HDD, CD, DVD, floppy disks, flash drives
Temporarily stores data while in use	Permanently stores data
Volatile memory	Non-volatile memory
CPU directly accesses data	CPU does not directly access data
Power cuts cause data loss	Power cuts do not cause data loss
Limited storage capacity	Expansive and scalable storage capacity
Faster data access	Slower data access



Сафдр

A central processing unit (**CPU**) is an important part of every computer. The **CPU** sends signals to control the other parts of the computer, almost like how a brain controls a body. The **CPU** is an electronic machine that works on a list of computer things to do, called instructions.

The central processing unit (**CPU**) of a computer is a piece of hardware that carries out the instructions of a computer program. It performs the basic arithmetical, logical, and input/output operations of a computer system. ... The **CPU** is sometimes also referred to as the central **processor** unit, or **processor** for short

**CPU has following three components.**  
**Memory or Storage Unit.**  
**Control Unit.**  
**ALU(Arithmetic Logic Unit)**

Control Unit this part controls the input and output devices.

Arithmetic Logic Unit this is the part that does all the working out: it does all the maths and makes the decisions.

Immediate Access Store this is the memory available for programs and data.

# **CENTRAL PROCESSING UNIT**

- ✘ The control unit and ALU of the computer are together known as the Central Processing Unit (CPU).
- ✘ The CPU is like brain performs the following functions:
  - It performs all calculations.
  - It takes all decisions.
  - It controls all units of the computer.
- ✘ A PC may have CPU-IC such as Intel 8088, 80286, 80386, 80486, Celeron, Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV, Dual Core, and AMD etc .

## **ARITHMETIC LOGICAL UNIT**

- ✘ All calculations are performed in the Arithmetic Logic Unit (ALU) of the computer.
- ✘ It also does comparison and takes decision.
- ✘ The ALU can perform basic operations such as addition, subtraction, multiplication, division, etc and does logic operations like,  $>$ ,  $<$ ,  $=$ , 'etc.
- ✘ Whenever calculations are required, the control unit transfers the data from storage unit to ALU, once the computations are done, the results are transferred to the storage unit by the control unit and then it is send to the output unit for displaying results.

# REGISTERS

- ✘ It is a special temporary storage location within the CPU. Registers quickly, accept, store and transfer data and instructions that are being used immediately (main memory hold data that will be used shortly, secondary storage holds data that will be used later).
- ✘ To execute an instruction, the control unit of the CPU retrieves it from main memory and places it onto a register.
- ✘ The typical operations that take place in the processing of instruction are part of the instruction cycle or execution cycle.
- ✘ The instruction cycle refers to the retrieval of the instruction from main memory and its subsequence at decoding.
- ✘ The process of alerting the circuits in CPU to perform the specified operation. The time it takes to go through the instruction cycle is referred to as I-time.

## **CONTROL UNIT**

- ✘ It controls all other units in the computer.
- ✘ The control unit instructs the input unit, where to store the data after receiving it from the user.
- ✘ It controls the flow of data and instructions from the storage unit to ALU.
- ✘ It also controls the flow of results from the ALU to the storage unit.
- ✘ The control unit is generally referred as the central nervous system of the computer that control and synchronizes its working.

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# Output Unit

The output unit of a computer provides the information and results of a computation to outside world.

- ✘ Printers, Visual Display Unit (VDU) are the commonly used output devices.

Other commonly used output devices are

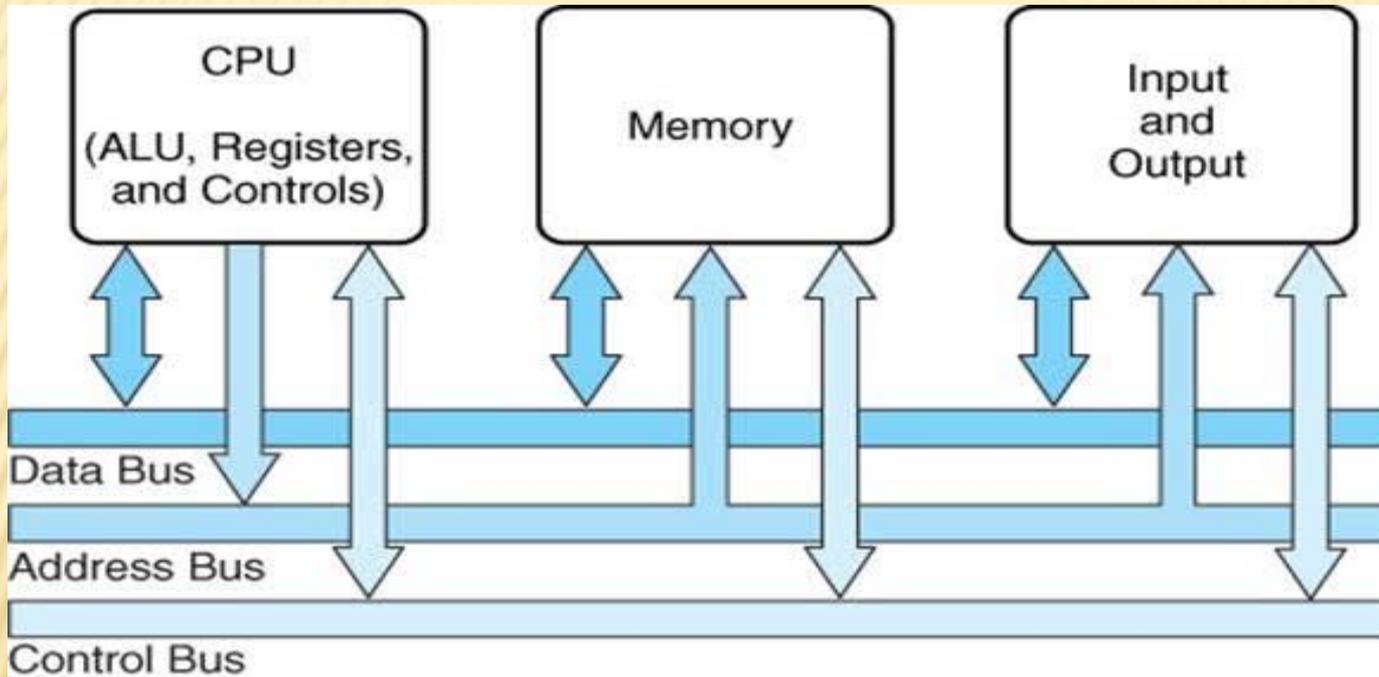
- Hard disk drive,  
SD/ Micro SD card  
Pen drive

# Buses

- ✘ The term Bus refers to an electrical pathway through which bits are transmitted between the various computer components.
- ✘ Depending on the design of the system, several types of buses may be present.
- ✘ The most important one is the data bus, which carries the data through out the central processing unit.
- ✘ The wider data bus, the more data it can carry at one time and thus the greater the processing speed of the computer.

A **system bus** is a single computer bus that connects the major components of a computer system, combining the functions of a data bus to carry information, an address bus to determine where it should be sent, and a control bus to determine its operation. The technique was developed to reduce costs and improve modularity, and although popular in the 1970s and 1980s, more modern computers use a variety of separate buses adapted to more specific needs.

# BUS



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## Three types of bus are used.

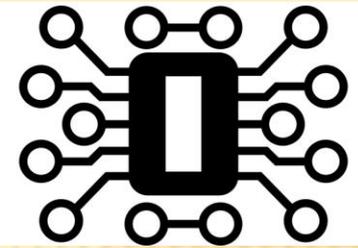
Address bus - carries memory addresses from the processor to other components such as primary storage and input/output devices. ...

Data bus - carries the data between the processor and other components. ...

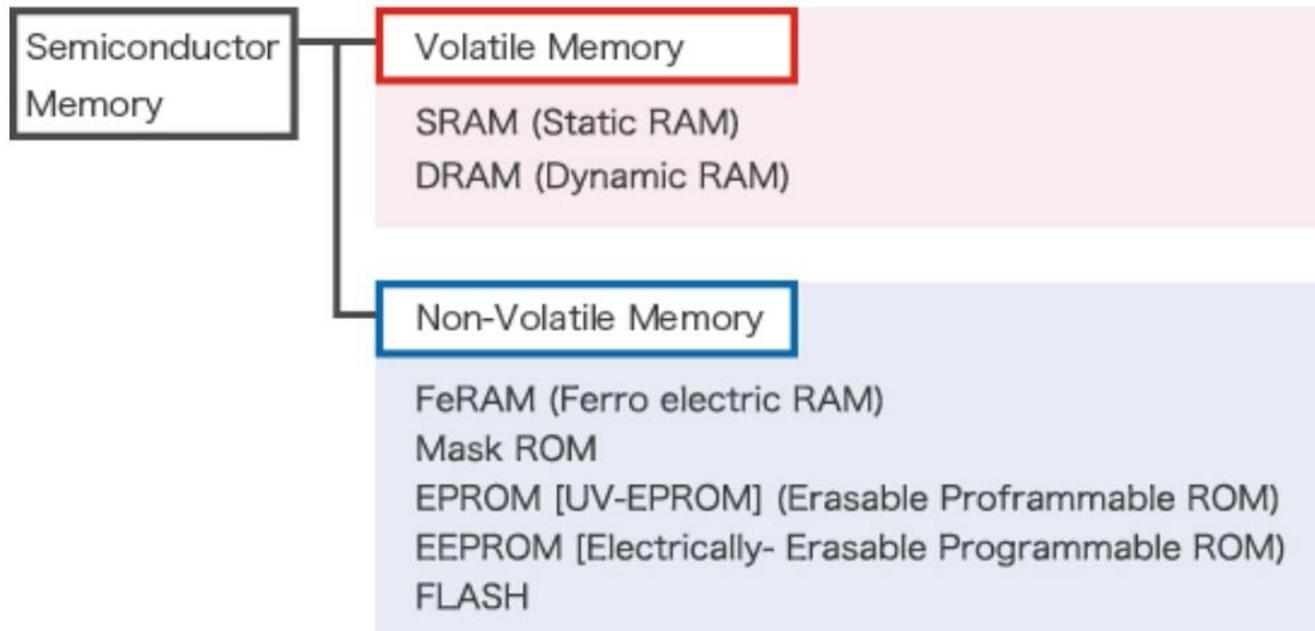
Control bus - carries control signals from the processor to other components.

**Bus width** refers to the number of bits that can be sent to the CPU simultaneously, and **bus speed** refers to the number of times a group of bits can be sent each second.

# SEMICONDUCTOR MEMORY

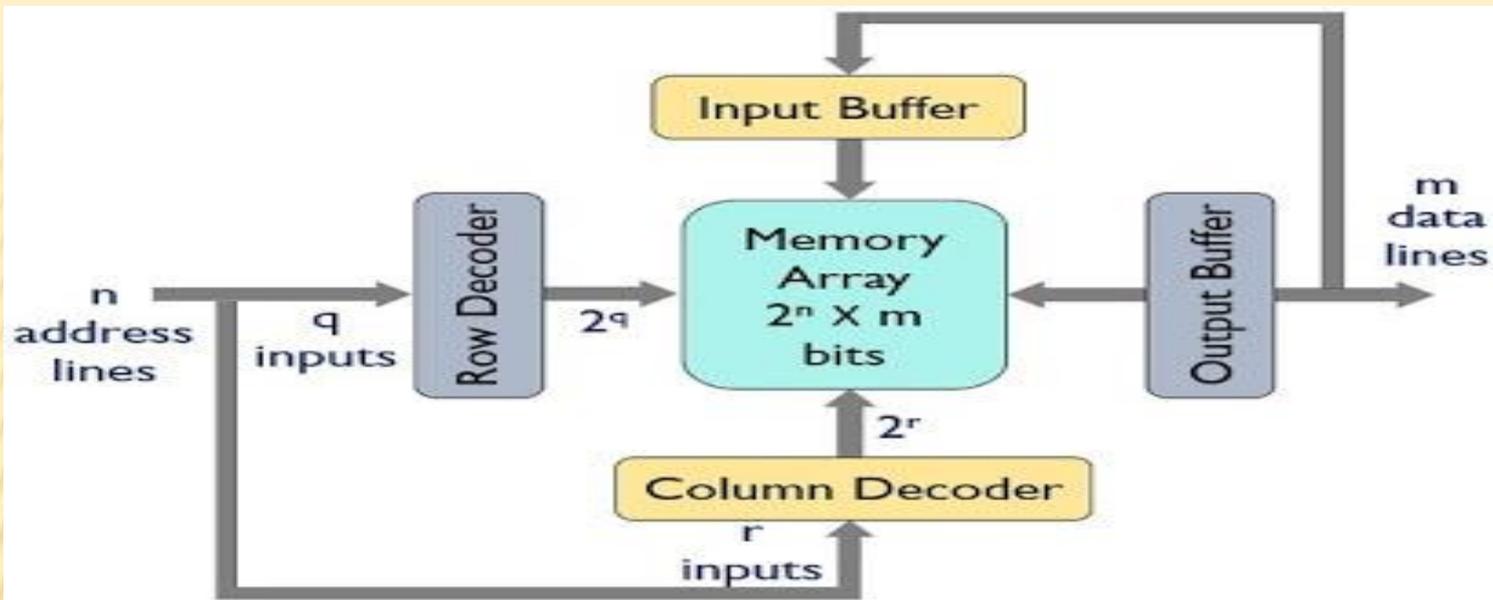


## Semiconductor Memory Types



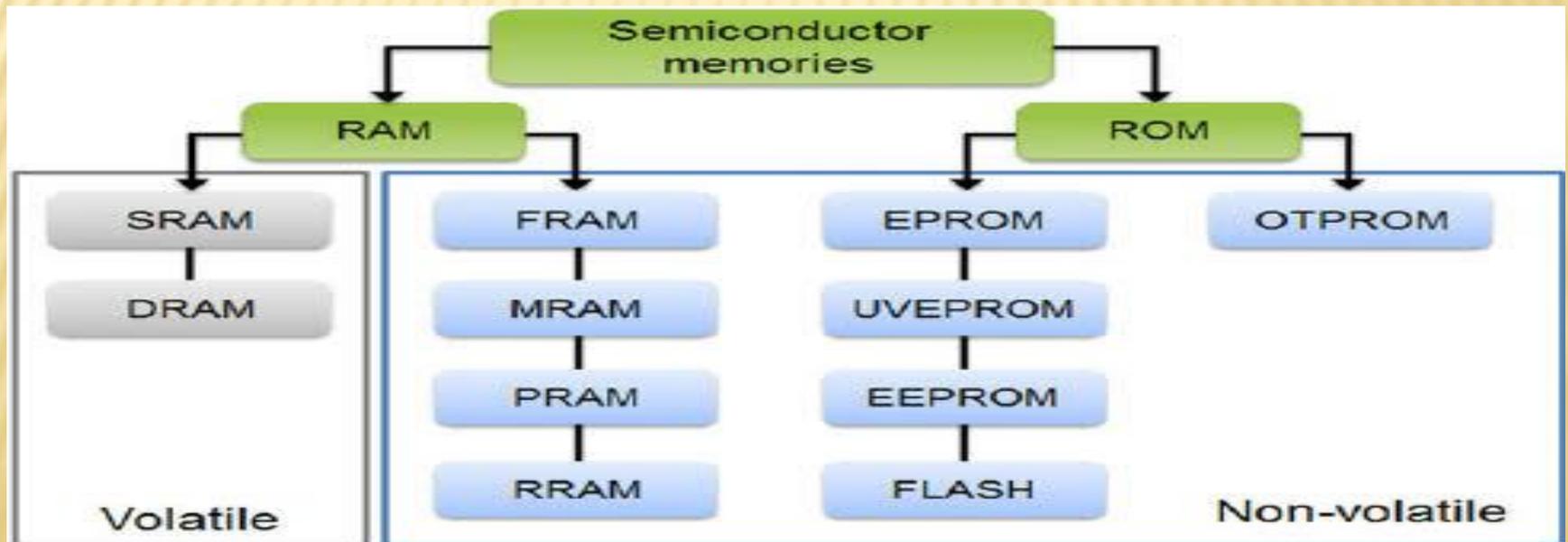
\***RAM** (Random Access Memory) : Enables Read/Write of stored contents

\* **ROM** (Read Only Memory) : Allows only Read operation



**Functional Block Diagram of Semiconductor Memory**

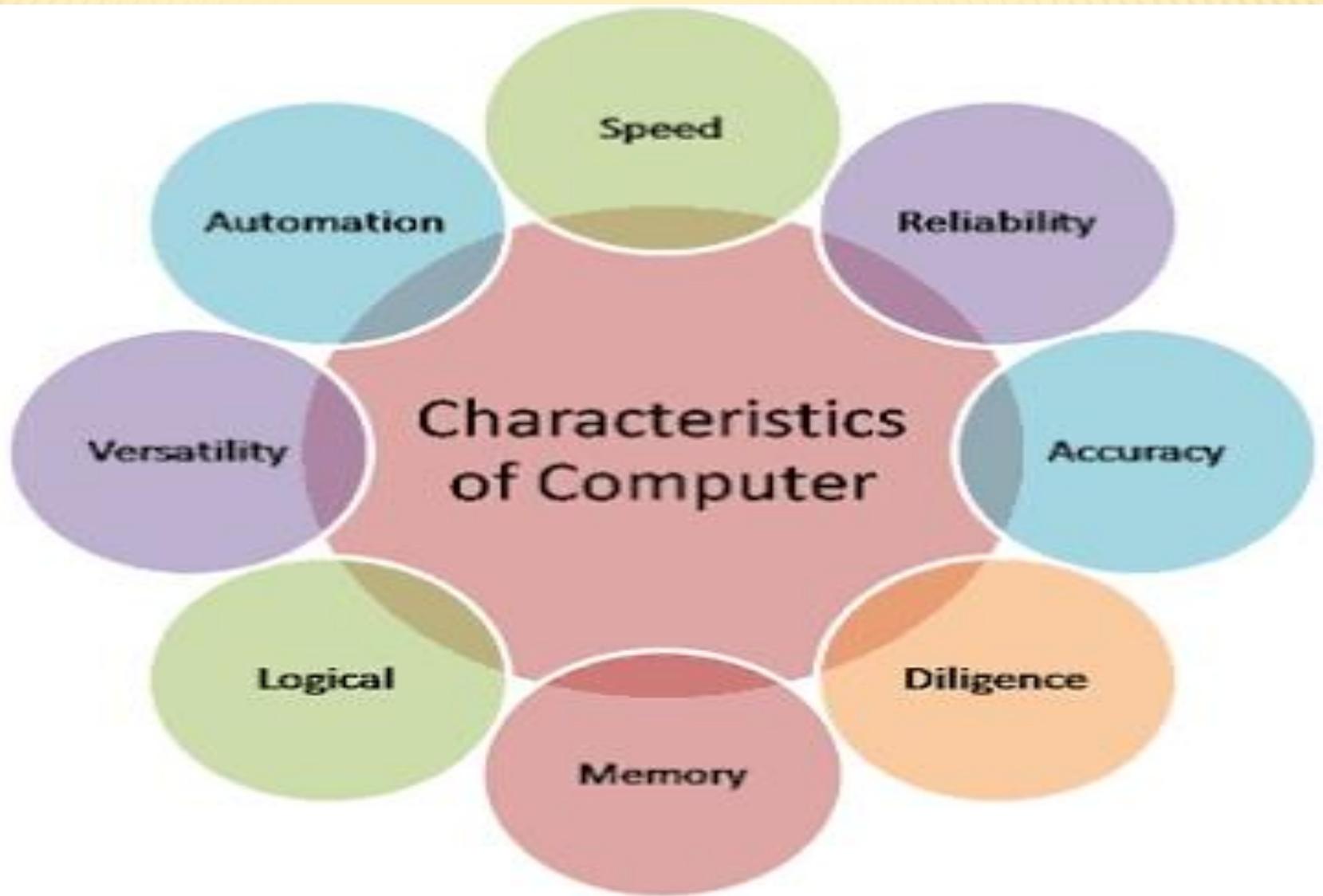
Electronics Desk



	RAM	ROM
<b>Volatility</b>	RAM is volatile in nature as it automatically erased when computer shutdowns	ROM is non-volatile since it is never erased when there is any shutdown or restart of computer.
<b>Accessibility</b>	RAM can be directly accessed by the processor	ROM can't be directly accessed by the processor since it is transferred into RAM where it is executed by the processor.
<b>Storage</b>	RAM is used to store the temporary information for limited time.	ROM is used to store permanent information which can't be deleted.
<b>Hardware structure</b>	RAM is in form of chip while	ROM is generally optical drivers made of magnetic tapes
<b>Cost</b>	Costlier than ROM	Cheaper than RAM
<b>Size</b>	Chip Size is larger than ROM	Chip Size is smaller than ROM
<b>Writing speed</b>	Writing data to a RAM chip is a faster process	Writing data to a ROM chip is a slow process
<b>Storage Limit</b>	A RAM chip can store multiple gigabytes (GB) of data , up to 16 GB or more per chip	A ROM chip typically stores only several megabytes (MB) of data, up to 4 MB or more per chip
<b>Examples</b>	Static and dynamic RAM	PROM, EPROM and EEPROM are types of ROM.

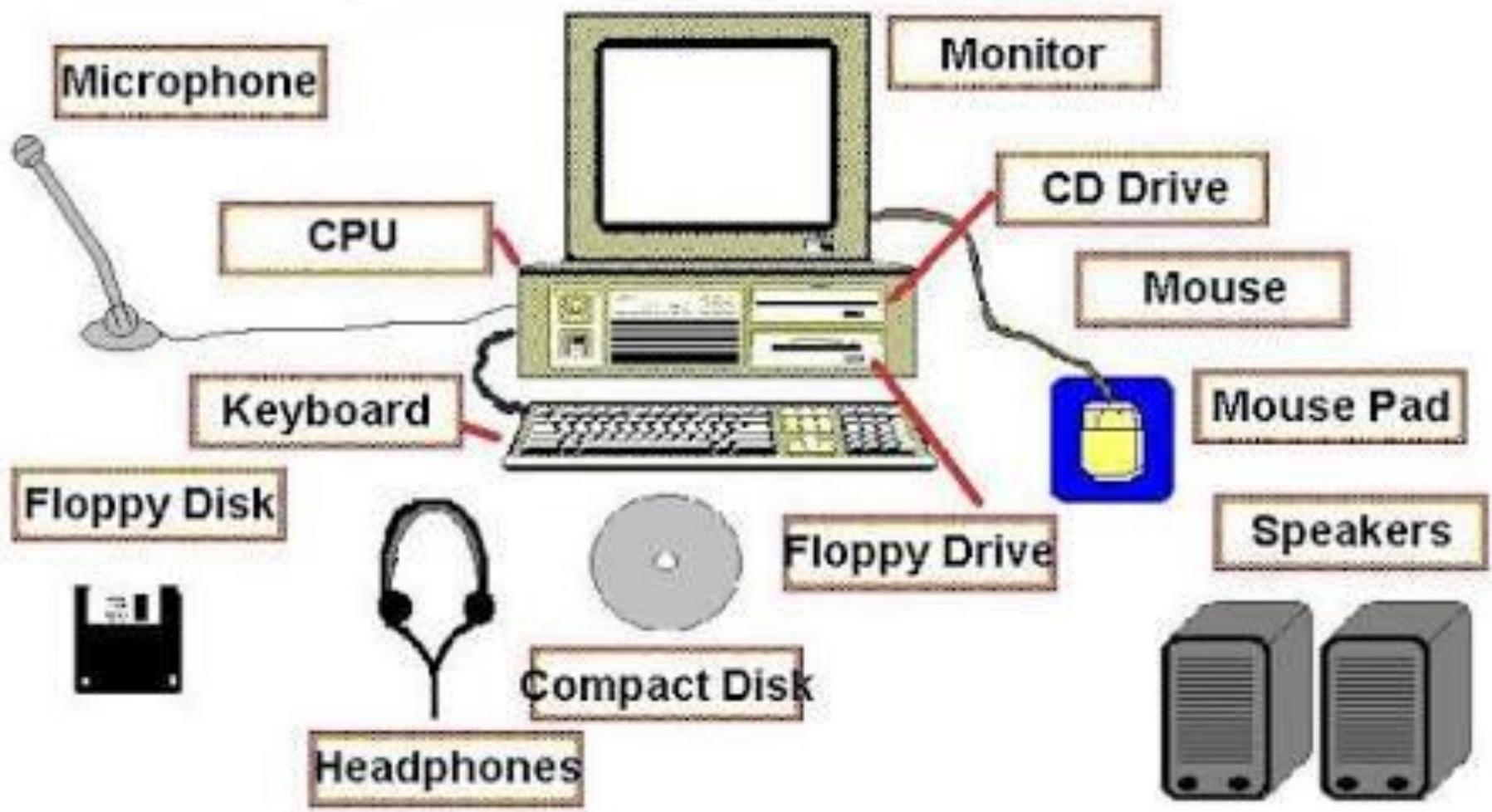
DRAM	SRAM
1. Constructed of tiny capacitors that leak electricity.	1. Constructed of circuits similar to D flip-flops.
2. Requires a recharge every few milliseconds to maintain its data.	2. Holds its contents as long as power is available.
3. Inexpensive.	3. Expensive.
4. Slower than SRAM.	4. Faster than DRAM.
5. Can store many bits per chip.	5. Can not store many bits per chip.
6. Uses less power.	6. Uses more power.
7. Generates less heat.	7. Generates more heat.
8. Used for main memory.	8. Used for cache.

### Difference between SRAM and DRAM



**Characteristics of Computer**

# Computer Terminology



# TERMINOLOGY



FIGURE 1-7

# *SPECIFICATIONS*

## **PC Laptop Specifications**

Intel Core i5-8365U Processor.

8GB DDR4 2400 RAM.

120 GB Solid State Drive.

15.6" Wide Screen Display.

Microsoft Windows Windows 7 Pro(or other least expensive Microsoft Windows operating system)

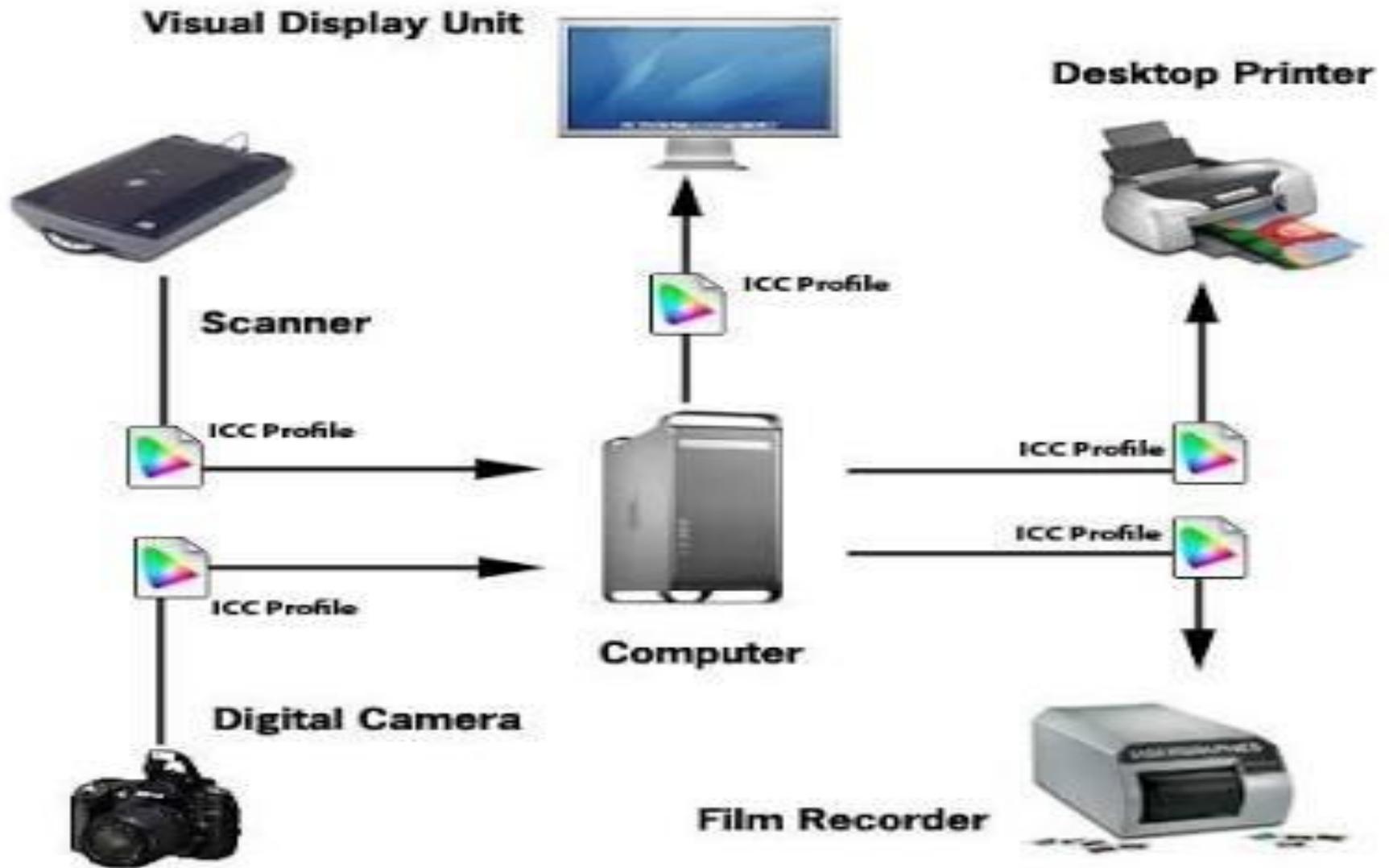
On board 10/100/1000 Mbps Ethernet NIC.

On board Wireless NIC.

On board HD Audio.

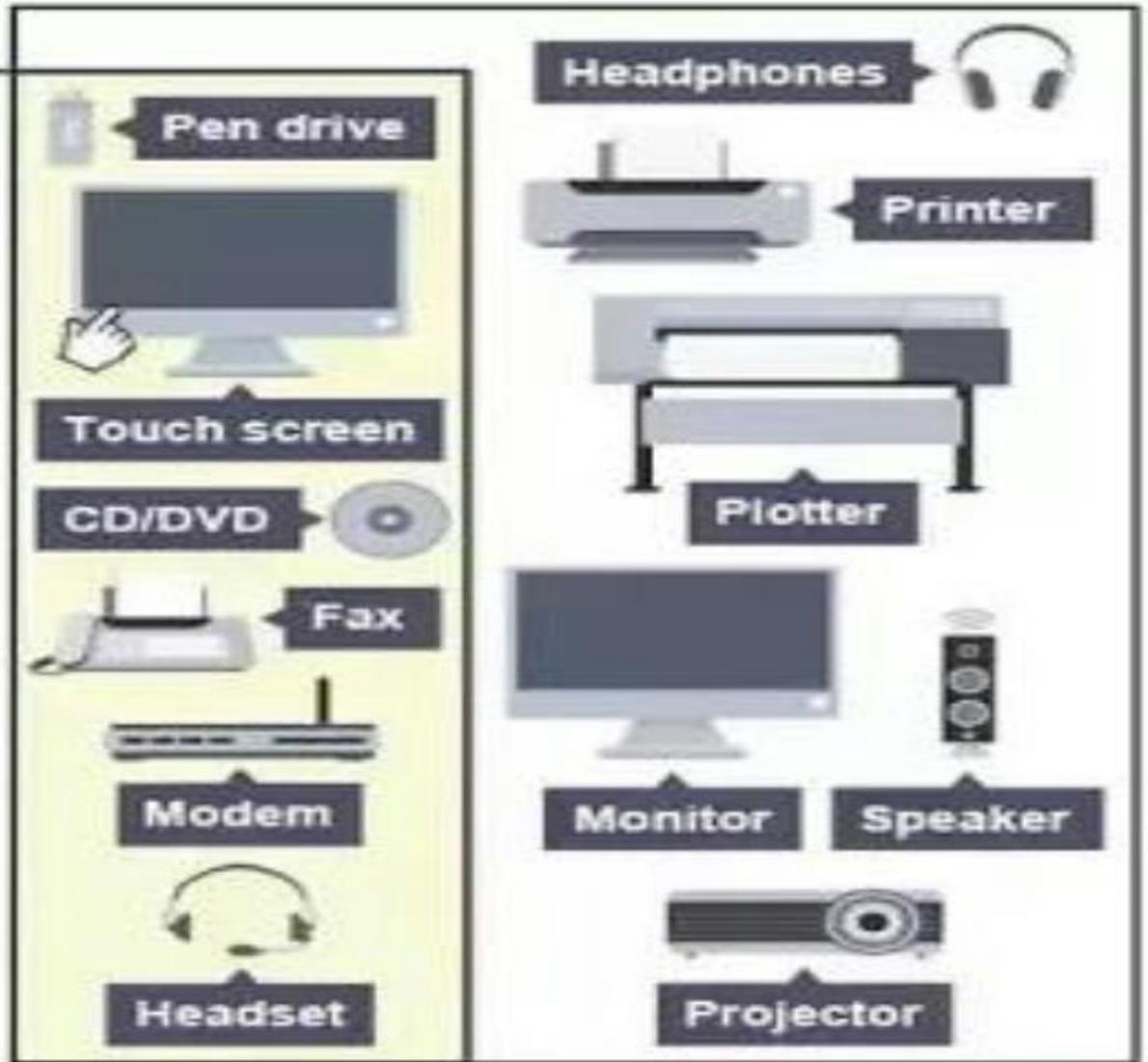
Device name	Steve
Processor	Intel(R) Core(TM) i3-3110M CPU @ 2.40GHz 2.40 GHz
Installed RAM	3.00 GB
Device ID	BB9B4FD9-F4A9-4E0D-8261-89E95F7560DF
Product ID	00331-10000-00001-AA829
System type	32-bit operating system, x64-based processor
Pen and touch	No pen or touch input is available for this display

# INPUT - - - OUTPUT DEVICES



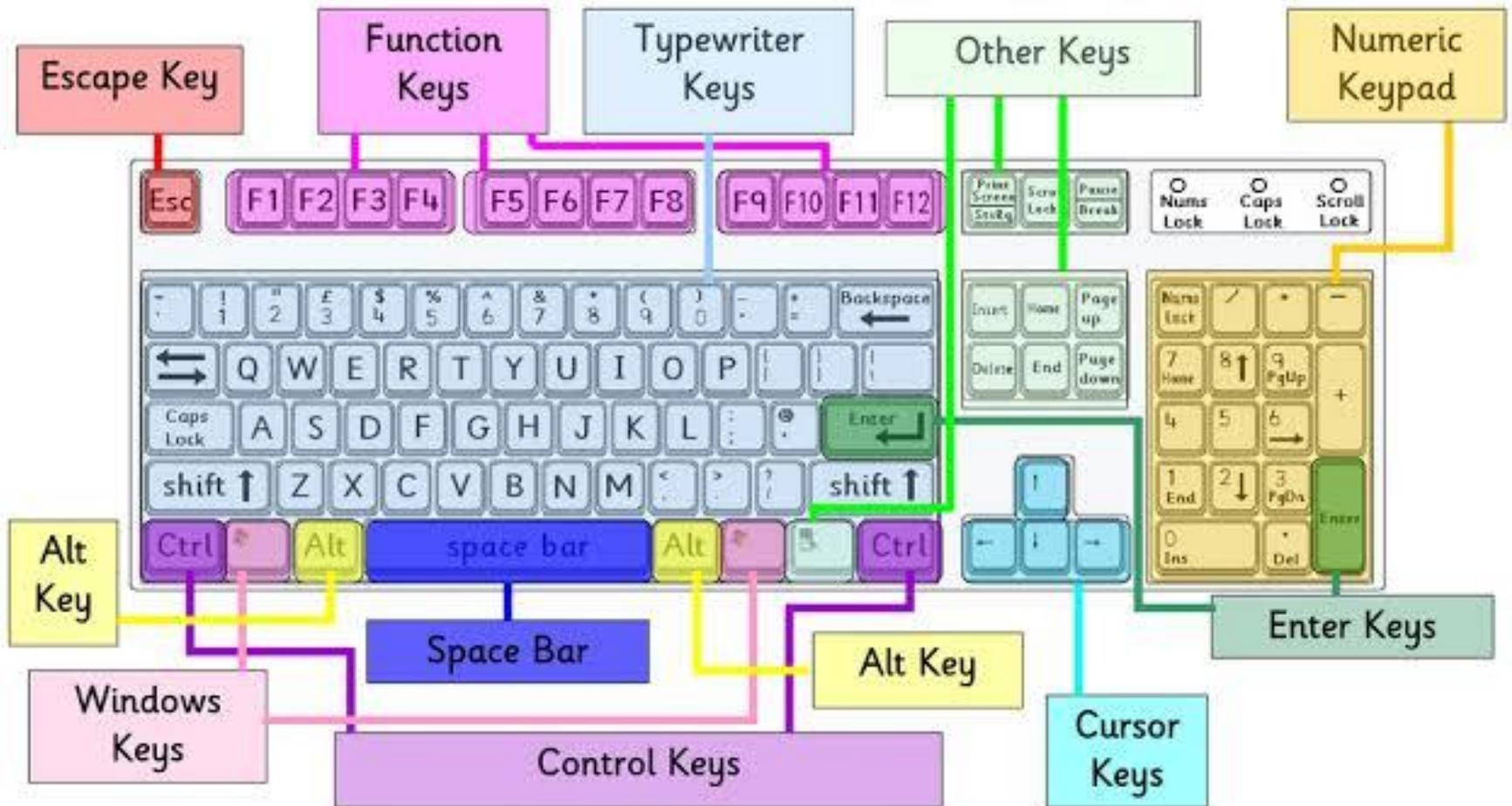
# Input and Output Devices

## Input devices



## Output devices

# Your Computer Keyboard



# Saitek Computer Keyboard

Num Lock, Caps Lock, and Scroll Lock indicators



## Full Form of MICR

# Magnetic Ink Character Recognition



**MICR code** is a **code** printed on cheques using **MICR** (Magnetic Ink Character Recognition technology). This enables identification of the cheques and which in turns means faster processing. An **MICR code** is a 9-digit **code** that uniquely identifies the bank and branch participating in an Electronic Clearing System (ECS).

The starting 3 digits of the **code** signify the city **code**, the next 3 digits (the middle ones) stand for the **bank code** and the last 3 digits represent the **code** of the particular branch. You can easily find the **MICR** number at the bottom of your cheque leaf, printed adjacent the cheque number (on the right-hand side)

A **DIGITIZER TABLET** (also known as a **digitizer** or graphics tablet) is a tool **used** to convert hand-drawn images into a format suitable for computer processing. Images are usually drawn onto a flat surface with a stylus and then appear on a computer monitor or screen.

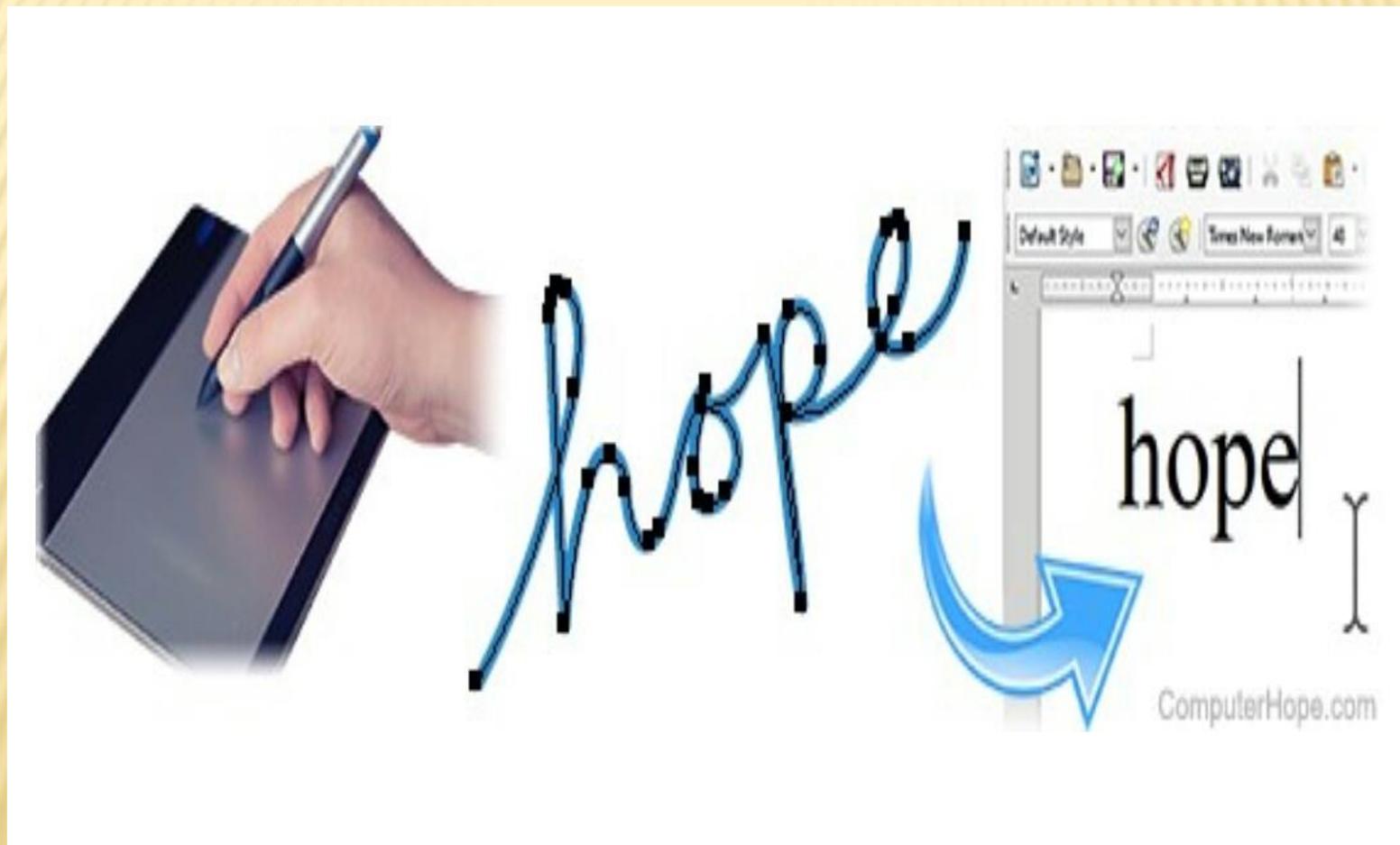
Both capacitive and resistive **touchscreen** devices have a **digitizer**. It's essentially a glass layer that's placed over the device's liquid-crystal **display** (LCD) layer. The **digitizer's** primary purpose is to convert the analog signals from your **touch** commands into digital signals that they device can read.

There are three common **types** of touch-screen **digitizers**: passive, active and dual.

When you touch an FTIR screen you scatter light – and several cameras on the back of the screen detect this light as an optical change, just as a capacitive touch screen detects a change in electrical current.



What is this ?



# Monitor / V D U

A **monitor** is an electronic visual computer display that includes a screen, circuitry and the case in which that circuitry is enclosed. Older computer **monitors** made use of cathode ray tubes (CRT), which made them large, heavy and inefficient. ... A **monitor** is also known as a screen or a visual display unit (VDU).

## **Different Types of Monitors**

CRT (cathode ray tube) monitors.

LCD (liquid crystal display) monitors.

TFT Monitor.

LED (light-emitting diodes) Monitors.

DLP Monitor.

Touchscreens Monitor.

Plasma Screen Monitor.

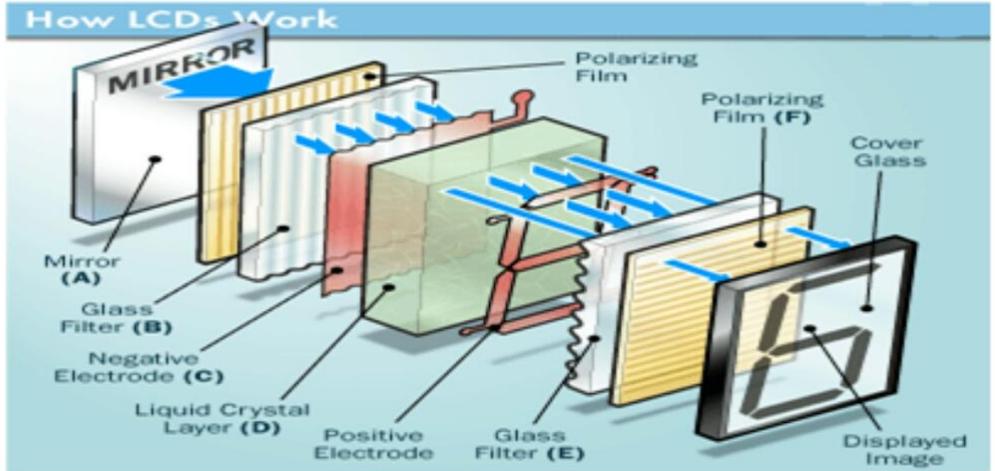
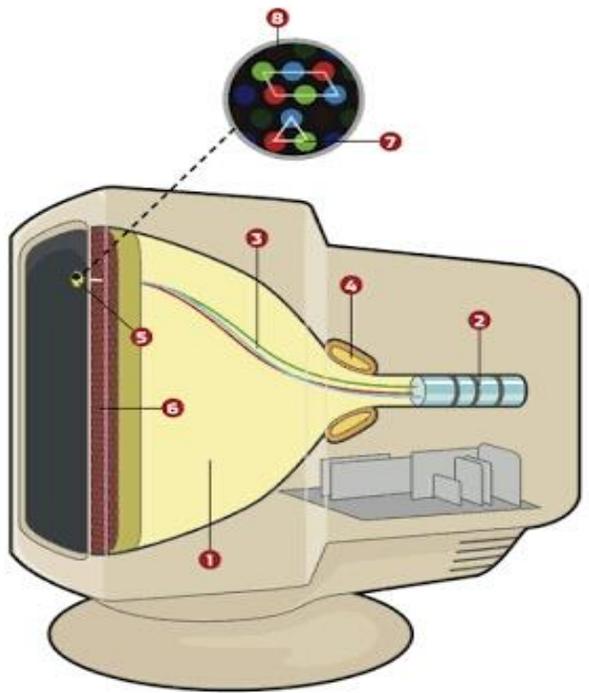
OLED Monitors.

A **monitor** usually comprises the visual display, circuitry, casing, and power supply. The display device in modern **monitors** is typically a thin film transistor liquid crystal display (TFT-LCD) with LED backlighting having replaced cold-cathode fluorescent lamp (CCFL) backlighting.

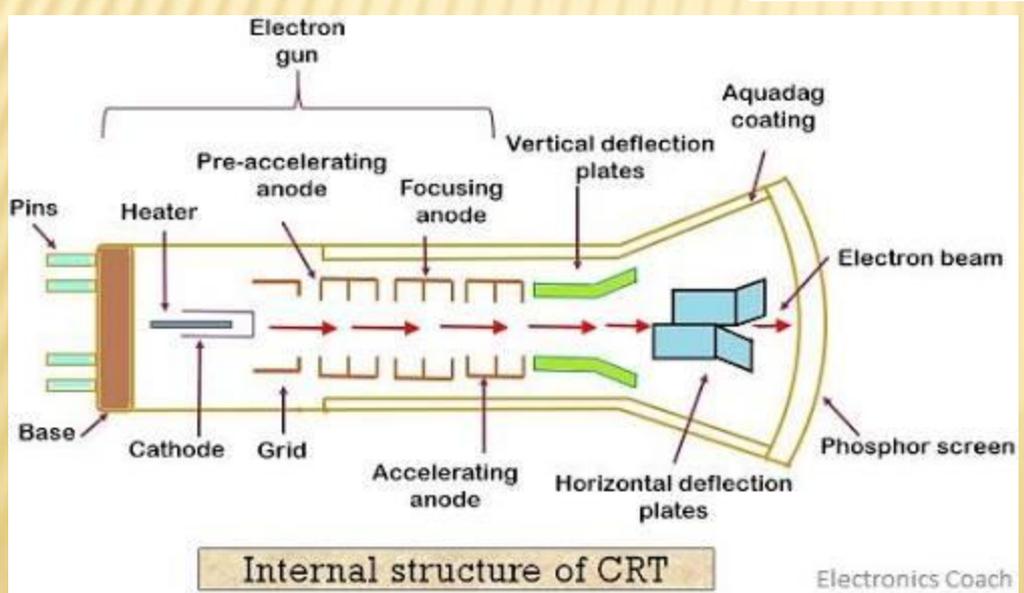
**Resolution** refers to the number of individual dots of color, known as **pixels**, contained on a display. Resolution is expressed by identifying the number of pixels on the **horizontal axis** (rows) and the number on the **vertical axis** (columns), such as 800x600. Resolution is affected by a number of factors, including the size of the screen.

As monitor sizes have increased over the years, display standards and resolutions have changed.

# How LCDs are Constructed?



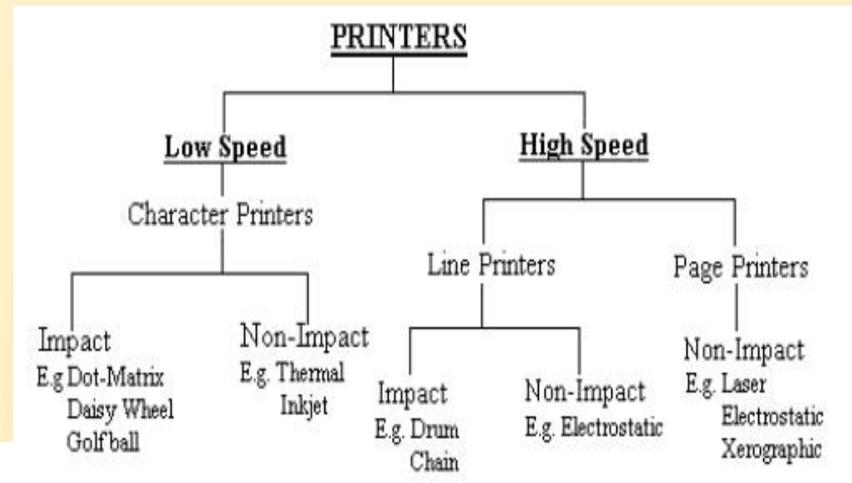
LCD Layered Diagram



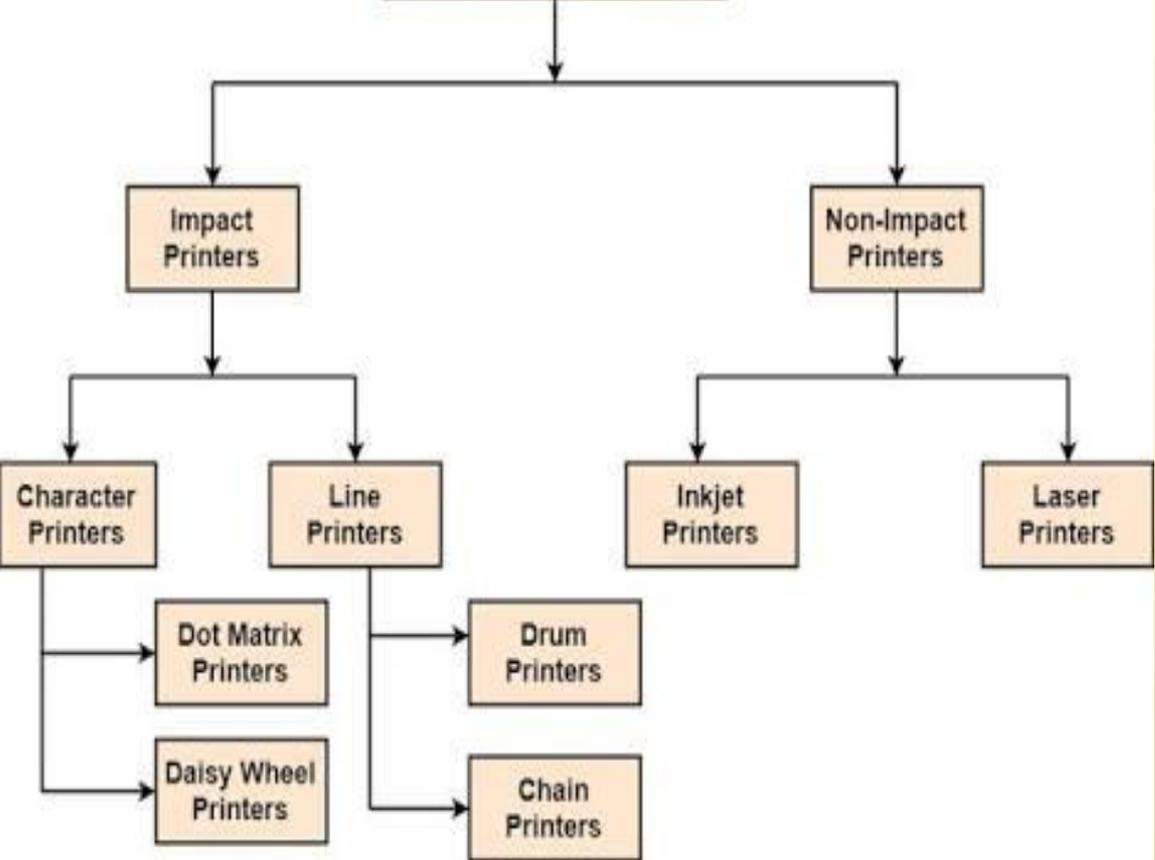
Electronics Coach



Two **Types of Printers**. The two **types of printer** are impact and non-impact **printers**. Impact **Printers** can produce a page, a line, or a character at a time while Non-impact **printers** can produce both text and graphics.



Classification of Printers



**TYPES OF PRINTERS**

## LASER PRINTER

A laser printer is a popular type of personal computer printer that uses a non-impact (keys don't strike the paper), photocopier technology. When a document is sent to the printer, a laser beam "draws" the document on a selenium-coated drum using electrical charges. After the drum is charged, it is rolled in toner, a dry powder type of ink. The

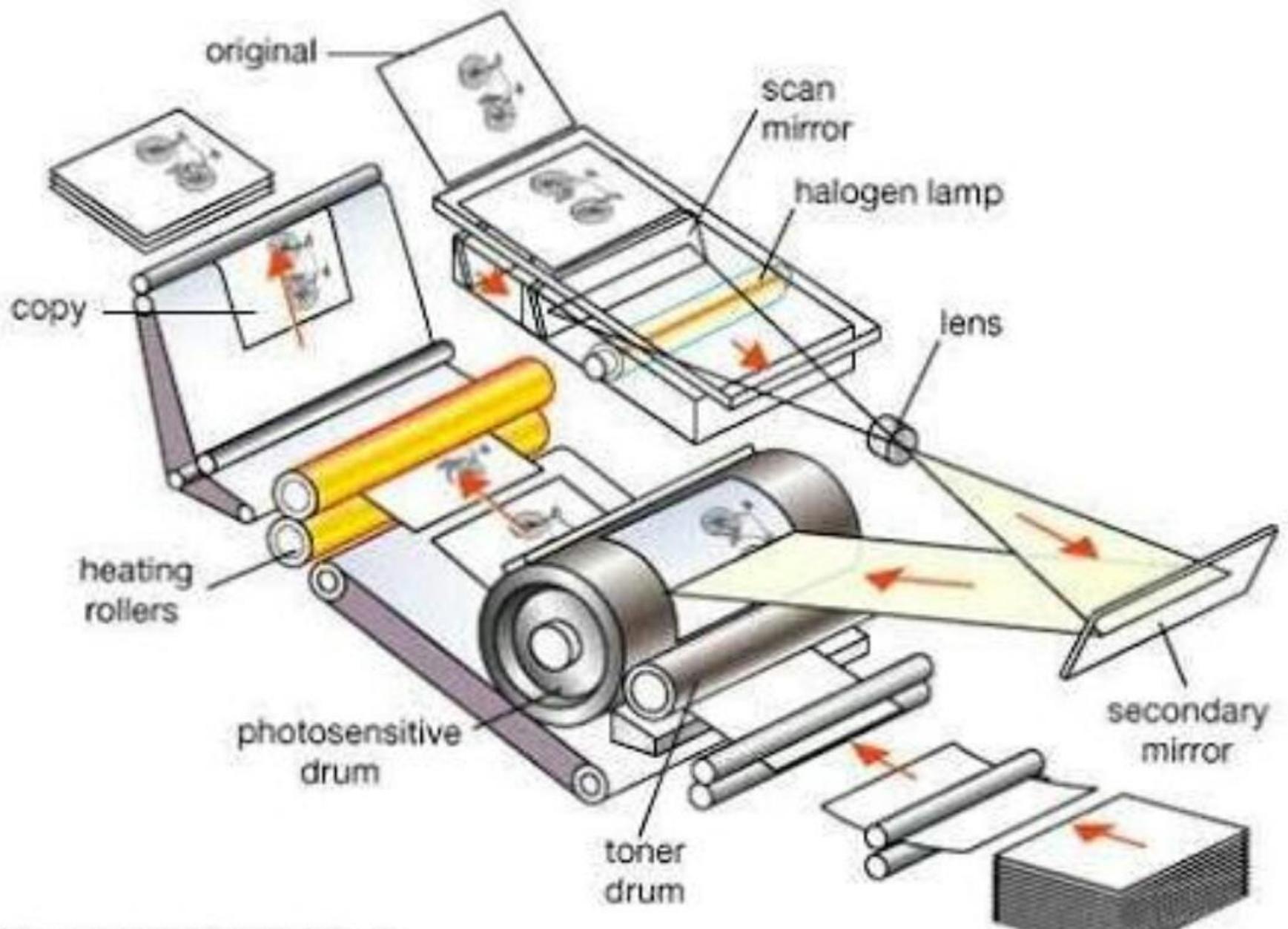
toner adheres to the charged image on the drum. The toner is transferred onto a piece of paper and fused to the paper with heat and pressure. After the document is printed, the electrical charge is removed from the drum and the excess toner is collected. Most laser printers print

• Monochrome

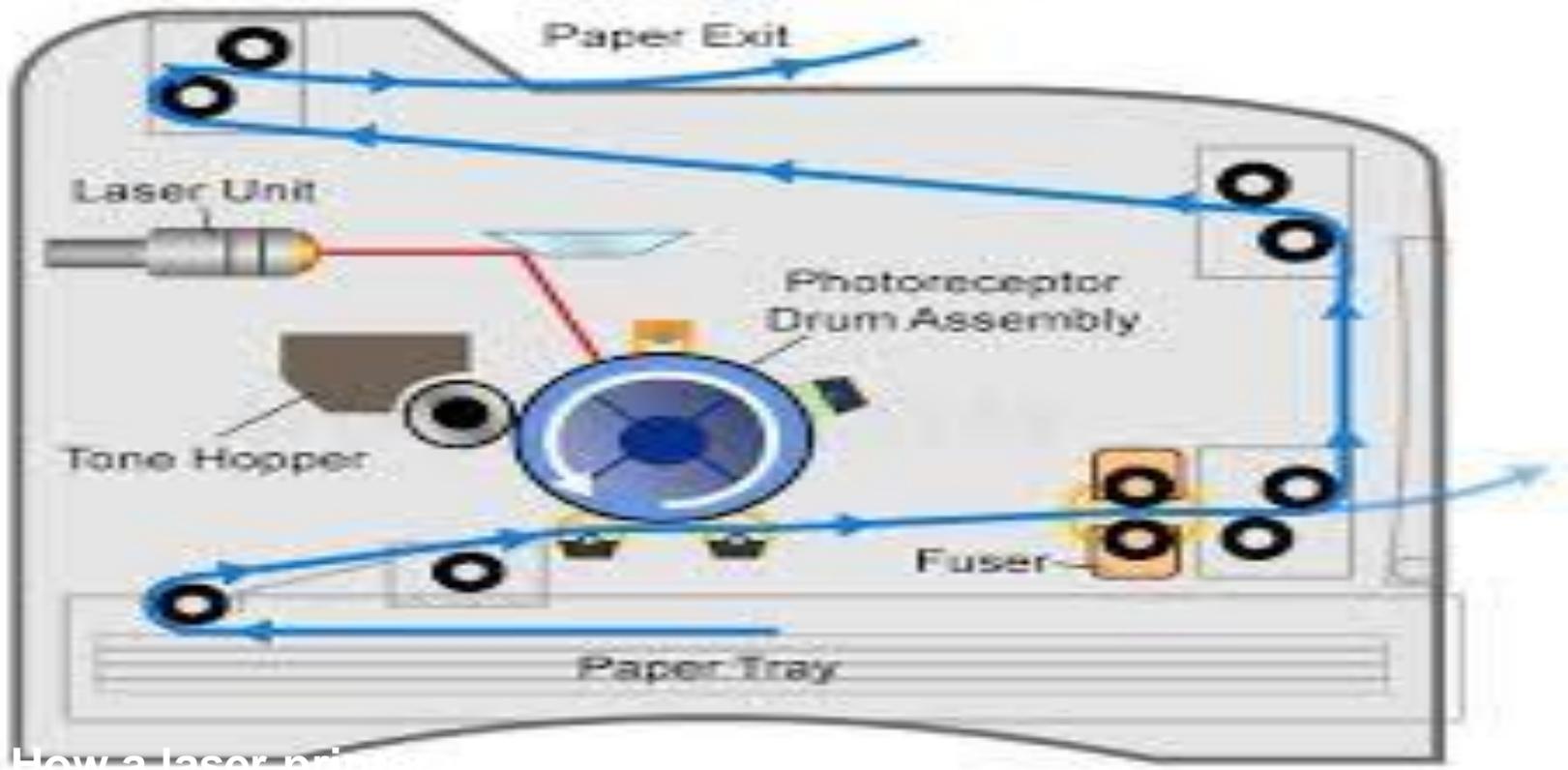


Laser printing *is an electrostatic digital printing process. ... Laser printing differs from traditional xerography as implemented in analog photocopiers in that in the latter, the image is formed by reflecting light off an existing document onto the exposed drum.*

*Laser printing: 1969  
Solid ink printing: 1987  
Inkjet printing: 1950*



# How Laser Printers Work



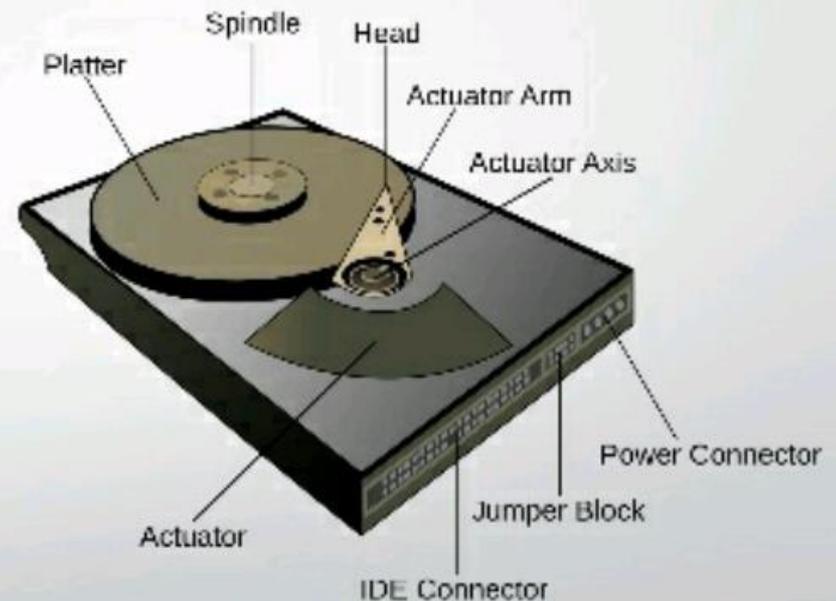
## How a laser printer works

When you print something, your computer sends a vast stream of electronic data (typically a few megabytes or million characters) to your laser printer. An electronic circuit in the printer figures out what all this data means and what it needs to look like on the page. It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern of static electricity. The static electricity attracts onto the page a kind of powdered ink called toner. Finally, as in a photocopier, a fuser unit bonds the toner to the paper.

# H.D.D. HARD DISK DRIVE

## Components

- A typical HDD has two electric motors, a spindle motor that spins the disks and an actuator (motor) that positions the read/write head assembly across the spinning disks.
- The disk motor has an external rotor attached to the disks; the stator windings are fixed in place. Opposite the actuator at the end of the head support arm is the read-write head.



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A computer **hard disk** drive (**HDD**) is a non-volatile memory hardware device that controls the positioning, reading and writing of the **hard disk**, which furnishes data storage.

It is an electro-mechanical data storage device that uses magnetic storage to store and retrieve digital data using one or more rigid rapidly rotating platters coated with magnetic material.

The difference between hard drives and **solid state drives** is in the technology used to store and retrieve data. ... **HDDs** are cheaper and you can get more storage space. **SSDs**, however, are **faster**, lighter, more durable, and use less energy. Your needs will dictate which storage drive will work best for you.

PCs with **hard drives** remain common, but the fastest machines use banks of flash memory called a solid-state **drive** (SSD) instead. SSDs no longer are exotic. ... So, while SSDs are ascendant, don't count **hard drives** out as **obsolete**.

# DVD

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Stands for "Digital Versatile Disc." A DVD is a type of **optical media** used for storing **digital** data. It is the same size as a **CD**, but has a larger **storage capacity**. Some DVDs are formatted specifically for video playback, while others may contain different types of **data**, such as **software** programs and computer files.

DVD is a digital optical disc storage format invented and developed in 1995 and released in late 1996. The medium can store any kind of digital data and is widely used for software and other computer files as well as video programs watched using DVD players.

Weight: 16 grams (0.56 oz)





Secondary Memory



## Memory Size

- ✘ All digital computers use the binary system, i.e. 0's and 1's. Each character or a number is represented by an 8 bit code.  
The set of 8 bits is called a byte.  
A character occupies 1 byte space.  
A numeric occupies 2 byte space.  
Byte is the space occupied in the memory.
- ✘ The size of the primary storage is specified in KB (Kilobytes) / MB (Megabyte) or GB.
- ✘  $1 \text{ KB} = 1024 \text{ bytes}$  ,  $1 \text{ MB} = 1000\text{KB}$ .  $1 \text{ GB} = 1000\text{MB} = 1000000\text{KB}$
- ✘ The size of the primary storage in a typical PC usually starts from 4GB to 16 GB.
- ✘ DDR4 RAM, which is short for "double data rate fourth generation random access **memory**", is the **latest** internal **computing** update engineered to boost performance. This **memory** upgrade promises faster, more efficient performance. DDR4 technology has two predecessors, DDR3 and DDR2.

- ✘ **Plotters** work in conjunction with CAD software on the computer, to output line drawings for plans, blueprints and other technical drawings. Due to the mechanical actions involved in moving the pen, compared to other types of printers such as ink jet and laser printers, early plotters were slow to produce their output. Only a small number of pen plotters are still in use commercially

A **plotter** is a **computer** hardware device much like a printer that is used for printing vector graphics. Instead of toner, **plotters** use a pen, pencil, marker, or another writing tool to draw multiple, continuous lines onto paper rather than a series of dots like a traditional printer

#### **How Does a Plotter Printer Work?**

Computer plotters are a type of output device commonly used for computer-aided design applications, to output large vector designs such as architectural blueprints. By moving a pen mechanically, plotters draw line art onto the surface of the paper to reproduce vector graphics drawn on a computer. Although ideal for printing large line art graphics, plotters could not reproduce raster graphics, and the introduction of wide format inkjet and laser printers have rendered them largely obsolete.



अच्छा काम करो ✓

## PLOTTER



बुरा काम मत करो।

**THANK YOU.**  
**REVISE REVISE REVISE**  
**WITH SCIENTIFIC METHOD**

**THANK**  
**YOU**

Saदर

