First Stage
Lecture -4

COMPUTER ORGANIZATION

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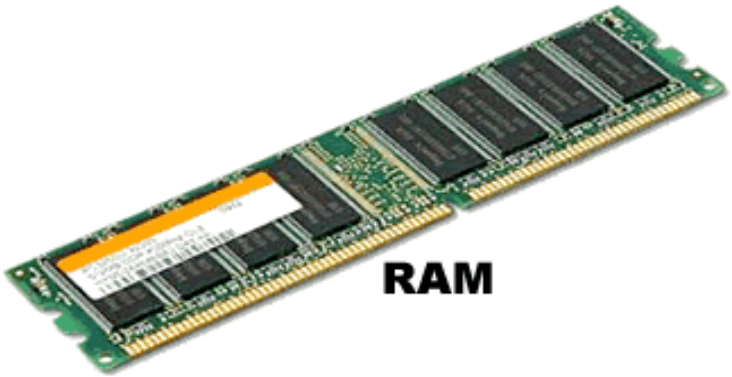
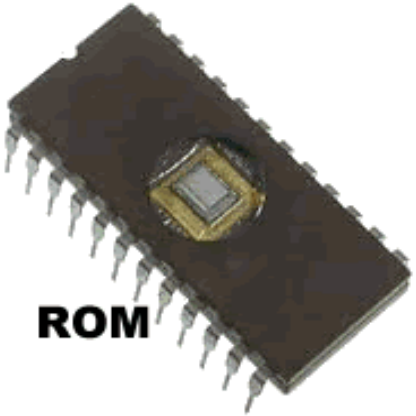
3 Internal Memory (RAM and ROM)

- *There are two types of internal memory **RAM** and **ROM**.*
- *RAM and ROM are used to **store computer data** and this can be directly accessed by the CPU.*
- *RAM and ROM are sometimes referred to as **'Primary Storage'.***





RAM (Random Access Memory)

- *RAM is used to **temporarily store information** that is **currently in use** by the computer. This can include anything from word documents to videos.*
- *RAM can be **read from and written to** and so the information stored in RAM can change all the time (it depends what tasks you are using the computer for).*
- *RAM is a **fast memory**. Data can be written to and read from RAM very quickly. RAM is generally measured in GB (Gigabytes).*
- *RAM is **Volatile Memory**. This means that information stored in RAM is deleted as soon as the computer is turned off.*

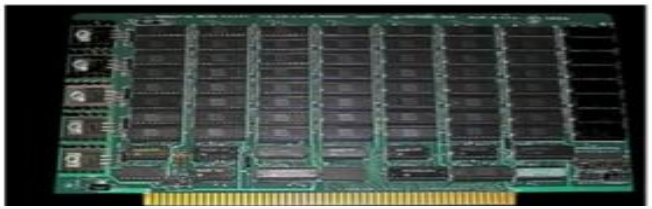
Kinds of RAM

1. **Static RAM (SRAM):** *The word static indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not have to be refreshed on a regular basis.*

2. **Dynamic RAM (DRAM):** *it's unlike SRAM, must be continually refreshed in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory because it is cheap and small. All DRAMs are made up of memory cells which are composed of one capacitor and one transistor.*

Differences Between Kinds of RAM

SRAM – Static RAM



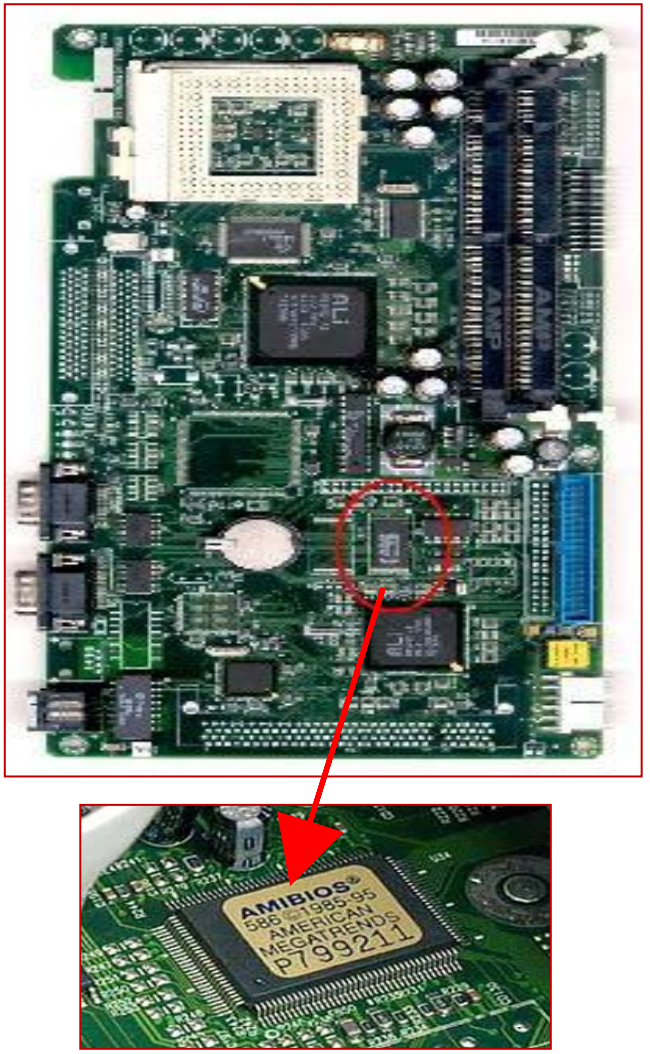
- ☑ It has long life
- ☑ There is no need to refresh
- ☑ Faster
- ☑ Used as cache memory
- ☑ Large size
- ☑ Expensive
- ☑ High power consumption

DRAM – Dynamic RAM

- ☑ It has short data lifetime
- ☑ Need to refresh continuously
- ☑ Slower as compared to SRAM
- ☑ Used as RAM
- ☑ Lesser in size
- ☑ Less expensive
- ☑ Less power consumption

ROM (Read Only Memory)

- *ROM is used to permanently store instructions that tell the computer how to boot(start up). It also loads the operating system (e.g. Windows). These instructions are known as the BIOS (Basic input/output system) or the boot program.*
- *Information stored in ROM is known as READ ONLY. This means that the contents of ROM cannot be altered or added to by the user.*
- *ROM is fast memory. Data stored in ROM can be accessed and read very quickly.*
- *ROM is Non-Volatile memory. This means that stored information is not lost when the computer loses power.*



Kinds of ROM

ROM Types	ROM Types	Description
ROM	Read-only memory chips	Information is written to a ROM chip when it is manufactured. A ROM chip cannot be erased or re-written and can become obsolete.
PROM	Programmable read-only memory	Information is written to a PROM chip after it is manufactured. A PROM chip cannot be erased or re-written.
EPROM	Erasable programmable read-only memory	Information is written to an EPROM chip after it is manufactured. An EPROM chip can be erased with exposure to UV light. Special equipment is required.
EEPROM	Electrically erasable programmable read-only memory	Information is written to an EEPROM chip after it is manufactured. EEPROM chips are also called Flash ROMs. An EEPROM chip can be erased and re-written without having to remove the chip from the computer.

Differences Between RAM & ROM

RAM

- It is read and write memory.
- It is temporary memory.
- It is volatile memory.
- The user can read and write data and programs into it at any time during data processing.
- It has large storage capacity.
- It has two types SRAM & DRAM

ROM

- It is read only memory.
- It is permanent memory.
- It is non-volatile memory.
- The manufacturer of the ROM can only write data and programs into it at its manufacturing time.
- It has small storage capacity.
- It has three types PROM, EPROM and EEPROM

Memory Units

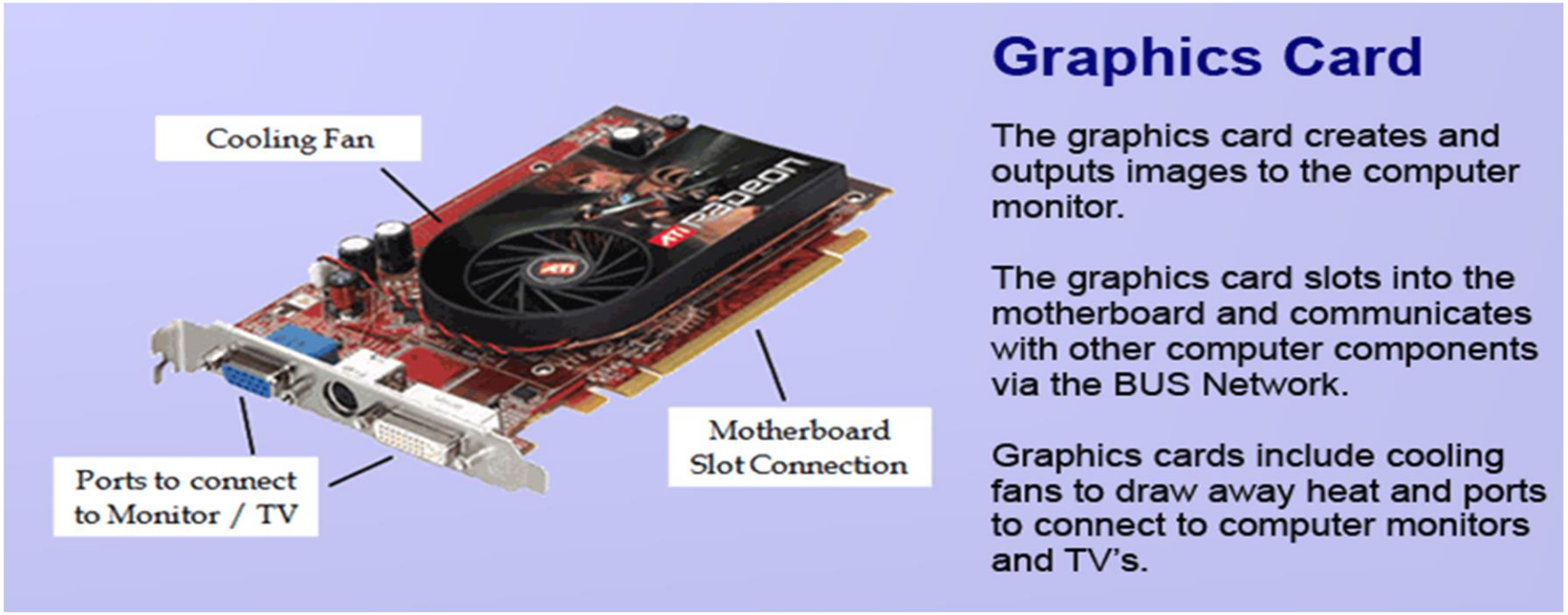
- **Memory unit: is the amount of data that can be stored in the storage unit.**

Following are the main memory storage units:

Unit	Description
Bit (Binary Digit)	A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
Byte	1. A group of 8 bits is called byte. A byte is the smallest unit which can represent a data item or a character. 2. The storage capacity of a computer is measured in bytes. 3. A byte contains enough information to store a single ASCII character, like "**A**" or "a" .
Kilobyte (KB)	A kilobyte consists of 1024 bytes.
Megabyte (MB)	A megabyte consists of 1024 kilobytes.
Gigabyte (GB)	A gigabyte consists of 1024 megabytes
Terabyte (TB)	A terabyte consists of 1024 gigabytes
Petabyte (PB)	A Petabyte consists of 1024 terabytes

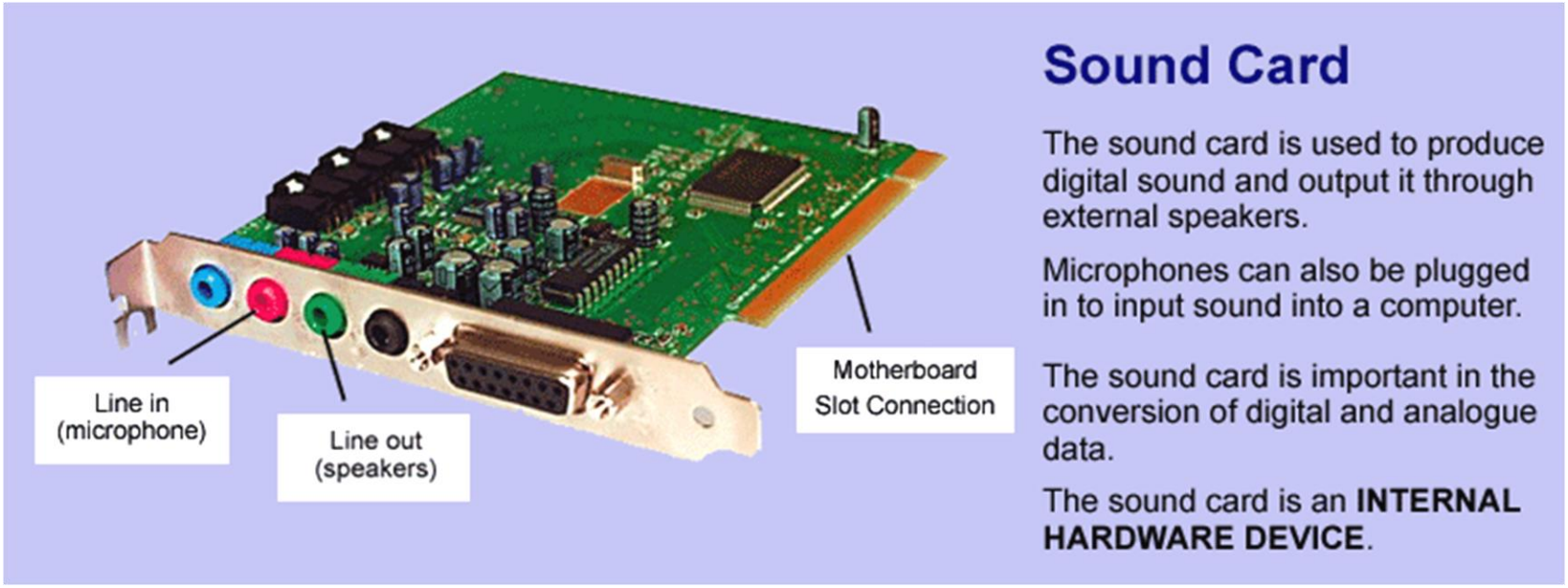
4 Video Card (graphics card)

- *Graphics cards are hardware devices that plug into the motherboard and enables the computer to **display images on the monitor**.*
- *Graphics cards usually require the **installation of software** alongside the hardware. The software **instructs the computer how to use the graphics card** and also allows you to **alter settings** to change image quality and size.*



5 Sound Card

- *Sound cards are **internal hardware devices** that plug into the **motherboard.***
- *A sound card's main function is to allow the computer system to **produce sound** but they also allow users to **connect microphones** in order to **input sounds** into the computer.*
- *Sound cards are also useful in the **conversion of analogue data into digital** and **vice versa.***



6 Storage Devices (secondary storage)

1. Internal Hard Disk Drive

2. External Hard Disk Drive

- *Secondary storage devices are used to store data that is **not instantly needed** by the **computer**.*
- *Secondary storage devices **permanently store data and programs** for as long as we need.*
- *There are two categories of storage devices:*
  - ***Internal Storage*** *Internal Hard Disk Drives*
  - ***External Storage*** *External Hard Disk Drive, Memory Stick etc*