

CPU

of notes

- The CPU (full form → Central Processing Unit) is the primary component of a computer that acts as its "control center".
- The CPU is present on the motherboard and does calculations and co-ordinates the motherboard components.
- The CPU processes data available in the main memory.

⇒ Components of CPU:

→ ALU (Arithmetic Logic Unit)

The ALU implements all the arithmetic, logical and shift operations by supporting support circuitry that provides these evaluations.

⇒ Control Unit

The control unit fetches the instruction from the main memory, decodes the instructions, and executes them.

→ Instruction pointer in CPU's control unit

Gives the location of next program instruction to be executed.

→ Accumulator.

The result of the operations is placed in the accumulator, and stored in RAM or used in other CPU operations.

→ Memory Address Register (MAR)

It is connected to the address lines of system bus. It specifies the address in memory for a read or write operation.

→ Memory Buffer Register (MBR)

It is connected to data lines of system bus. It contains the value to be stored in memory or last value read from memory.

Instruction cycle of CPU

(1) Fetch : The CPU retrieves the instruction from memory. The instruction is typically stored at the address specified by program counter.

(2) Decode : The CPU interprets the instruction and determines what operation we need to perform.

(3) Execute : In this cycle, the CPU performs operation which is specified by the instruction. This may involve reading or writing data from or to memory, performing arithmetic or logic operations on data, which manipulates the control flow of program.

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System clock of CPU

- > The system clock is a device used in computer which regulates the internal components of computer by issuing a high-frequency signal.
- > The role of CPU system clock ensures that various circuits inside a computer work together at the same time.

Measures of CPU size

- Word size: the number of bits the CPU can process at once, which is dependent on:
 - number of registers in CPU
 - size of data bus
- Cache size: cache is high-speed memory on the CPU that stores data which is needed often.
- RAM:
Random Access memory is the part of the computer that holds programs while they are being executed and data while it is being processed.
- The RAM is a volatile in nature.
- RAM entries can be accessed in a random order.
- RAM is considered as part of computer's primary memory. It is much faster than to read from and write to hard secondary storage.



→ A circuit known as a decoder converts an encoded form, such as binary coded decimal, into decimal form.

As a result, output is the binary equivalent of the input. The outputs of decoder will be output of every OR gate in the ROM.

Features of ROM

- ROM is non-volatile memory
- Information stored in ROM is permanent.
- Information and programs stored on it, we can only read out cannot modify
- Information and programs are stored on ROM in binary form.
- It is used in start up process of computer.

CMOS Memory (complementary Metal Oxide Semiconductor)

- A computer needs a semi-permanent way of keeping some start-up data.
- CMOS memory requires (very little) power to retain its contents.

Reg. No: 22BCG2436

Cache Memory

Cache memory is small, high-speed storage area in computer. The cache is smaller and faster than memory that stores copied of the data from frequently used main memory locations.

Characteristics of Cache Memory

- Cache memory is an extremely fast memory that acts as a buffer between RAM and the CPU.
- Cache memory holds frequently requested data and instructions so that they are immediately available to the CPU when needed.
- Cache memory is costlier than main memory of disk memory but more economical than CPU registers.
- Cache memory is used to speed up and synchronize with high speed CPU.

Network Devices

The different layers of network are as follows:

Application Layer.
Presentation Layer
Session Layer
Transport Layer
Network Layer
Datalink Layer
Physical Layer

Different Network Hardware Devices :

> Network Adapter

A network adapter is the component of a computer internal hardware that is used for communicating over a network with another network computer.

It enables a computer to connect with another computer, server, or any networking device over a local area network connection.

In most modern network devices, network adapters contain the data transceiver.

For a desktop or tower PC, network adapter is likely to be a type of expansion board.

Expansion boards connect to the system board through expansion slots.

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The circuit used by the system board to transmit data to the computer's components is the computer's bus.

> Repeater

A repeater operates at the physical layer. Its job is to amplify (i.e., regenerate) the signal over the same network before the signal becomes too weak and/or corrupts. To extend the length to which the signal can be transmitted over the same network. When the signal becomes weak, they copy about ~~bit~~ by bit and regenerate it as per its topology.

> Hub

A hub is a basically multi-port repeater. A hub connects multiple wires coming from different sources, for example, the connector in Star Topology which connects different stations.

Types of Hub

- Active Hub: These are the hubs that have their power supply and can clean, boost and relay the signal along the network. It serves both as a repeater as well as a wiring center. These are used to extend the maximum distance between nodes.

o Passive Hub: These are the hubs that collect wiring from nodes and power supply from the active hub.

o Intelligent Hub: It works like an active hub and includes remote management capabilities. They also provide flexible data rates to network devices.

> Bridge

A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading IEEE MAC address of the source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

Types of Bridges

o Transparent Bridge: These are all bridge in which the stations are complete unaware of the bridge's existence i.e., whether or not a bridge is added or deleted from the network.

o Source Routing Bridge: In these bridges, routing operation is performed by the source station and the frame also specifies which gate to follow.

- Reg No: 22BCE2436
- > Switch: A switch is a multi port bridge with a buffer and a design that can boost its efficiency with a large number of ports input (less traffic) and performs a better job. A switch is a data link layer device. The switch can forward data, which makes it a very efficient device. It does not forward packets that have errors and forward good packets selectively to correct port only.
 - > Router - A router is a device like a switch that routes data packets based on their IP address. The router is mainly a Network layer device. Routers normally connect LANs and WANs and have a dynamically updating routing table based on which they make decisions on routing the data packets.
 - > Gateway: A gateway is a passage to connect two networks that may work upon different networking models. They work as messenger agents that take data from one system, interpret it, and transfer it to another system.

OSI (Open Systems Interconnection)

Data flows through the OSI model in a step-by-step process:

- Application Layer: Applications create the data.
- Presentation Layer: Data is formatted and encrypted.
- Session Layer: Connections are established and managed.
- Transport Layer: Data is broken into segments for reliable delivery.
- Network Layer: Segments are packaged into packets and routed.
- Data Link Layer: Packets are framed and sent to the next device.
- Physical Layer: Frames are converted into bits and transmitted physically.