

COMPUTER MEMORY

Computer memory is the storage space in the computer where the data to be processed and the instructions required for processing are stored.

Types of memory

There are basically two major types of memory, which includes:

- Primary memory (main memory)
- Secondary memory (external storage)

PRIMARY MEMORY

Also known as the main memory is the storage in the computer in which data is stored for quick access by the CPU and are connected via a memory bus. The primary memory is divided into two:

Random Access Memory (RAM)

The RAM is the volatile memory that temporarily stores data and instruction currently being used by the computer. It is called volatile because the content of it disappears when the computer is turned off or there is loss of power supply.

Read Only Memory (ROM)

The ROM is the non-volatile memory that stores small program that the computer can use to perform some of the basic operations required to initiate the boot process. The content of the ROM are often times stored by the manufacturer of the system and always permanent. Since the content of it can only be read, they are called **Read Only**. Have you ever seen the black/blue background with some information during the booting process? That's the content of the ROM being displayed.

SECONDARY MEMORY

This is the permanent, non-volatile memory that is not directly accessed by the computer/processor. Before the content of the secondary memory can be used by the computer, it must be copied into the RAM. It has the capacity to store huge amount of data. The secondary storage is the slowest and cheapest form of memory. Examples of secondary storage include Hard Disk (Local Disk), Optical disk (CD, DVD), Floppy Disk, USB flash drive, memory card etc.

Differences between primary and secondary memory

Primary	Secondary
It is the internal memory	It is the external memory
It is under the direct control of the CPU	It is not directly under the control of the CPU
It cannot be used for massive data storage	It can be used for massive data storage
It is faster than the secondary storage	It is slower than the primary storage
It does not supplement the secondary storage	It supplements the primary storage

Assignment 1:

1. Write the difference(s) between CD-R and CD-RW, DVD-R and DVD-RW
2. Write the size, and technology of the following storage devices:
 - Hard disk
 - Floppy disk

- USB flash drive
- Magnetic tape
- Compact Disc

Unit of storage

The storage capacity is the amount of space available for the storage of data in a particular storage media. The storage unit includes:

- Bits: a bit is a contraction of the word “binary digit” and is denoted with either 1 or 0. A bit is the simplest unit of data storage.
- Nibble: a nibble is a collection of 4 bits
- Byte: a byte is a collection of 8 bits
- Word: a word is 2 bytes
- Kilobyte: a kilobyte is 1024 bytes (1000 bytes approximately)
- Megabyte: a megabyte is 1048576 bytes i.e. 1024^2 bytes (1 million bytes approximately)
- Gigabyte: a gigabyte is 1073741824 bytes i.e. 1024^3 bytes (1 billion bytes approximately)
- Terabyte: a terabyte is 1099511627776 bytes i.e. 1024^4 bytes (1 trillion bytes approximately)

Conversion from one unit of storage to another

1. Convert 64 bits to byte
 Solution: 8 bits make 1 byte
 1 bit makes $1/8$ byte
 64 bits make $1/8 \times 64 = 8$ bytes
2. Convert 16384 bits to byte and kilobyte
 Solution: **a.** 8 bits = 1 byte
 1 bit = $1/8$ byte
 16384 bits = $1/8 \times 16384$
 = 2048 bytes
 b. 1024 bytes = 1 KB
 1 byte = $1/1024$ KB
 2048 bytes = $1/1024 \times 2048$
 = 2KB

Assignment 2:

- a. Explain the following units of storage
 - Petabyte
 - Zettabyte
 - Yottabyte
- b. Convert 0.5 Terabyte to megabyte