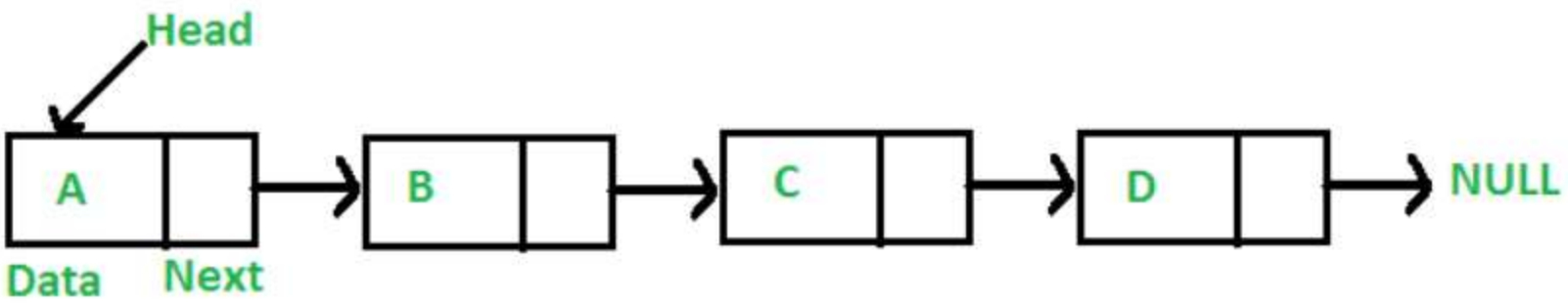
MEMORY HIERARCHY: INTERNAL MEMORY

COMPUTER ORGANIZATION
(PCC – CS402)

Bengal Institute of Technology,
Kolkata - 150

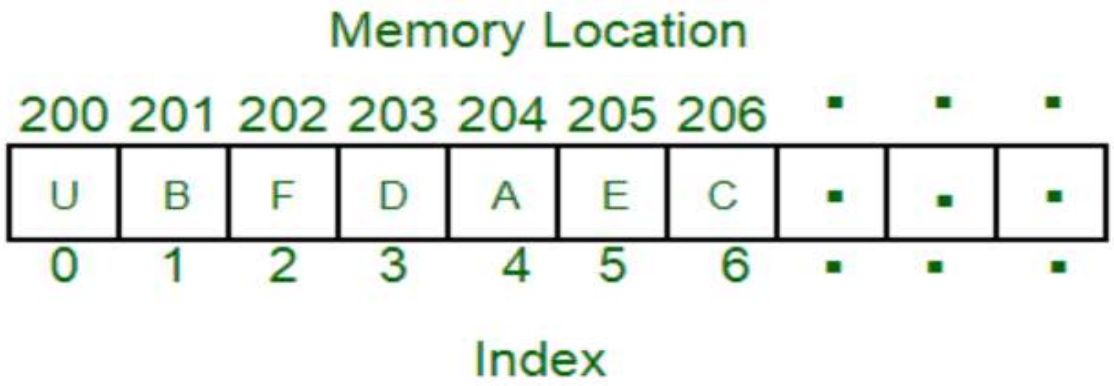
Types of memory accesses : Sequential

- In this method, the memory is accessed in a specific linear sequential manner, like accessing in a single Linked List. The access



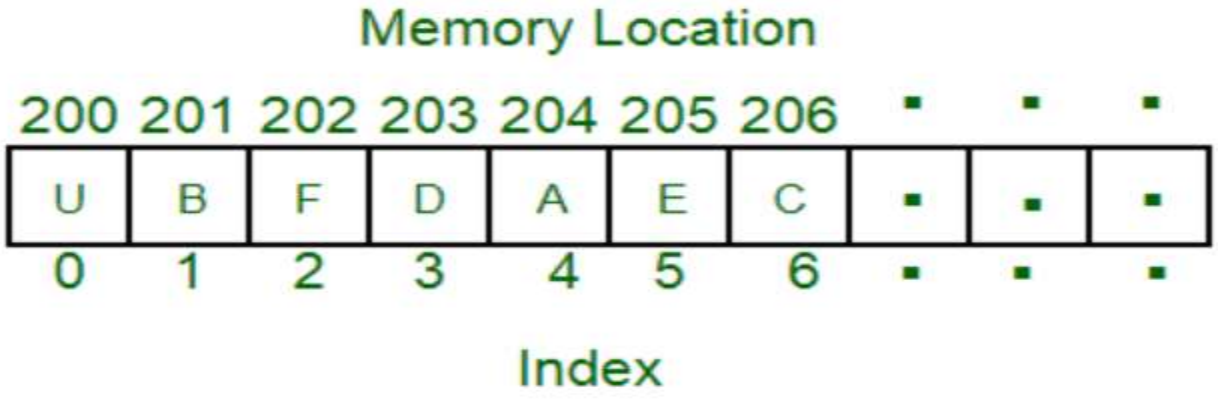
Types of memory accesses : Random

- In this method, any location of the memory can be accessed randomly like accessing in Array. Physical locations are independent in this access method. Applications of this random memory access are RAM and ROM.

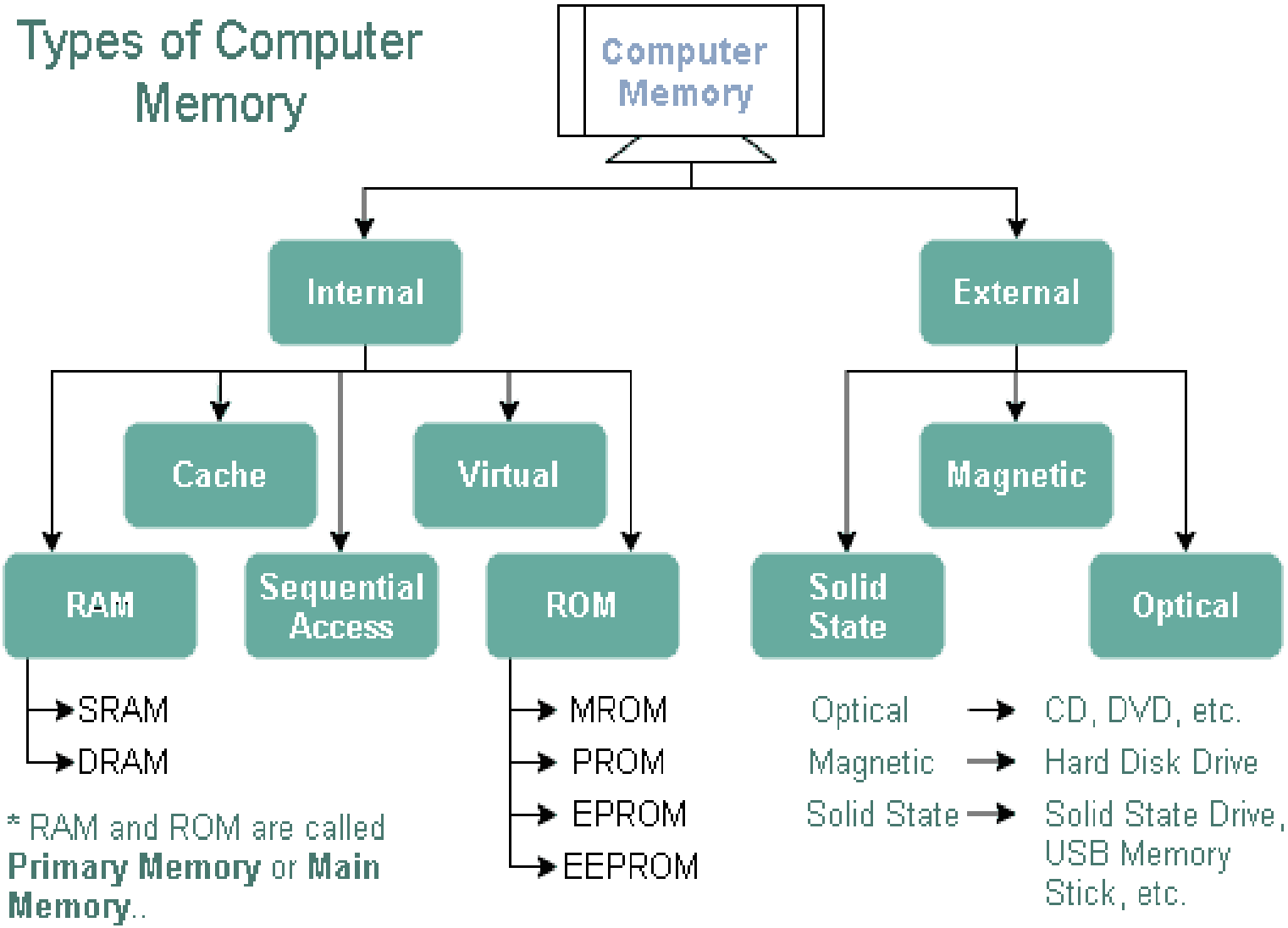


Types of memory accesses : Direct

- In this method, the particular location of the memory can be accessed directly like accessing in Array. This method is a combination of above two access methods. The access time depends on both the memory organization and characteristics of storage technology. The access is semi-random or direct as in Magnetic Disks.



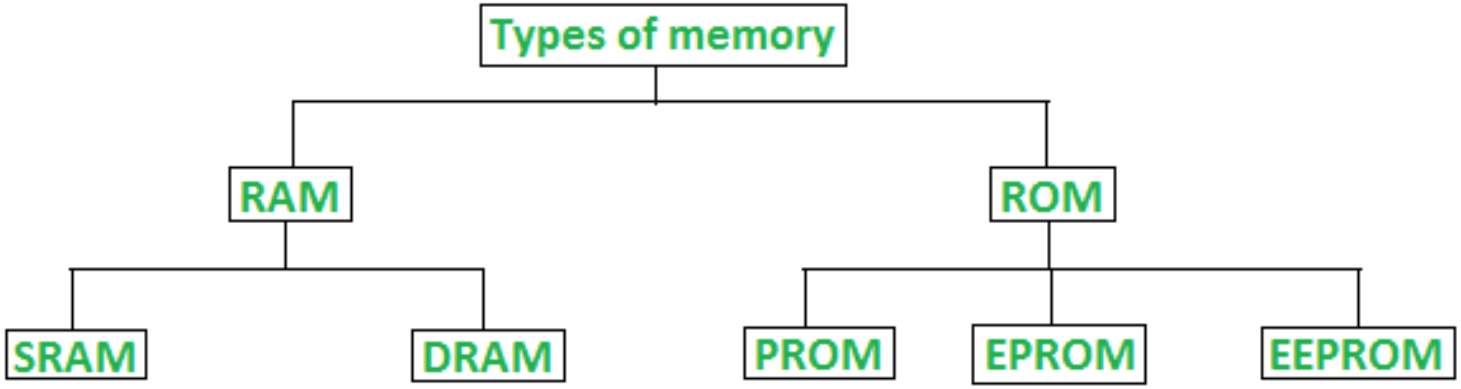
Types of Computer Memory



Random Access Memory (RAM) and Read Only Memory (ROM)

- basic type – Primary memory(RAM and ROM) and
- Secondary memory(hard drive,CD,etc.).
- Random Access Memory (RAM) is primary-volatile memory and Read Only Memory (ROM) is primary-non-volatile memory.

Primary Memory Classification

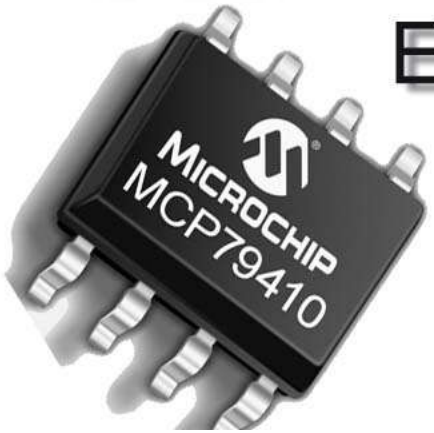


Classification of computer memory

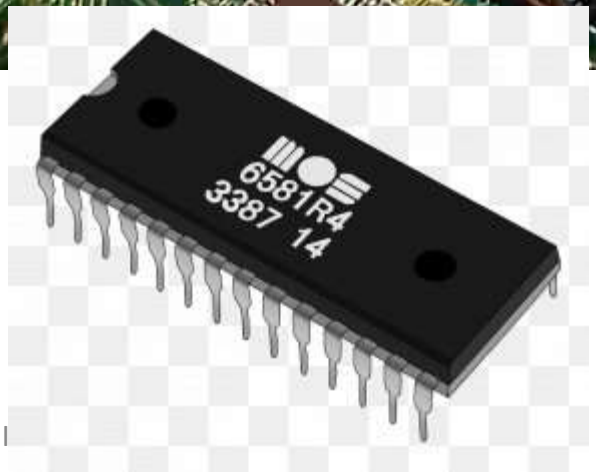
ROM

EPROM

ROM



EEPROM CHIP



ROM

- Stores crucial information essential to operate the system, like the program essential to boot the computer.
- It is not volatile.
- Always retains its data.
- Used in embedded systems or where the programming needs no change.
- Used in calculators and peripheral devices.
- ROM is further classified into 4 types- *ROM*, *PROM*, *EPROM*, and *EEPROM*.

Types of Read Only Memory (ROM)

- **PROM (Programmable read-only memory)** – It can be programmed by user. Once programmed, the data and instructions in it cannot be changed.
- **EPROM (Erasable Programmable read only memory)** – It can be reprogrammed. To erase data from it, expose it to ultra violet light. To reprogram it, erase all the previous data.
- **EEPROM (Electrically erasable programmable read only memory)** – The data can be erased by applying electric field, no need of ultra violet light. We can erase only portions of the chip.

RAM AND ROM: Comparison

RAM	ROM
1. Temporary Storage.	1. Permanent storage.
2. Store data in MBs.	2. Store data in GBs.
3. Volatile.	3. Non-volatile.
4.Used in normal operations.	4. Used for startup process of computer.
5. Writing data is faster.	5. Writing data is slower.

Difference between RAM and ROM

RAM

- It is also called as *read write memory* or the *main memory* or the *primary memory*.
- The programs and data that the CPU requires during execution of a program are stored in this memory.
- It is a volatile memory as the data loses when the power is turned off.
- RAM is further classified into two types- *SRAM (Static Random Access Memory)* and *DRAM (Dynamic Random Access Memory)*.
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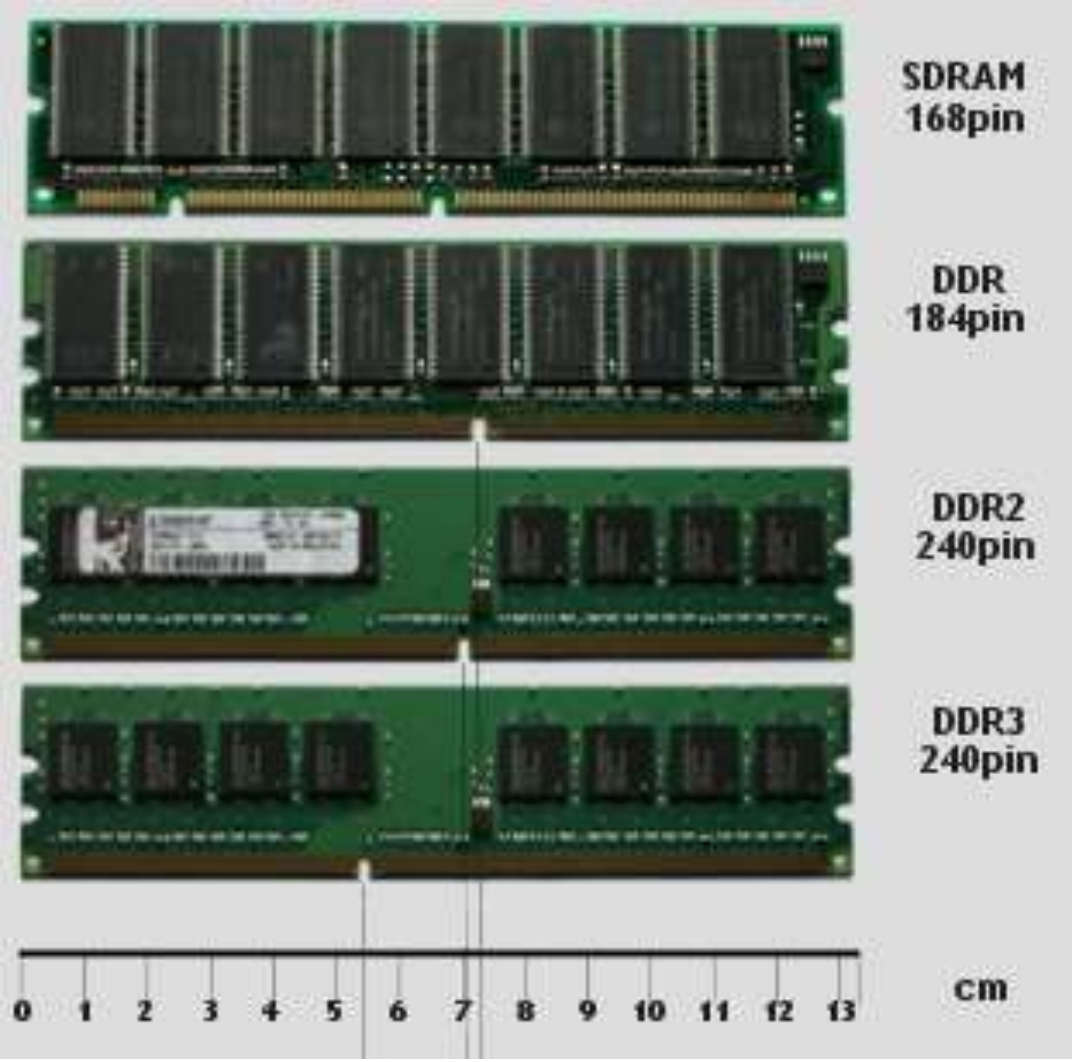
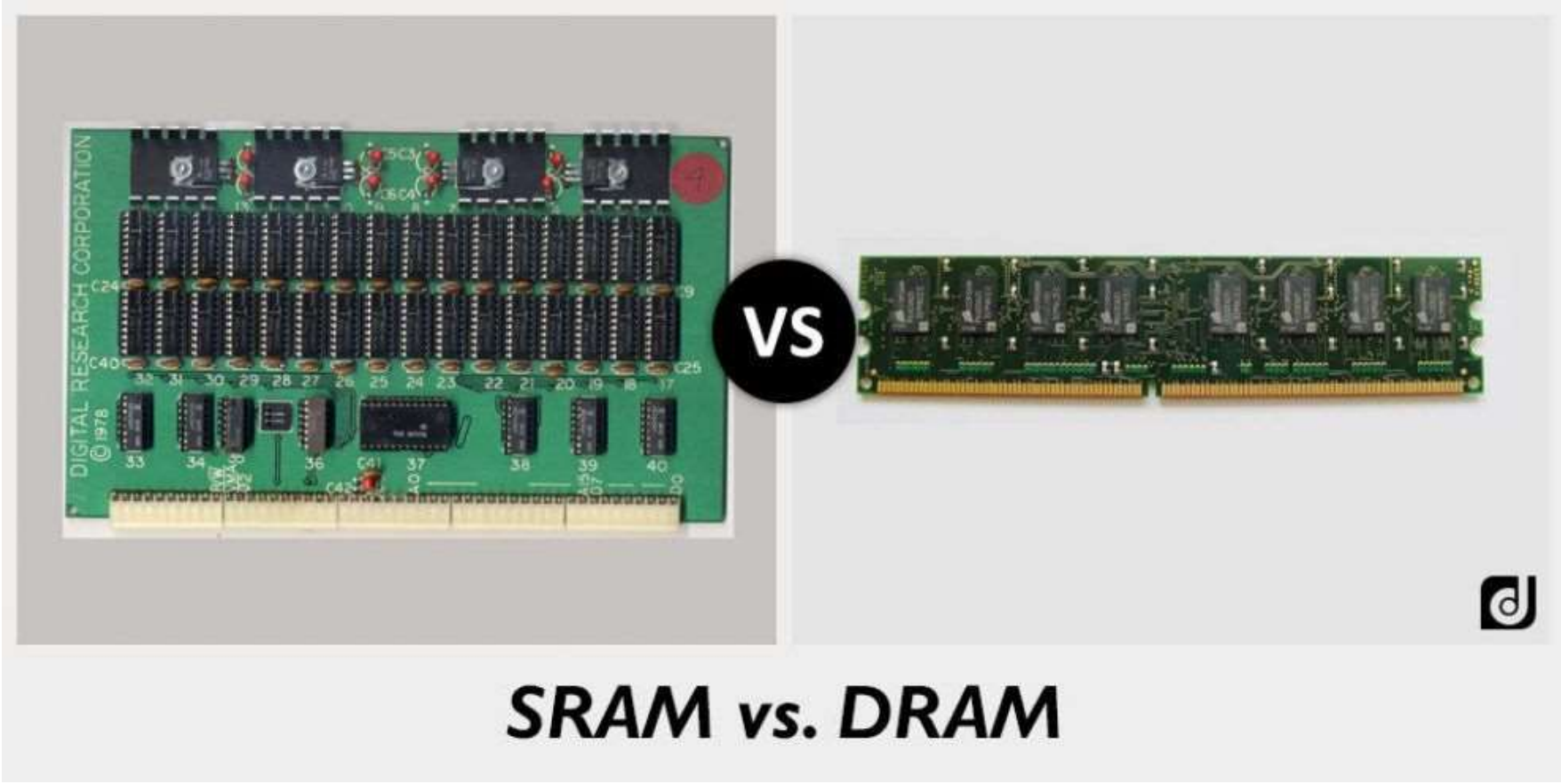
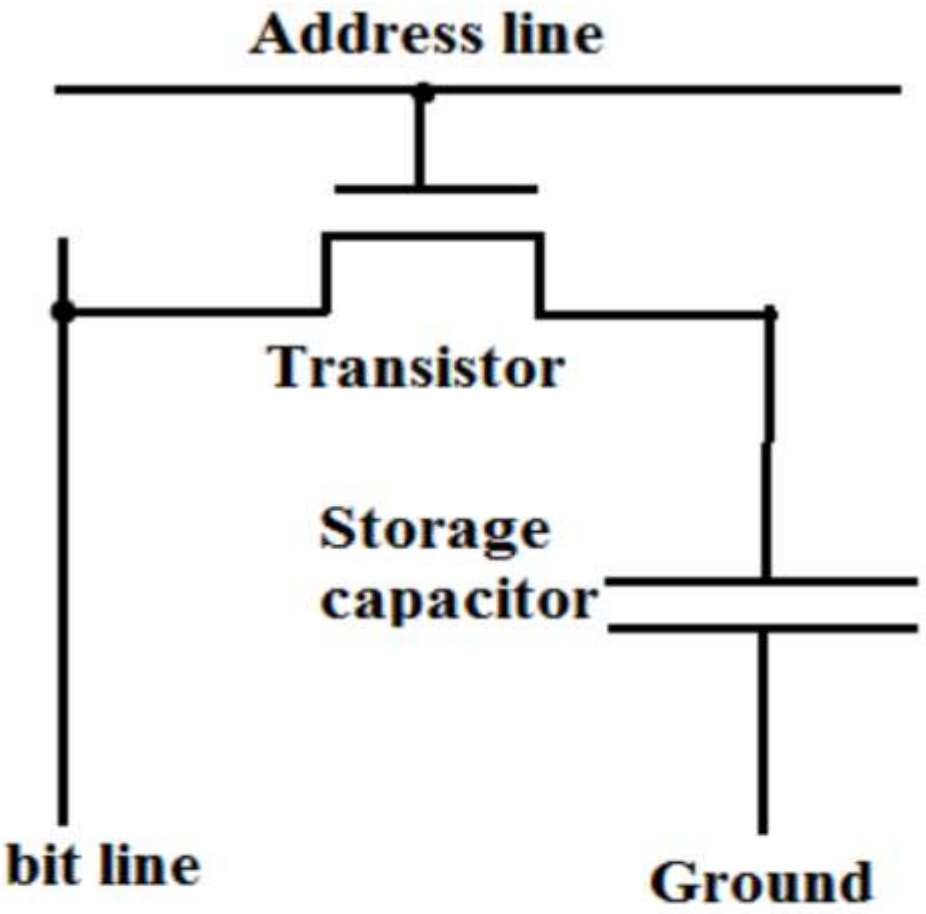
Different types of RAMs



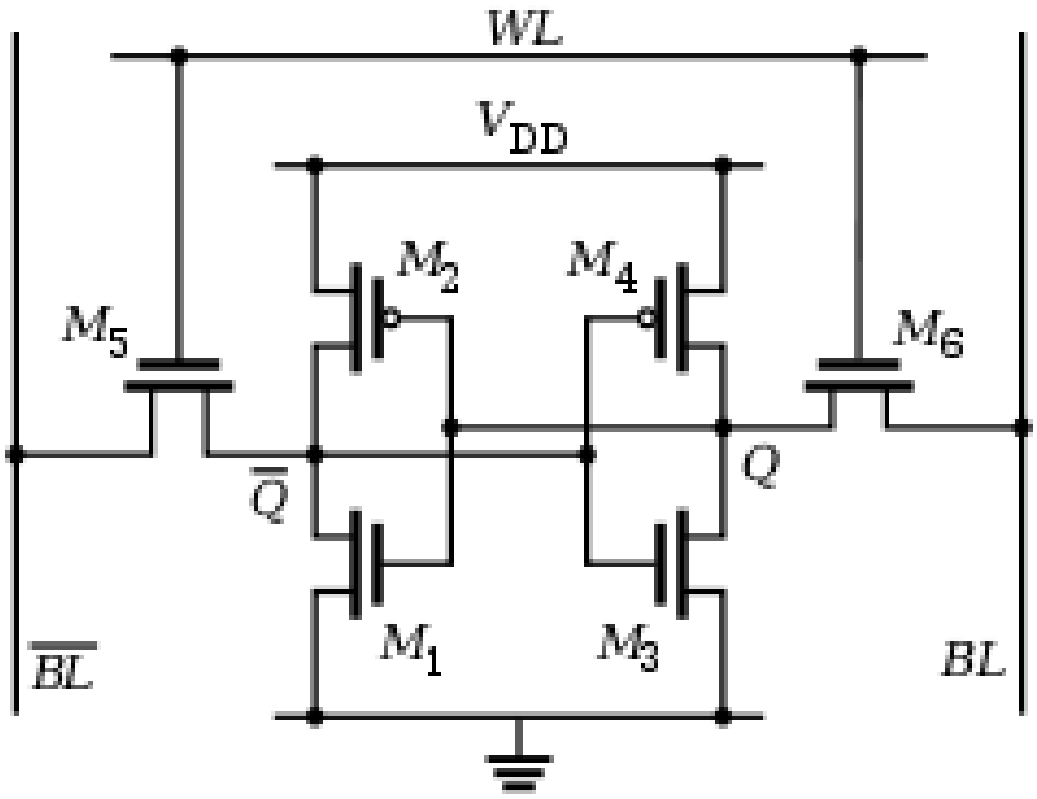
SRAM AND DRAM



DRAM CELL


Address line
Transistor
Storage
capacitor
bit line
Ground

SRAM CELL



Compare And Contrast SRAM And DRAM

DRAM	SRAM
1. Constructed of tiny capacitors that leak electricity.	1.Constructed of circuits similar to D flip-flops.
2.Requires a recharge every few milliseconds to maintain its data.	2.Holds its contents as long as power is available.
3.Inexpensive.	3.Expensive.
4. Slower than SRAM.	4. Faster than DRAM.
5. Can store many bits per chip.	5. Can not store many bits per chip.
6. Uses less power.	6.Uses more power.
7.Generates less heat.	7.Generates more heat.
8. Used for main memory.	8. Used for cache.

Difference between SRAM and DRAM