Unit I | Fundamentals of Computers CHAPTER 3

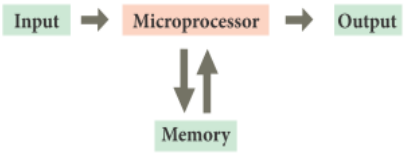
# Computer Organization

**1.Differentiate between computer architecture and Computer organization**

- **Computer Architecture** deals with the engineering considerations involved in designing a computer.
- **Computer Organization** deals with the hardware components that are transparent to the Programmer.

**2.What is microprocessor? Define microprocessor.**

- The microprocessor is a programmable multipurpose **silicon chip**.
- It is driven by **clock pulses**.
- It accepts input as a **binary data** and after processing, it provides the **output data** as per the **instructions** stored in the memory.




**3.What are the main units of Microprocessor? Explain**

Microprocessor is made up of 3 main units. They are,

1. Arithmetic and Logic unit (ALU)
2. Control unit
3. Registers (Internal Memory)

**Arithmetic and Logic unit (ALU):**

- To perform arithmetic and logical instructions based on computer instructions.

**Control unit:**

- To control the **overall operations** of the computer through signals.

**Registers (Internal Memory):**

- They are used to **hold** the instruction and data for the execution of the processor.

**4.What is System Bus?**

- A bus is a collection of wires used for communication between the **Microprocessor** and **other devices**.

There are 3 types of buses, they are

1. Address bus
2. Data bus
3. Control bus

**Address bus**

- The Address bus is used to point a **memory location**.
- The Memory Address Register(**MAR**) is connected with the **address bus.**
- The address bus is **unidirectional**.

**Data bus**

- A data bus is used to transfer **data** between the memory and the CPU.
- The Memory Data Register(**MDR**) is connected with the **data bus**
- The data bus is **bidirectional**

**Control bus**

- The control bus controls both **read** and **write** operations.

**5. What are the parameters which influence the characteristics of a microprocessor? Or What are the Characteristics of Microprocessors. Explain**

There are three important Characteristics of Microprocessors. They are,

a) Clock speed
b) Instruction set
c) Word size

**Clock speed**

- Every microprocessor has an **internal clock**.
- It regulates the speed of executing instructions.
- The speed at which the microprocessor executes instructions is called the clock speed.
- Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

**Instruction set**

- **Instruction** is a command which is given to a computer to perform an operation based on data.
- Basic set of machine understandable instructions to execute by microprocessor is called an **instruction set.**

  **Types of operations**
  - Data transfer
  - Arithmetic operations
  - Logical operations
  - Control flow
  - Input/output

**Word size**

- The number of bits that can be processed by a processor in a single instruction is called its word **size**.

**6.What is an Instruction?**

- **Instruction** is a command which is given to a computer to perform an operation based on data.

**7.How to determine architecture of the microprocessor?**

- Total number of input and output **pins** determine the architecture of the microprocessor

**8.Differentiate between Memory Data Register(MDR) and Memory Address Register (MAR)**

| MDR | MAR |
|---|---|
| It keeps the data | It keeps the address of data |
| It is connected with the data bus | It is connected with the address bus |
| The word in the RAM has the same size as MDR | ALU places the address of the memory to be fetched into MAR |

**8. What is the use of program counter? Or What is a Program counter?**

- The **Program Counter** (PC) is a **special register** in the CPU which always keeps the address of the **next instruction** to be executed.

**9.Explain how Data communication between CPU and memory. Or**
**How the read and write operations are performed by a processor? Explain**

- The Central Processing Unit(CPU)has a Memory Data Register (MDR) anda Memory Address Register (MAR).
- MDR keeps the data .
- MAR keeps the address of data.
- The Data bus is connected with MDR.
- The address bus is connected with MAR.
- The word in the RAM has the same size as MDR.
- If the processor is an 8-bit processor ,The size MDR is eight 8 bits.
- The data bus has eight parallel wires to transfer data either MDR to word or word to MDR.
- The control line is labeled as**R/W** , which becomes **1** means **READ**operation and **0** means **WRITE** operation.

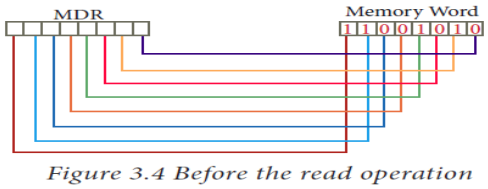
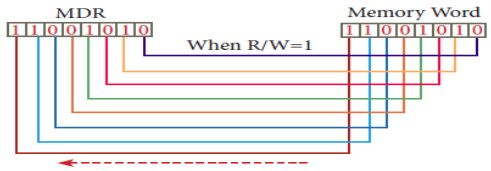



*Figure 3.4 Before the read operation*




- The read operation transfers the data(bits) from **word** to **Memory** Data Register.
- The write operation transfers the data(bits) from **Memory** Data Register to **word**.

**10.Define Read and Write operation.**

- The read operation transfers the data(bits) from word to Memory Data Register.
- The write operation transfers the data(bits) from Memory Data Register to word.

**11.How microprocessors are classified ?**

- based on the Data Width
- based on Instruction Set

**12.How Microprocessors are classified based on the Data Width or size of the data?**

- Depending on the data width, microprocessors can process instructions.

It can be classified as follows:

- 8-bit microprocessor
- 16-bit microprocessor
- 32-bit microprocessor
- 64-bit microprocessor

**14.What are the types of microprocessors based on instruction set?**

- Reduced Instruction Set Computers (RISC)
- Complex Instruction Set Computers (CISC)

**Reduced Instruction Set Computers (RISC)**

- They have **small set of** highly optimized instructions.
- Complex instructions are implemented using simple instructions.
- Ex.Pentium IV, Intel P6, AMD K6 and K7

**Complex Instruction Set Computers (CISC)**

- They support **hundreds of instructions**.
- These Computers can accomplish a wide variety of tasks, making them **ideal for personal computers**.
- Ex.Intel 386 & 486, Pentium, Pentium II and III, and Motorola 68000.

**15.Write short note on Memory access.**

- Computer memory is the **storage space** in the computer, where **data**and **instructions** are stored.
- There are two types of accessing methods to access (read or write) the memory.
- They are **sequential** access and **random** access.

**16.What are the methods of accessing memory?**

- There are two types of accessing methods to access (read or write) the memory.
- They are sequential access and random access

**Sequential access,**

- The memory is accessed in an **orderly** manner from starting to end.

**Random access,**

- Any byte of memory can be accessed directly **without** navigating through previous bytes.

**17.Write the types of RAM.**

There are two basic types of RAM

- Dynamic RAM (DRAM)
- Static RAM (SRAM)

**Dynamic RAM (DRAM)**

- Dynamic RAM being a common type needs to be**refreshed frequently**.
- **Slower** than SRAM
- **Less** expensive.

**Static RAM (SRAM)**

- Static RAM needs to be **refreshed less often**.
- It is **faster**.
- It is **expensive** .

**18.What is bit and byte**?

- The **smallestunit** of information that can be stored in the memory is called as a **bit.**
- The memory can be accessed by a collection of **8 bits** which is called as a **byte**.
- The bytes are referred by '**B**'.

**19.Differentiate between RAM and ROM**

| RAM | ROM |
|---|---|
| It is volatile memory | It is non-volatile memory |
| It is the place in a computer where the Operating System, Application Programs and the data in current use are kept temporarily | ROM stores critical programs during the manufacturing process itself i.e booting |
| It allows both read and write . | It cannot be modified or removed and can only be read. |
| Stores temporarily | Stores permanently |
| When the power is turned off, whatever data stored in RAM is lost. | It retains its contents even when the computer is turned off. |
| They are two types SRAM,DRAM | They are PROM,EPROM,EEPROM |

**20.Write short note on Read Only Memory (ROM).**

**21.Write short note on Random Access Memory (RAM**).

**22.What are the types of ROM? Explain.**

- Programmable Read Only Memory (PROM)
- Erasable Programmable Read Only Memory (EPROM)
- Electrically Erasable Programmable Read Only Memory (EEPROM)

**Programmable Read Only Memory (PROM)**

- It is a non-volatile memory.
- Data can be written **only once**.
- Content cannot be erased.
- PROM is manufactured as a **blank memory**,
- PROM programmer or a **PROM burner** is used to write data to a PROM chip.
- The process of programming a PROM is called **burning the PROM**.

**Erasable Programmable Read Only Memory (EPROM)**

- It is a non-volatile memory.
- Data can be written many times.
- The content can be erased using ultraviolet rays.
- EPROMs are used widely in personal computers.

**Electrically Erasable Programmable Read Only Memory (EEPROM**)

- It is a non-volatile memory.
- It can be erased by exposing it to an electrical charge.
- It is slower in performance.

**Differentiate between EEPROM and PROM ref.above q**
**Differentiate between EEPROM and EPROM ref.above q**
**Which source is used to erase the content of a EPROM. ref.above q**

**23.How PROM differ from ROM?**

- The PROM differs from ROM.
- PROM is manufactured as a blank memory,
- ROM stores critical programs during the manufacturing process itself.
- PROM programmer or a PROM burner is used to write data to a PROM chip.
- ROM content cannot be modified or removed

**24.Define Cache Memory**.

- The cache memory is a very high speed and expensive memory
- It is closer to CPU.
- The arrangement of cache memory between the CPU and the main memory.

**25. Define Access Time.**

- How quickly the memory can respond to a read / write request is called as Access Time.

**26.List some secondary storage Devices**.

1.Hard Disk 2.Compact Disc (CD)
3.Digital Versatile Disc (DVD) 4.Flash Memory Devices.
5. Blu-Ray Disc

**27.Write short note on Hard disk**.

- Hard disk is a **magnetic** disk used to store data.
- It has the **stacked** arrangement of disks accessed by a pair of heads for each of the disks.
- The hard disks come with a **single** or **double** sided disk.

**28.Write short note on Compact disk(CD)**

- CD is made up of **polycarbonate** plastic material.
- A thin layer of **aluminum** or **gold** is applied to the surface.
- In CD, data is represented as "pits" encoded in a spiral track on top.
- The areas between pits are known as "lands".
- A motor within the CD player rotates the disk.
- The capacity is 700MB

**29.Define Digital Versatile Disc (DVD)**

- DVD is an **optical** disc
- DVDs are read with a **laser**.
- The disc can have one or two sides, and one or two layers per side;
- Single layer has 4.7 GB capacity,
- Double layer has 8.5 GB capacity.
- **Double**-layered sides are usually **gold**-coloured
- **Single**-layered sides are usually **silver**-coloured, like a CD

**Differentiate CD and DVD( ref. above answers)**

**30. How will you differentiate a flash memory and an EEPROM?**

- Flash memory is a **non-volatile** computer storage medium.
- It can be electrically erased and reprogrammed.
- It offers fast access times
- The capacity is from 1GB to 2TB.
- They are either EEPROM or EPROM.
  Ex. Pendrives, Memory cards etc
- It can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones

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**31.Define Blu-Ray Disc**

- Blu-Ray Disc is a high-density optical disc similar to DVD.
- A double-layer Blu-Ray disc can store up to 50GB of data.
- The format was developed to enable recording, rewriting and playback of high-definition video,
- DVD uses a red laser to read and write data.
- **Blu-ray** uses a **blue-violet laser** to write.
- Hence, it is called as Blu-Ray.

**32.Explain different types of Ports and Interfaces in computer.**

**Serial Port**: To connect the external devices like screen
**Parallel Port**: To connect the printers.
**USB Ports**:

- To connect external devices like cameras, scanners, mobile phones, external hard disks and printers to the computer.
- It stands for **Universal Serial Bus** (USB)
- USB 3.0, USB 3.1 ,USB 3.2 can transfer data up to 5GB/Sec.

**VGA Connector**: To connect a monitor ,LCD projector.
**Audio Plugs**: To connect sound speakers, microphone and headphones.
**PS/2 Port**: To connect mouse and keyboard to PC.
**SCSI Port**: To connect the hard disk drives and network connectors.

**33.Define High Definition Multimedia Interface (HDMI) or What is HDMI?**

- High-Definition Multimedia Interface is an audio/video interface .
- It transfers the uncompressed video and audio data from a video controller, to computer monitor, LCD projector, digital television etc.

**32.Arrange the memory devices in ascending order based on the access time**

**1.Cache Memory**.

- The cache memory is a very high speed and expensive memory
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- The arrangement of cache memory is in between the CPU and the main memory.

**2.Main Memory**
**RAM**

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## 33.Explain the types of ROM.

**Types of ROM**

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