

4.4 Memory

RAM

- It is a volatile memory which means the data stored in the RAM evaporates the moment you cut the power supply. That's one of the reasons we can't use random access memory as permanent storage despite the fact that it's way faster than the traditional magnetic disk-based hard drives.
- All of the modern operating systems we use have built-in workarounds to handle RAM's volatile nature. All the work done is constantly saved on the hard drive to avoid situations where unexpected system shutdown would result in data loss.

ROM

- The ROM is a non-volatile memory; it doesn't forget the data even if the power supply is removed. ROM is used to store firmware for the hardware which hardly gets any update, for instance, the BIOS

Differences

<i>RAM vs ROM difference</i>	RAM	ROM
Data	The data is not permanent and it can be altered any number of times.	The data is permanent. It can be altered but only a limited number of times that too at slow speed.
Speed	It is a high-speed memory.	It is much slower than the RAM.
CPU Interaction	The CPU can access the data stored on it.	The CPU can not access the data stored on it. In order to do so, the data is first copied to the RAM.
Size and Capacity	Large size with higher capacity.	Small size with less capacity.
Usage	Primary memory (DRAM DIMM modules), CPU Cache (SRAM).	Firmware like BIOS or UEFI. RFID tags, microcontrollers, medical devices, and at places where a small and permanent memory solution is required.
Cost	It doesn't come cheap.	Way cheaper than RAM.

Virtual memory

- Virtual memory is an abstraction of the main memory. It extends the available memory of the computer by storing the inactive parts of the content RAM on a disk. It fetches it back to the RAM when the content is required.

Cache memory

- Cache memory is used to store frequently accessed data in order to quickly access the data whenever it is required. They both are conceptually the same; however they mainly differ in the matter of implementation.

Purposes

- VM- It extends the memory capacity of a computer beyond the one that is installed.
- CM- It reduces the amount of time needed to access the data.