Memory Devices

Computers and many modern electronic devices rely on Memory devices to store and retrieve datas. These datas are used to direct electronic circuits for their action.

There are two types of Memory devices based on the memory cells that can be accessed at a given instant.

1. **Sequentially Access Memory – SAM**

It is accessed by stepping through each memory location until the desired location is obtained. An example is Magnetic Tape.

2. Random Access Memory – RAM

The memory can be accesses randomly at any instant without going to each memory location. Most of the electronic gadgets are based on RAM. It very fast than SAM. RAM Memory is considered as **"Volatile"** since the memory will be lost when power is removed from it.RAM can be classified into Dynamic RAM and Static RAM.

1. Dynamic RAM – DRAM

DRAM stores a bit as the presence or absence of charge on MOSFET gate substrate capacitance. As the capacitance has leakage, it must be refreshed every few milliseconds.

2. Static RAM – SRAM

SRAM is an array of flip flops of which the bit stored in the flip flop will remain until power is removed or another bit replaces it. SRAM does not need to be refreshed. SRAM has faster access times than DRAM.

Read Only Memory – ROM

ROM is non volatile and hence its memory will not lost when power is removed. ROM is usually used to store data or programs that do not change frequently and must still be there when power supply cuts off. The ROM is programmed only once.ROM may be Mask ROM, Programmable ROM , EPROM, EEPROM etc.

1.Mask ROM

Mask ROM are programmed by having "1"s and "0"s etched into their semiconductors at the time of manufacturing.

2. Programmable ROM - PROM can be written after manufacturing by electrically burning specific transistors or diodes in the memory array.

3. EPROM can be erased and reprogrammed by using ultraviolet light.

4. EEPROM (electronically erasable PROM) data can be erased electronically but it takes longer time compared to RAM. Read and write time for RAM is almost the same but PROM has slower write times. PROM must be erased before they can be reprogrammed and it often needs a higher programming voltage than its operating voltage.

Non Volatile RAM – NVRAM

NVRAM is an electronic Chip that contains both RAM and ROM. During power on reset, the contents of the ROM are copied to RAM. Before the power turns off, the system will copy the entire contents of the RAM into ROM for non volatile storage’

Shadow RAM

The RAM in an NVRAM is called shadow RAM. NVRAM fills the gap between easily written memory and non volatile memory.