

Computer System is a collection of hardware and software that performs specific tasks. It includes the computer along with any software and peripheral devices that are necessary to make the computer function.

Computer Hardware

It is a collective term used to describe any of the physical components of an analog or digital computer. The term hardware distinguishes the tangible aspects of a computer.

Central Processing Unit (CPU)

Central Processing Unit (CPU) consists of the following features:

- It is considered as the brain of the computer.
- It performs all types of data processing operations.
- It controls the operation of all parts of the computer.

CPU itself has following three components:

- ALU (Arithmetic Logic Unit)
- CU (Control Unit)
- MU (Memory Unit)

Computer Architecture

Computer architecture refers to the design, structure and functioning of a computer system. It focuses on how various components, such as the processor, memory and input/output devices, interact and perform tasks efficiently.

Central Processing Unit

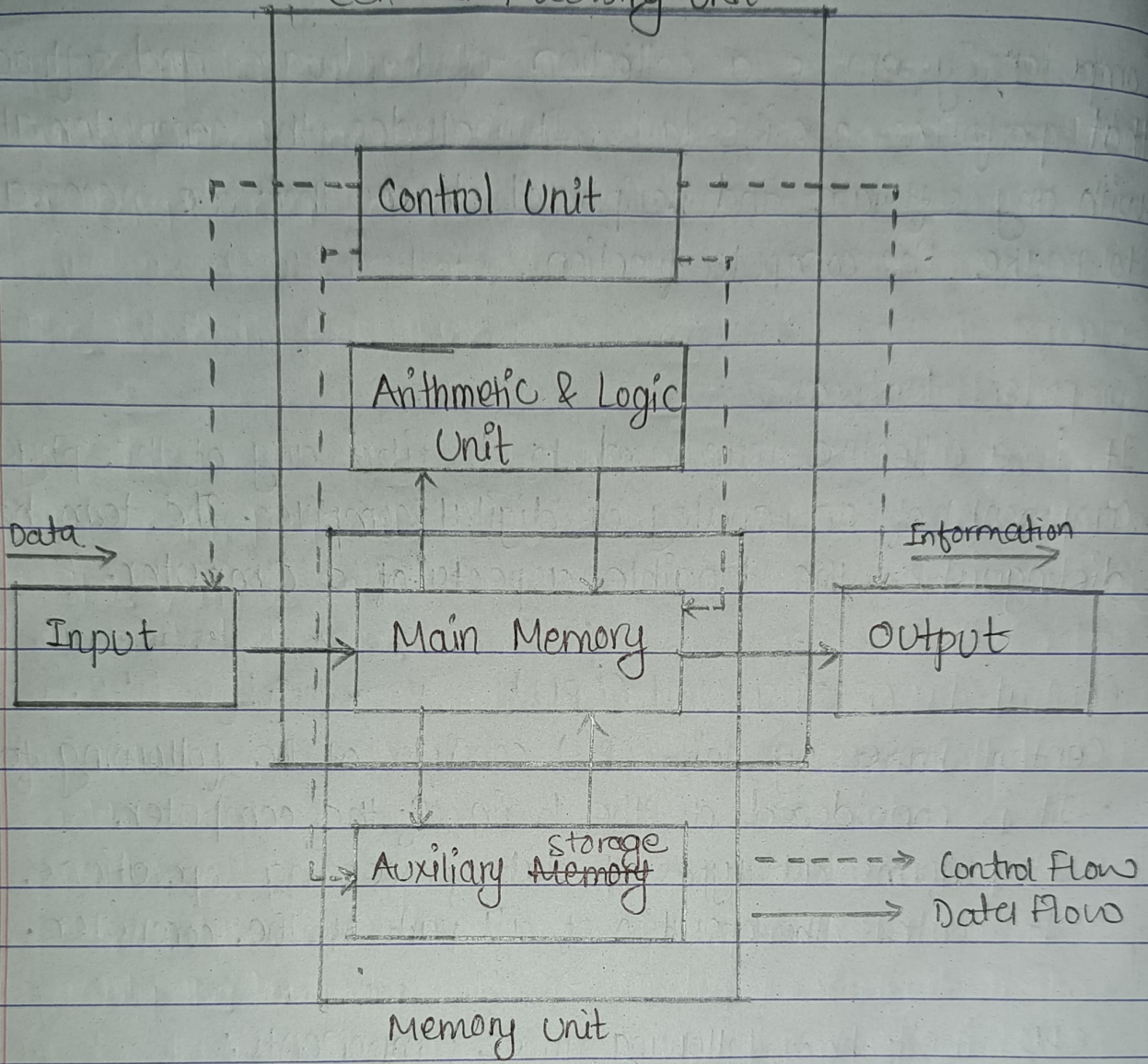


Fig: Block Diagram of computer system

ALU (Arithmetic Logic Unit)

This unit consists of two subsections i.e. Arithmetic section and Logic section. Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication and division. All complex operations are done by making repetitive use of the above operations. Function of logic section is to perform logic operations such as comparing, selecting, matching and merging of data.

CU (Control Unit)

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

Functions of this unit are:

- Controls the transfer of data and instructions among other units.
- Manages and coordinates all the units of computer.

Memory or Storage Unit

This unit can store instructions, data and intermediate results.

This unit supplies information to other units of the computer when needed.

Functions of this unit are:

- Stores all the data and instructions required for processing.
- Stores intermediate results of processing.

Bus in Computer

In computer architecture, a bus is a communication system that transfers data between components inside a computer or between computers.

The bus consists of three main parts:

- 1) **Control Bus**: The control bus carries control signals. The control signals is used for controlling and coordinating the various activities across the computer. It is generated from the control unit within the CPU.
- 2) **Address Bus**: Address bus carries the memory address within the device. It allows the CPU to reference memory locations within the device. It connects the CPU and another peripheral and carries only the memory address.
- 3) **Data Bus**: Data bus transfers data from one location to another across the computer. The meaningful data which is to be sent from a device is placed on these lines. The CPU uses a data bus to transfer data.

Computer Memory

Although many types of memory in a computer exist, the most basic distinction is between primary memory and secondary memory.

Primary memory includes ROM and RAM, and is located close to the CPU on the computer motherboard. It is used to store data that the CPU needs ~~immed~~ imminently.

Secondary memory by contrast, is usually physically located within a separate storage device, such as a hard disk drive or solid state drive, which is connected to the computer system either directly or over a network.

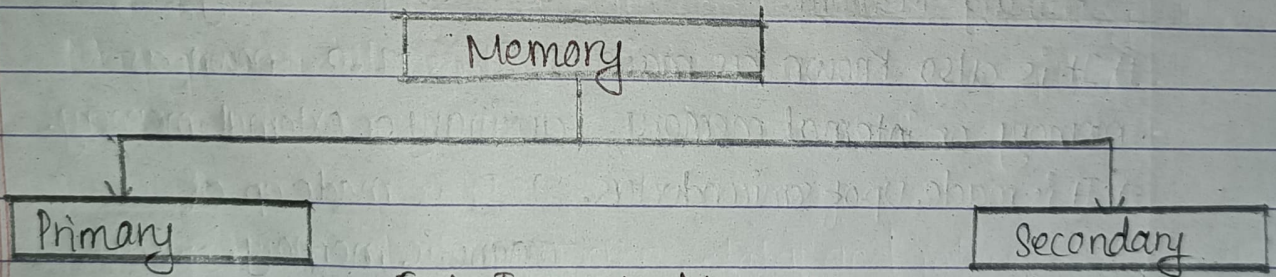


Fig: Types of Memory

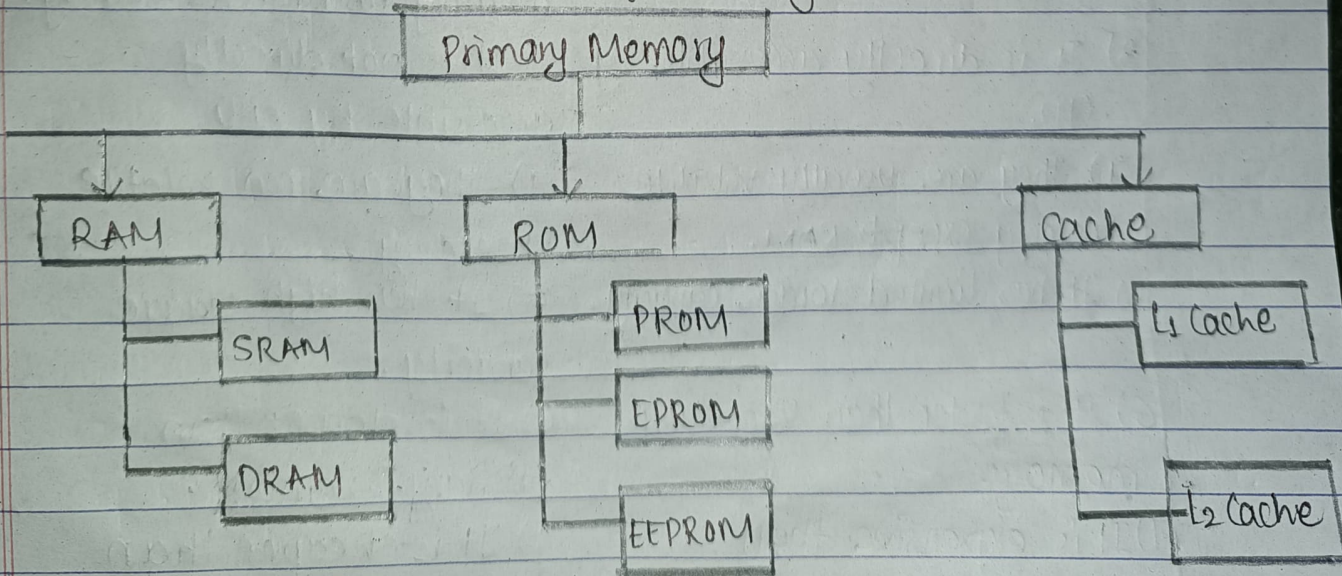


Fig: Types of Primary Memory

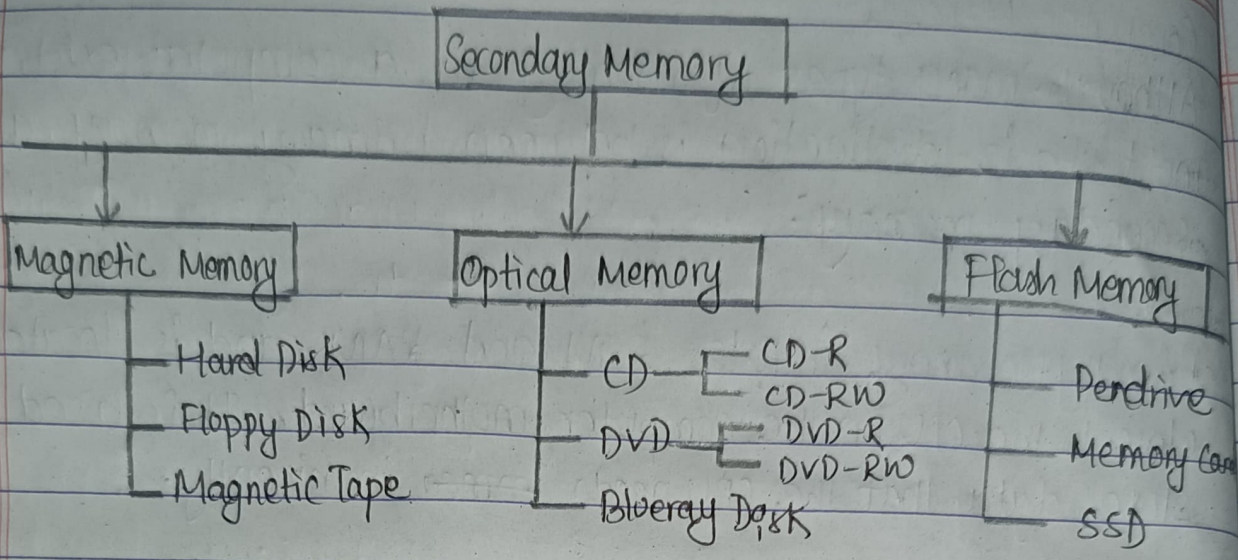


Fig: Types of Secondary memory.

Differences between Primary & Secondary Memory

Primary Memory	Secondary Memory
1) It is also known as main memory or internal memory.	1) It is also known as auxiliary or external memory.
2) It is made up of semiconductors.	2) It is made up of magnetic memory, optical memory and flash memory.
3) It is directly accessible by CPU.	3) It is not directly accessible by CPU.
4) They are usually volatile memory except RAM.	4) They are non volatile memory.
5) It has limited storage capacity.	5) It has high storage capacity.
6) It is faster than secondary memory.	6) It is slower than primary memory.
7) It is expensive than secondary memory.	7) It is cheaper than primary memory.

Examples of primary memory includes RAM, ROM and cache whereas secondary memory includes Hard Disk, Floppy Disk, Pen Drive, CD, DVD etc.

Assignment

1) Define computer architecture. Explain the main parts of computer system in detail.

⇒ Computer architecture refers to the design and organization of a computer system, encompassing its components and their interactions. It involves both hardware and software aspects.

The main parts of the computer system are:

- **Input Unit**: The input unit is responsible for accepting data and instructions from the user or external sources and converting them into the form that computer can process. Some common input devices are: keyboard, mouse, touchscreens, scanners, microphones etc.
- **Output Unit**: The output unit is responsible for presenting the processed information to the user or external devices. It converts the results of computations into a human-readable form. Examples of output devices include Monitors, printers, speakers, etc.

- **Central Processing Unit (CPU):** It is often referred to as the "brain" of the computer. It performs arithmetic and logical operations and manages the overall execution of programs. It interprets and executes instructions stored in the computer's memory. Its main components are: Arithmetic Logic Unit (ALU), Control Unit, Registers.

- **Storage unit:** It is the unit which stores data and instructions. It allows for quick access to information.

2) **What is memory? Explain the types of memory in computer system.**

⇒ Computer memory is a data storing devices. It is the storage space in the computer system, where data is to be processed and instructions required for processing are stored. Computer memory can be categorized into two main types: Primary memory & secondary Memory.

Primary Memory

It is also known as main memory or internal memory. It is used to store data that are actively being used and processed by the computer's CPU.

Primary memory are made up of semiconductors and usually volatile in nature. It can be directly accessed by the CPU. It has limited storage capacity. These memory are faster and expensive than secondary memory. Example of primary memory include RAM and ROM.

Secondary Memory

It is also known as auxiliary memory or external memory. Secondary memory is a non-volatile form of computer memory that is used for long-term storage of data, programs, and the operating system. It is used for permanent storage of files and data that needs to be preserved between computer sessions. Secondary memory are made up of magnetic memory, optical memory and flash memory. It is cheaper but slower than primary memory.

Cache Memory

It is a small, quick and expensive memory placed between Main Memory and CPU. It contains copy of main memory's data and when Processor request for data, it send data to processor for processing.

3) Describe the functions of CPU in brief.

⇒ Central Processing Unit (CPU) is regarded as brain of the computer. It takes all the major decisions in a computer system. It consists of three main components: ALU, CU and MU. The functions of these components are as follows:

- Arithmetic and Logic Unit (ALU): All the arithmetic and logical operations are performed through this unit. An arithmetic operation includes addition, subtraction, multiplication, division and logical operations include all type of comparisons.

- **Control Unit**: This unit controls each and every part of the computer system. It controls the transfer of data and instructions among other units and sends the commands to various part of the computer system.
- **Memory Unit**: This unit provides space for storing data, instructions, intermediate results and final result. This unit also supplies information to the other units when needed.

4) **What is bus architecture. what are the types of bus.**
⇒ **Bus Architecture** refers to the arrangement and interconnection of various components within a computer system using a communication channel called "bus".

A bus is a set of parallel conductors that transfer data and control signals between different components of a computer. It serves as a communication highway, allowing the exchange of information between different parts of the computer system. There are three main types of buses found in a computer architecture.

- **Data Bus**: It is used for transferring data between the CPU, memory and other peripheral devices. The width of the data bus determines the amount of data that can be transferred simultaneously.

• **Address Bus**: It carries the memory address within the device. It allows the CPU to reference memory locations within the device. It connects the CPU and another peripheral and carries only the memory address.

• **Control Bus**: The control bus carries control signals. The control signals controls and coordinates the operations of various components in the computer system. It is generated from Control Unit within the CPU.

Hence, the combination of these buses forms the basic architecture of a computer system.

5) **Differentiate between RAM and ROM.**

⇒ RAM and ROM are two types of primary memory with distinct characteristics and purposes. The differences between RAM and ROM are:

RAM	ROM
1) RAM is volatile in nature.	1) ROM is non volatile, in nature.
2) Data can be read as well as write.	2) Data can be read but cannot be written.
3) It is a temporary storage.	3) It is a permanent storage.
4) It is divided into SRAM and DRAM.	4) It is divided into PROM, EPROM and EEPROM.
5) It is used in normal operation of computer.	5) It is primarily used in startup process of computer or bootstrapping.

RAM	ROM
6) Writing data to RAM is faster.	6) Writing data to ROM is much slower compared to RAM.
7) The instructions are written into the RAM at the time of execution.	7) The instructions are written into the ROM at manufacturing time.
8) RAM has large storage capacity.	8) ROM has very low storage capacity.

6) Differentiate between SRAM and DRAM.

⇒ SRAM and DRAM are the two types of RAM which can be differentiated as below:

SRAM	DRAM
1) Transistors are used to store data.	1) Capacitors are used to store data.
2) It does not need periodic refreshment to maintain data.	2) It needs periodic refreshment.
3) SRAM are faster than DRAM.	3) DRAM's are slower than SRAM.
4) SRAM are expensive as compared to DRAM.	4) DRAM are less expensive as compared to SRAM.
5) SRAM consumes less power.	5) DRAM consumes high power.
6) It consumes more space.	6) It requires less space.
7) SRAM can hold only a small amount of data.	7) DRAM can hold much more data.
8) Static RAM are used in cache memories.	8) Dynamic RAM are used in main memories.

7) Differentiate between impact printer and non-impact printer.

⇒ Impact printers and non-impact printers are two broad categories of printed printers with distinct mechanisms for producing printed output. They can be differentiated as:

Impact Printer	Non-impact Printer
1) It prints characters by striking print hammer or wheel against inked ribbon.	1) It prints character and images without striking the papers.
2) It is slower than non-impact printers.	2) It is faster than non impact printer.
3) Its printing quality is poor.	3) Its printing quality is good.
4) It generates noise during printing.	4) It does not generate noise during printing.
5) It can print multiple copies at a time when carbon paper is used.	5) It cannot print multiple copies at a time.
6) It is less expensive.	6) It is more expensive.
7) Impact printers are old printing technology.	7) Non impact printers are latest technology.
8) It is difficult to print graphical image with impact printer.	8) It can easily print graphical images.
9) Example: Dot matrix printer	9) Example: Ink-jet printer, Laser printer.

8) Differentiate between CRT and LED monitor.

⇒ CRT (Cathode Ray Tube) and LED (Light Emitting Diode) are two different type of monitors which can be differentiated as:

CRT Monitor	LED Monitor
1) It uses cathode ray tube to display images.	1) It uses light-emitting diodes to backlight the display.
2) It is larger and heavier.	2) It is slimmer and lighter compared to CRT monitors.
3) CRT Monitors generally have lower resolution.	3) LED Monitors supports a wide range of resolutions.
4) CRT Monitors offer poor picture quality.	4) LED Monitors produce images of high picture quality.
5) It produces more heat.	5) It produces less heat than CRT monitors.
6) It consumes high energy.	6) It consumes less energy than CRT monitors.
7) It generates humming sound while operating.	7) It operates silently.
8) CRT monitors impact the environment as they consume more power and made up of relatively hazardous materials.	8) LED monitors are more environment friendly than CRT monitors.