S

पु॰ना International School

Shree Swaminarayan Gurukul, Zundal

# Class -V

# Super Computer

# Year- 2020-21

# 2. Memory and Storage Devices

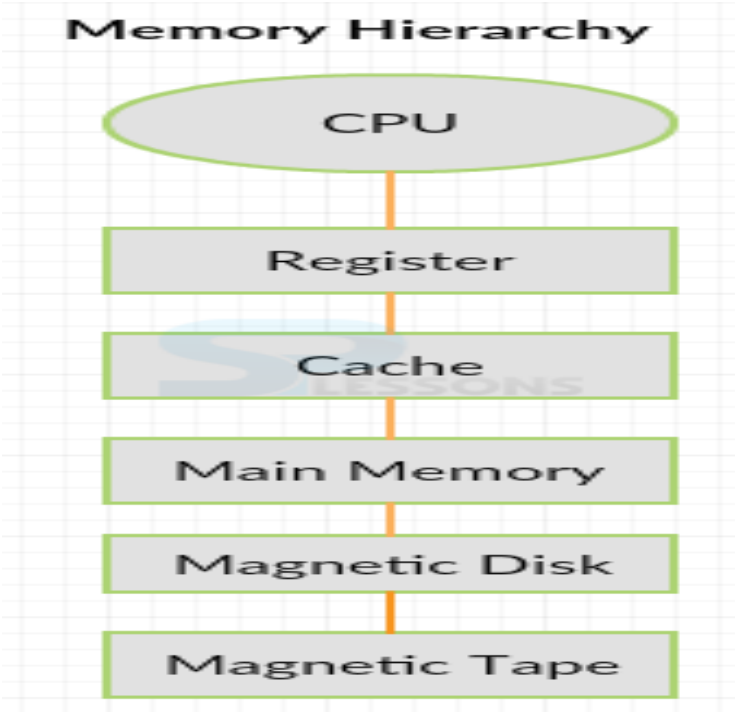
## ❖ Focus on Chapter

- Memory
- Primary memory
- Measuring units of data
- Secondary memory
- Storage devices

## Introduction

Storage devices are any type of hardware that is capable of storing and retrieving data. Most often these devices come in the form of hard drives or optical discs. There are two main categories of storage devices. Primary storage, such as RAM, is used by computer systems to temporarily store and retrieve data. Secondary storage devices, such as hard drives stores data permanently.

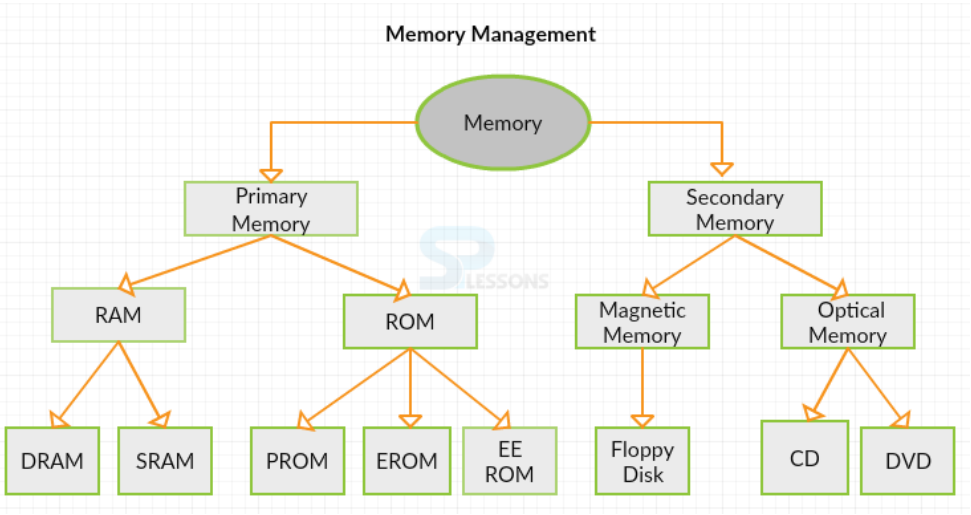
## Concepts



- Register can set flip- flops. These are very close to the CPU. The register is the fastest memory.
- Cache memory can store important data, i.e., highly executed data. It is the fast and smallest memory.
- It stores the data for immediate manipulations.

There are two types of storage memories:

1. Primary memory
2. Secondary memory




## Primary memory

It is also called as the main memory of the computer. It stores the instructions, operating system and data which required to run the computer. There are two types of primary memories.

RAM (Random Access Memory)

ROM (Read Only Memory)

## RAM

It performs both read and writes operations on memory. It stores data for temporally.If power failures happened in systems during memory access then you will lose your data permanently. So, RAM is a volatile memory. RAM categorized into following types.

1. DRAM
2. SRAM
3. DRDRAM

1. **Dynamic RAM**: Dynamic random-access memory (DRAM) is a type of random-access memory used in computing devices. It is made up of capacitors and transistors. DRAM stores each bit of data in a separate capacitor or transistors and it has two states of value in one bit called 0 and 1.

- DRAM is less expensive to produce than other RAMs
- DRAM writes data at the byte-level and reads at the multiple-byte page level
- DRAM requires less power than other RAMs
- Static RAM

2. **Static RAM**: Static random access memory(SRAM) is a type of RAM that holds data in a static form, that is, as long as the memory has power.as dynamic RAM, it does not need to be refreshed.

- Static RAM provides faster access to data and is more expensive than DRAM
- It is an expensive memory in which each cell must contain multiple transistors.
- Static RAM does not use capacitors. The cache memory is implemented in the cache memory. It is an expensive memory in which each cell must contain multiple transistors.
- SRAM is also highly recommended for use in PCs, peripheral equipment, printers, LCD screens, hard disk buffers, router buffers and buffers in CDROM / CDRW drives.

3. **Rambus Dynamic RAM**: Rambus Dynamic Random-Access Memory (RDRAM) is a memory subsystem designed to transfer data at faster rates. RDAM is made up of a random-access memory (RAM), a RAM controller and a bus path that connect RAM to microprocessors and other PC devices. RDRAM is also known as Direct RDRAM or Rambus.

- It is used in Video game consoles because its transfer rate of data is high compared all types of RAMs.
- RDRAM densities are 128 Mbit and 256 Mbit.

## ROM

ROM stands for read-only memory, stores information that can only be read. Modifying the data is difficult. ROM is also a type of non-volatile storage, which means that the information is stored even if the component loses power.

There are few basic ROM types:

1. PROM
2. EPROM
3. EEPROM – Electrically Erasable Programmable Read Only Memory
4. Flash EEPROM memory

1. **PROM**: Creating ROM chips from scratch is time-consuming and very expensive in small quantities. For this reason, developers created a type of ROM known as programmable read-only memory (PROM). Blank PROM chips can be bought in low cost and coded by the user with a programmer while buffering.

- It is used in digital electronic devices to store permanent data.
- It is available in low cost as compared to other RAMs.

2. **EPROM**: EPOM (erasable programmable read-only memory) is programmable read-only memory (programmable ROM) that can be erased and re-used and it is a non-volatile memory. We can erase the data in this EPROM by using high voltage Ultraviolet light.

- In EPROM we need to erase each and every cell.
- We can't erase data in RAM, PROM only we can erase data in EPROM.

3. **EEPROM**: EEPROM (Electrically Erasable Programmable Read Only Memory) this can be erased and reprogrammed using an electrical charge. EEPROM was a replacement for PROM and EPROM chips and later it is used for computer's BIOS.

- EEPROM requires data to be written or erased one byte at a time
- EEPROM are used to store configurations parameters and in modern computers, they replaced BIOS CMOS memory.

4. **Flash EEPROM memory**

Flash memory is a type of non-volatile memory that erases data in units called blocks. A block stored on a flash memory chip must be erased before data can be written or programmed to the microchip.

- It is more expensive than other hard drives and RAMSs.
- It can be erased only limited number of times

## Secondary memory device and their storage method and capacity

| Secondary Memory Device | Storage | Capacity |
|---|---|---|
| Floppy Disk (5.25 inches) | Magnetic | 1.2 MB |
| Floppy Disk (3.5 inches) | Magnetic | 1.44 MB |
| Floppy Disk (3.55 inches) | Magnetic | 80 KB to 242 KB |
| Hard Disk | Magnetic | upto 1 TB |
| CD-ROM | Optical | 640 MB to 680 MB |
| DVD-ROM | Optical | 4.7 GB to 17 GB |
| Pen-Drive | Solid State | 1 GB to 512 GB |
| Magnetic tape | Magnetic | Upto 1 TB |

## Memory Measurement

The data is measured in term of bits in the memory.

- A Bit is a single binary value that may be 0 or 1.
- A Nibble is a group of 4 bits.
- A Byte is a group of 8 bits and is equal to one character.

## ❖ Keywords

- **Primary memory –** memory containing programs and instructions that can be directly read by the CPU
- **Secondary memory –** memory that stores data permanently
- **Bit –** the smallest unit of computer memory

- **Checkpoint**

## Answer in one word each.

1. The hardware in a computer that stores data and information. **Memory**

2. A type of primary memory also known as permanent or non-permanent memory. **Rom**

3. A type of primary memory also known as temporary or volatile memory. **RAM**

4. The smallest unit 0f computer memory. **Bit**

# Exercise Corner

**A. Tick (✓) the correct answer.**

1. Which of the following memory contains programs and instructions that a computer needs to operate?

a. Ram ____ b. Rom ✓
c. Hard disk ____ d. DVD ____

2. Which of the following statements is not true about RAM?

a. RAM allows programs and data to be accessed randomly. _____
b. RAM requires power to keep data accessible. _____
c. the data is stored permanently in RAM. ✓
d. when the computer is switched off, all data stored in RAM is lost. _____

3. Which of the following units is equal to 1 TB?

a. 1024 KB____ b. 1024 GB ✓
c. 1024 MB____ c. 1024 bytes ____

4. Which of the following disc can hold up to 25 GB of data?

a. DVD ____ b. CD – R ____
c. CD – RW ___ d. Blu – Ray disc ✓

5. Which of the following secondary storage devices is enclosed within the CPU box of a computer?

a. Hard disk ✓ b. DVD _____
c. CD ____ d. USB flash Drive _____

**B. Fill in the blanks.**

1. **RAM** and ROM are the two types of primary memory.
2. **ROM** is also called permanent or non – violent memory.
3. The memory of a computer is represented in **bytes.**
4. The storage capacity of a hard disk ranges from **250 GB** to **3 TB.**
5. A USB flash drive is simply inserted into the **USB port** part of the computer.

**C. Write true or false.**

1. A computer can understand only two digits: 0 and 1 **T**
2. Secondary memory device store data temporarily. **F**
3. A hard disk is the most important secondary storage device of a computer. **T**
4. A compact disc can store up to 25 GB of a data. **F**
5. We cannot rewrite data onto a USB flash drive. **F**

**D. write P for primary device memory and S for secondary device memory.**

1. **S**
2. P
3. S
4. S
5. S
6. P