MEMORY
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1.4 Memory

Memory

Memory usually refers to a form of semiconductor storage known as random-access memory (RAM) and sometimes other forms of fast but temporary storage.

Memory Storage units:

Bits: Each 1 or 0 that a computer understands is called a bit.

Byte: A group of 8 bits is called a byte. All letters, digits and signs are stored in the computer as bytes. The standard by which all characters (numerals, alphabets, and symbols) are represented by a combination of 1s and 0s is called ASCII (American Standard Code for Information Interchange

Nibbles: A nibble is a collection of four bits.

Word: A word is a group of 16 bits.

- 1 kilobyte (KB) is equal to 1024 bytes.
- 1 Megabyte (MB) is equal to 1024 KB.
- 1 Gigabyte (GB) is equal to 1024 MB.

Primary storage, presently known as **memory**, is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored there in a uniform manner. Historically, early computers used delay lines, William's tubes, or rotating magnetic drums as primary storage.

Main memory is directly or indirectly connected to the CPU via a memory bus. The **memory bus** is the computer bus which connects the main memory to the memory controller in computer systems. It is actually comprised of two buses: an address bus and a data bus. When people just make reference to "the memory bus" they are usually referring to the data bus, which carries actual memory data within the PC. The address bus is used to select the memory address that the data will come from or go to on a read or write.

Non-volatile memory: Will retain the stored information even if it is not constantly supplied with electric power. It is suitable for long-term storage of information.

Volatile memory: Requires constant power to maintain the stored information. The fastest memory technologies of today are volatile ones (not a universal rule). Since primary storage is required to be very fast, it predominantly uses volatile memory.

Dynamic Random Access Memory: A form of volatile memory which also requires the stored information to be periodically re-read and re-written, or refreshed, otherwise it would vanish.

Static memory: A form of volatile memory similar to DRAM with the exception that it never needs to be refreshed.

ROM (Read-Only Memory): Computer almost always contains a small amount of read-only memory that holds instructions for starting up the computer. Unlike RAM, ROM cannot be written to.

PROM (Programmable Read-Only Memory): A PROM is a memory chip on which you can store a program. But once the PROM has been used, you cannot wipe it clean and use it to store something else. Like ROMs, PROM's are non-volatile.

EPROM (Erasable Programmable Read-Only Memory): An EPROM is a special type of PROM that can be erased by exposing it to ultraviolet light.

EEPROM (Electrically Erasable Programmable Read-Only Memory): An EEPROM is a special type of PROM that can be erased by exposing it to an electrical charge.