FACULTY OF ENGINEERING & TECHNOLOGY

SEMI-CONDUCTOR MEMORIES

Volatile Memories:

The memory unit consisting of binary cells made with flip-flop is known as volatile as the stored data is lost when the power is turned off. That memory is divide into two type SRAM & DRAM.

RAM
Random Access Memory

- It takes the form of integrated circuits that allow the stored data to be accessed in any order, i.e. at random. Regardless of the memory location that was last accessed.
- RAM generally store a bit of data in either the state of a flip-flop, as in SRAM (static RAM), or as a charge in a capacitor (or transistor gate), as in DRAM (dynamic RAM), EPROM, EEPROM and Flash.
- Some types have circuitry to detect and/or correct random faults called memory errors in the stored data, using parity bits or error correction codes. RAM of the read-only type, ROM, instead uses a metal mask to permanently enable/disable selected transistors, instead of storing a charge in them.

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SRAM
Static Random Access Memory

- Static Random Access Memory uses multiple transistors, typically four to six, for each memory cell but doesn't have a capacitor in each cell. It is used primarily for cache.
- Static indicates that it, unlike dynamic RAM (DRAM), does not need to be periodically refreshed, as SRAM uses bi-stable latching circuitry to store each bit.
- An SRAM cell has three different states it can be in: standby where the circuit is idle, reading when the data has been requested and writing when updating the contents.
- **Cache memory** is a relatively small amount (normally less than 1 MB) of high speed memory and resides very close to the CPU. It is designed to supply the CPU with the most frequently requested data. It takes a fraction of the time, compared to normal memory, to access cache memory.

DRAM
Dynamic Random Access Memory

DRAM:

Dynamic random access memory has memory cells with a paired transistor and capacitor requiring constant refreshing.

TYPES OF DRAM

SDRAM:

Synchronous dynamic random access memory takes advantage of the burst mode concept to greatly improve performance. It does this by staying on the row containing the requested bit and moving rapidly through the columns, reading each bit as it goes. The idea is that most of the time the data needed by the CPU will be in sequence. SDRAM is about five percent faster than EDO RAM and is the most common form in desktops today. Maximum transfer rate to L2 cache is approximately 528 Mbps.

DDR SDRAM:

Double data rate synchronous dynamic RAM is just like SDRAM except that is has higher bandwidth, meaning greater speed. Maximum transfer rate to L2 cache is approximately 1,064 MBps (for DDR SDRAM 133 MHZ).

Types of DRAM

RDRAM:

Rambus dynamic random access memory is a radical departure from the previous DRAM architecture. Designed by Rambus, RDRAM uses a Rambus in-line memory module (RIMM), which is similar in size and pin configuration to a standard DIMM. What makes RDRAM so different is its use of a special high-speed data bus called the Rambus channel. RDRAM memory chips work in parallel to achieve a data rate of 800 MHz, or 1,600 MBps. Since they operate at such high speeds, they generate much more heat than other types of chips. To help dissipate the excess heat Rambus chips are fitted with a heat spreader, which looks like a long thin wafer. Just like there are smaller versions of DIMMs, there are also SO-RIMMs, designed for notebook computers.

Credit Card Memory:

Credit card memory is a proprietary self-contained DRAM memory module that plugs into a special slot for use in notebook computers.

PCMCIA Memory Card:

Another self-contained DRAM module for notebooks, cards of this type are not proprietary and should work with any notebook computer whose system bus matches the memory card's configuration.