بسم الله الرحمن الرحيم

APPLICATIONS OF COMPUTER SCIENCES

PART 1

In MEDICAL IMAGING TECHNOLOGIES

By

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BY

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LECTURE 1

AirArabia

Why Study it?

After graduation … you will work as
a Technologist …. But also, you may work
as an Applicator or Administrator
So…. You will need these Basics

Good Luck

Dr. AHMAD MOKHTAR ABODAHAB

PART 1

BASICS OF COMPUTER SCIENCES

3rd Year Students

PART 2

COMPUTER APPLICATIONS

4th Year Students

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PART 1

BASICS OF COMPUTER SCIENCES

Contents

1- Computer Basics

- ✓ Hardware
- ✓ CPU and Memory
- ✓ Disk technology
- ✓ IP / MAC Addresses
- ✓ Exchange media

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WHAT IS A COMPUTER?

ELECTRONIC DEVICE THAT CAN GET IT DONE.

EXAMPLES

Computer

- is a **programmable machine**
- designed to perform arithmetic and logical operations automatically and

on given **input** by the user and gives the desired **output** after **processing**.

- Or An **electronic device** that stores, retrieves, and processes data, and can be programmed with instructions.

Speed

Computers work at an incredible speed.

A powerful computer

is capable of performing about 3-4 million simple instructions per second.

instructions/programs written by the programmer)

Two properties that measure the power of Computer :

***1.How much information* it can process?**

***2.How fast* can it process?**

Accuracy

In addition to being fast, computers are also accurate.

Errors

that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or Faulty instructions/programs written by the programmer)

Types of Computers

Mini and Mainframe Computers

Very powerful, used by large organisations such an banks to control the entire business operation. Very expensive!

PACS SERVER

Personal Computers

Cheap and easy to use. Often used as stand-alone computers or in a network. May be connected to large mainframe computers within big companies.

Computer components

- Two major categories : **hardware** and **software**.

➔ **Hardware** :

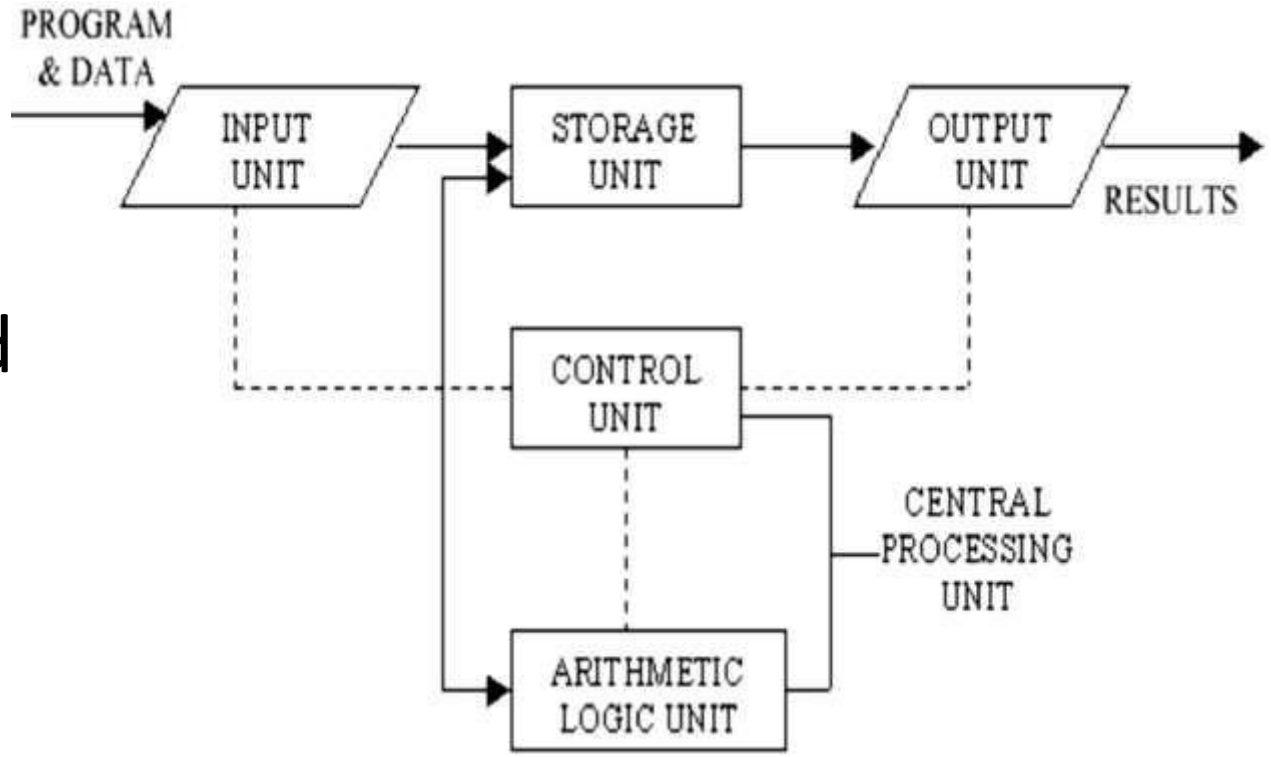
is the machine itself and its connected devices such as monitor, keyboard, mouse etc.

➔ **Software:**

are the set of programs that make use of hardware for performing various functions.

- A computer system consists of **mainly four basic units**; namely :

1. input unit,
2. storage unit,
3. central processing unit and
4. output unit.



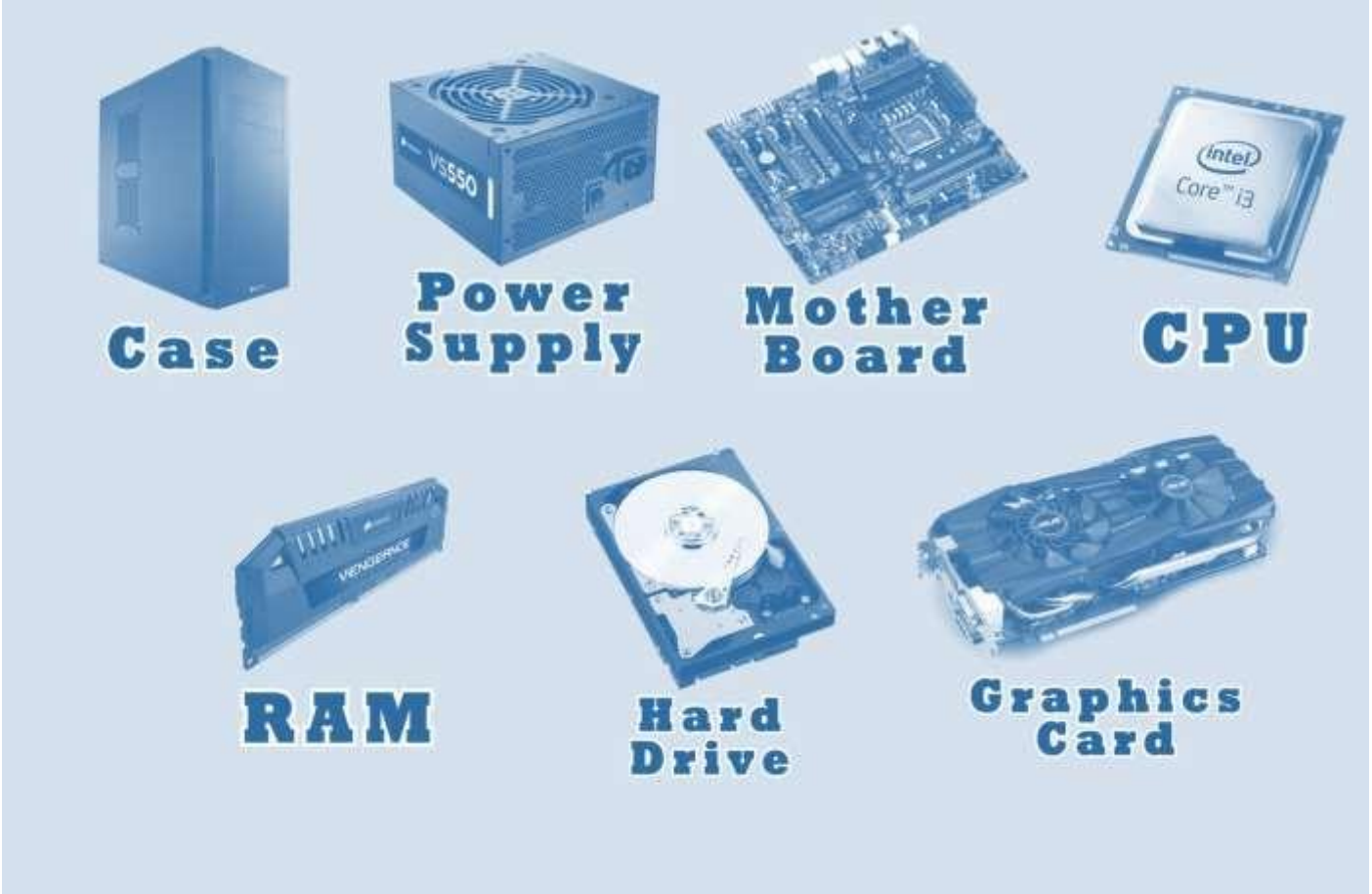
Hardware


System Fan
Floppy
Heat Sink
Hard Drive
Power Supply
Optical Drive
Motherboard
Processors (CPU)
RAM Moduels

7 Essential Parts …… & Others

- **C**ase
- **C**PU
- **C**ard Graphic

- **M**other
- **P**ower
- **H**ard
- **R**AM



Simple

Case

Power Supply

Mother Board

Complex

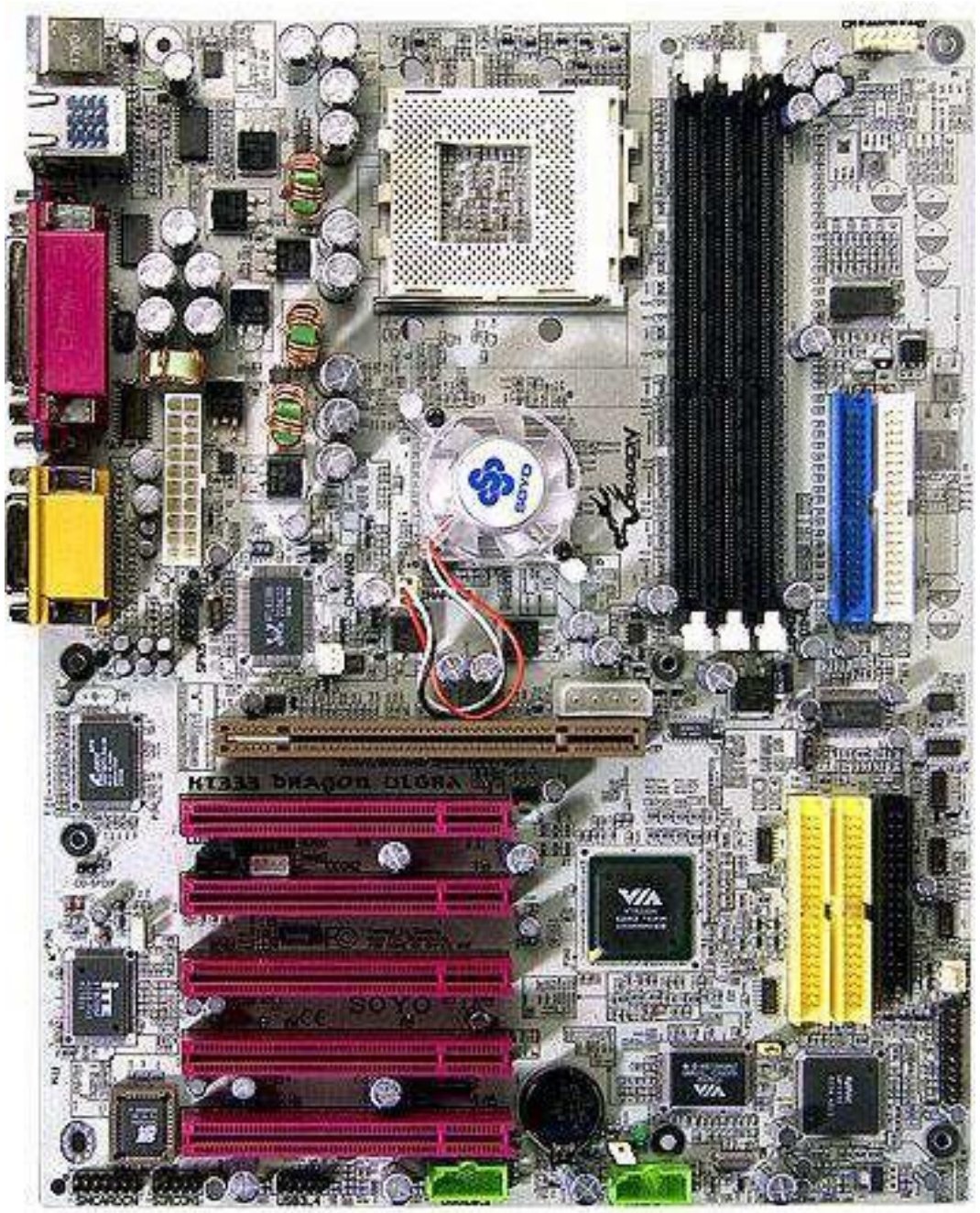
Graphics Card

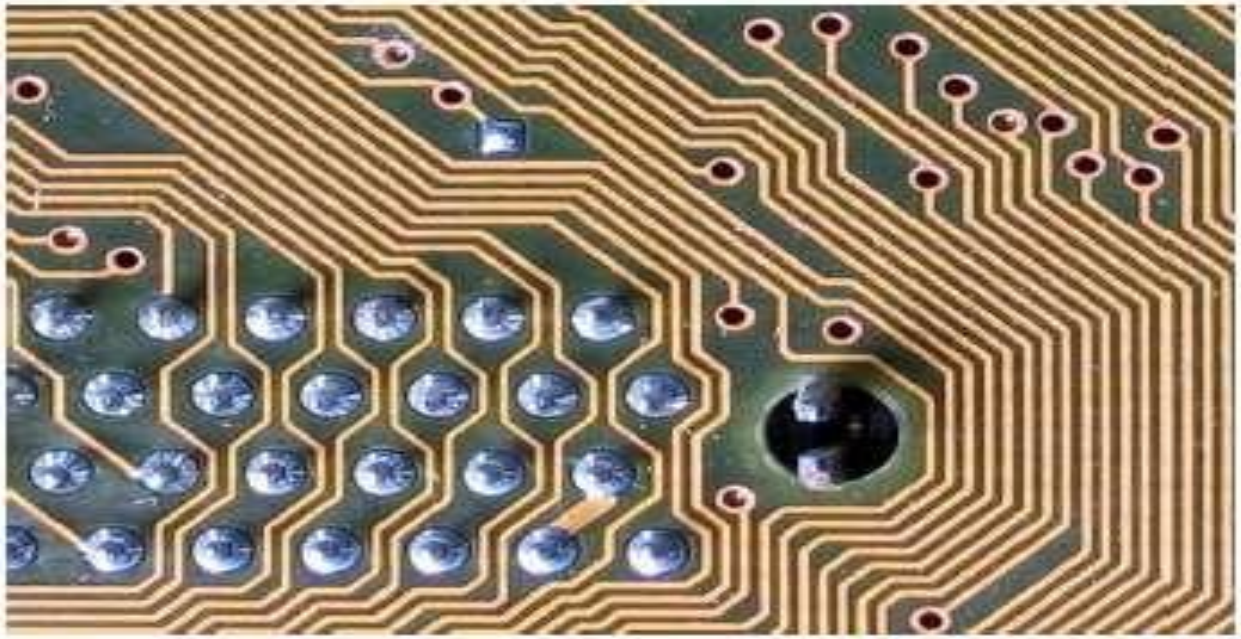
Hard Drive

RAM

CPU

Mother Board





Lines (traces) on a motherboard are like roads in a city

CPU

Central Processing Unit

Processor

RAM

Random Access Memory

Memory

Hard Drive

Disk Drive

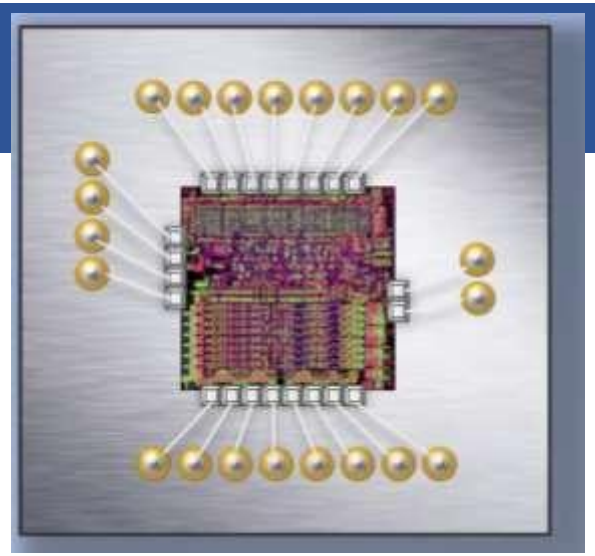
Storage

Graphics Card

GPU

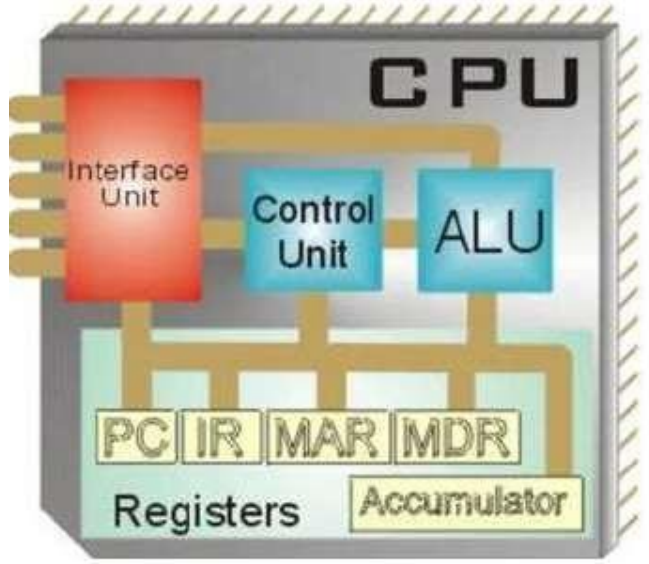
Graphics Processing Unit

CPU & Memory



- **CPU** = **C**entral **P**rocessing **U**nit
- Memory = ROM , RAM & Cash
- CPU Speed is measured by MHz or GHz

‘**M**ega or **G**ega Hertz ‘



http://visual6502.org/

RAM = Random Access Memory

- …because reading takes roughly the same time regardless of location

- RAM has quick read/write times, and its function is to load open programs and operating system data **currently in use** from the slower secondary storage, so it can be accessed directly by the CPU.

- Data lost when power lost = **Volatile**

ROM = Read Only Memory

- Can only be read, so can't be changed once programmed.
- Used in small amounts in computers to store essential programs, like those needed to be run in order to boot the computer
- Data retained when power lost = **Non-volatile**
- Now mostly replaced by the more versatile flash storage

RAM (Random Access Memory)

- RAM is a **volatile** memory.
- The storage capacity of the RAM is high.
- RAM is the **fastest** and **costliest** memory of the computer.
- It is a **read-write** memory of the computer.

Types of RAM

There are two kinds of RAM:

- **Static RAM**
- **Dynamic RAM**

Static RAM is one which requires the constant flow of the power to retain the data inside it.

Dynamic RAM needs to be refreshed to retain the data it holds.

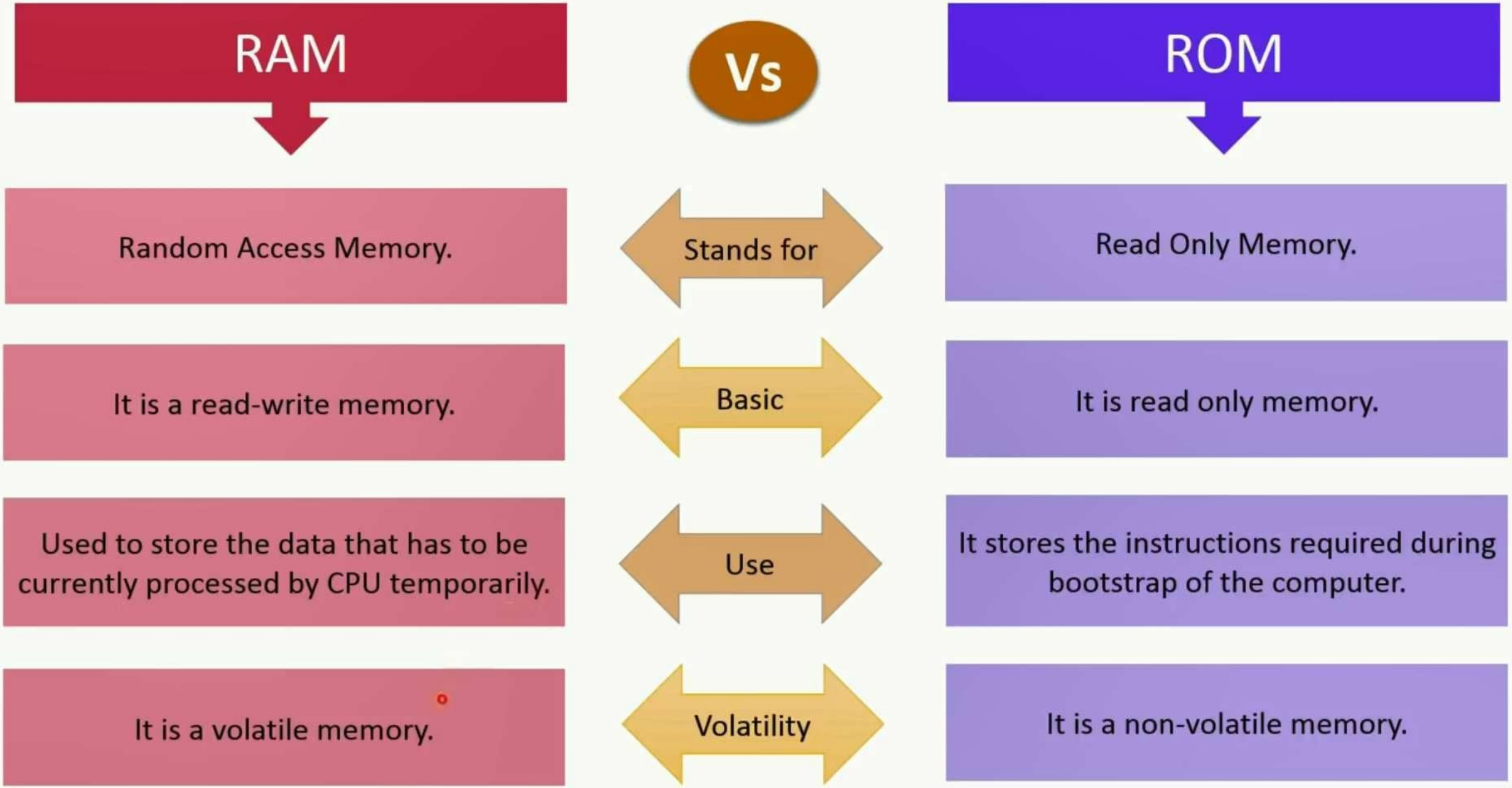
ROM (Read Only Memory)

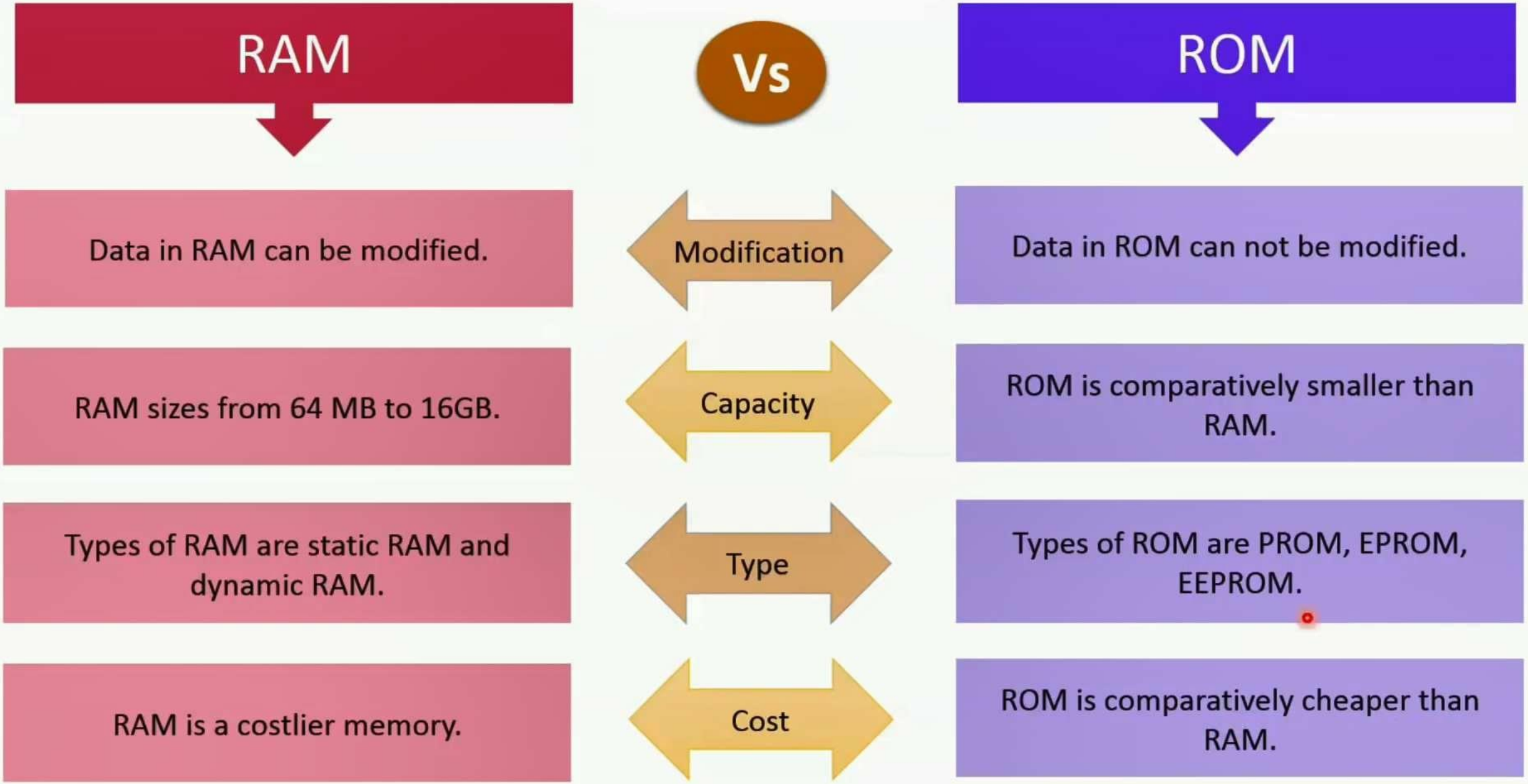
- ROM is a **non-volatile** memory.
- The **capacity** of ROM is comparatively **smaller** than RAM.
- It **slower** and **cheaper** than RAM.
- The data in ROM can only be read by CPU.
- ROM stores the instruction that computer requires during **Bootstraping.**

Types of ROM

There are three kinds of ROM:

- **PROM**: Programmable ROM, it can be modified only once by the user.
- **EPROM**: Erasable and Programable ROM, the content of this ROM can be erased using ultraviolet rays and the ROM can be reprogrammed.
- **EEPROM**: Electrically Erasable and Programmable ROM, it can be erased electrically and reprogrammed about ten thousand times.





B. **Secondary Memmory** :

Magnetic / Optical

- Secondary/auxiliary memory is storage other than the RAM.
- These include devices that are peripheral and are connected and controlled by the computer to enable permanent storage of programs and data.
- Secondary storage devices are of **two types**:
  - magnetic and
  - optical.
- **Magnetic devices :** include **hard disks** and
- **Optical devices :** are **CDs**, **DVDs**, **Pen drive**, **Zip drive** etc.

• Ram & Hard

RAM

-Data/Files Stored
-Small Storage Space
-Fast Access

-Run more/fancier programs

Hard Drive

-Data/Files Stored
-Large Storage Space
-Slow Access

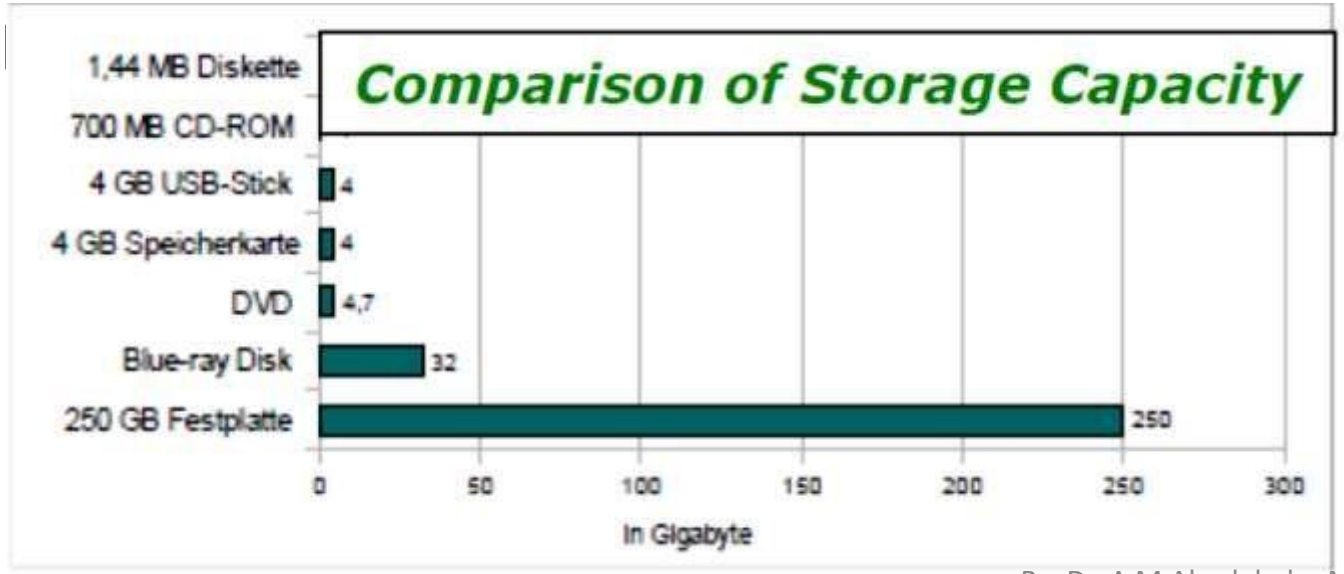
-Have more Installed
-Have more Videos/Pictures

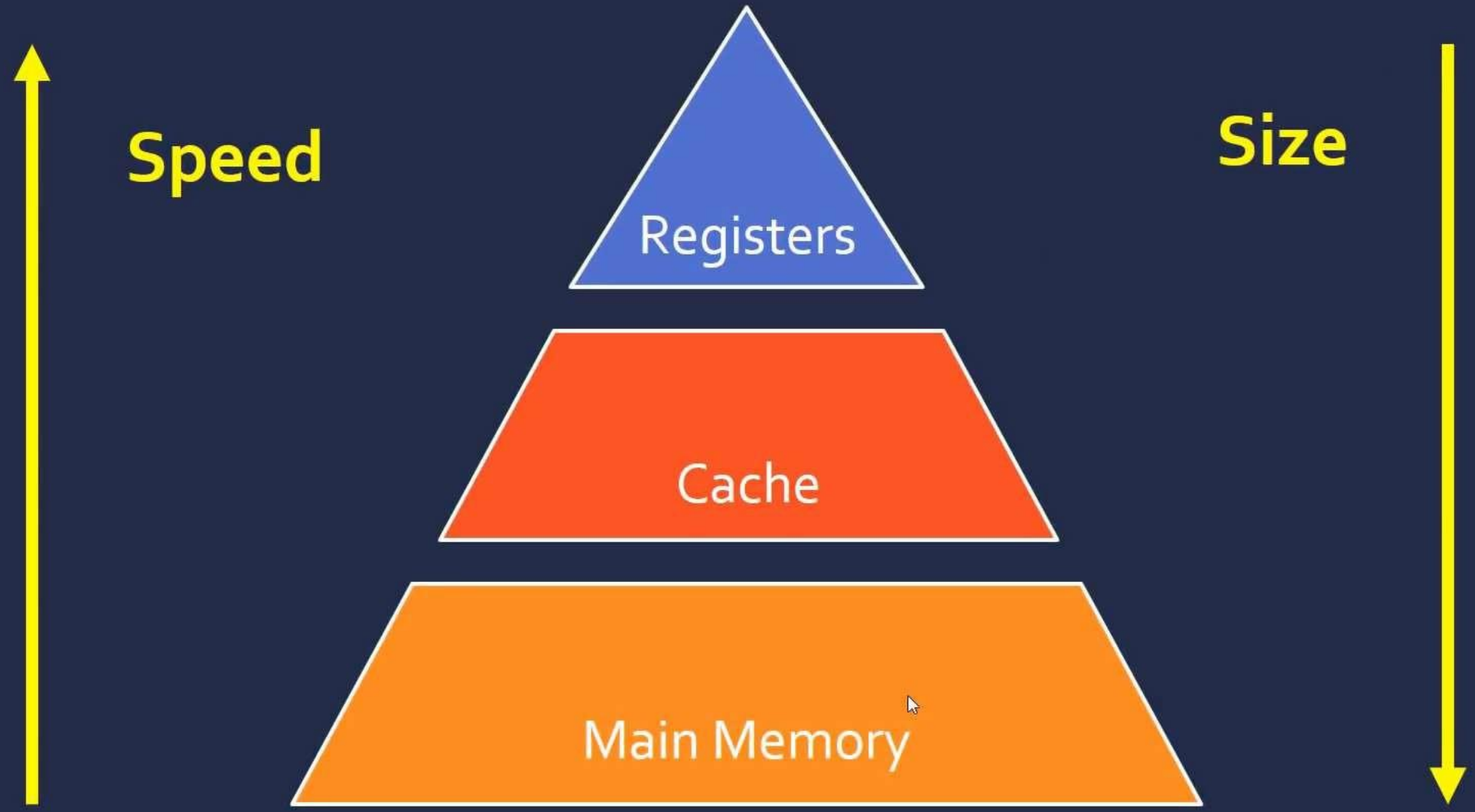
Storage sizes

Bit & Byte

- **Bit**: the smallest unit of information is. It is the State of 0 or 1.
- **Byte**: 1 byte = 8 bits
- Kilobytes (KB) ≈ 1,000 bytes
- Megabytes (MB) ≈ 1,000 K
- Gigabyte (GB) ≈ 1,000 MB
- Terabyte (TB) ≈ 1,000 GB

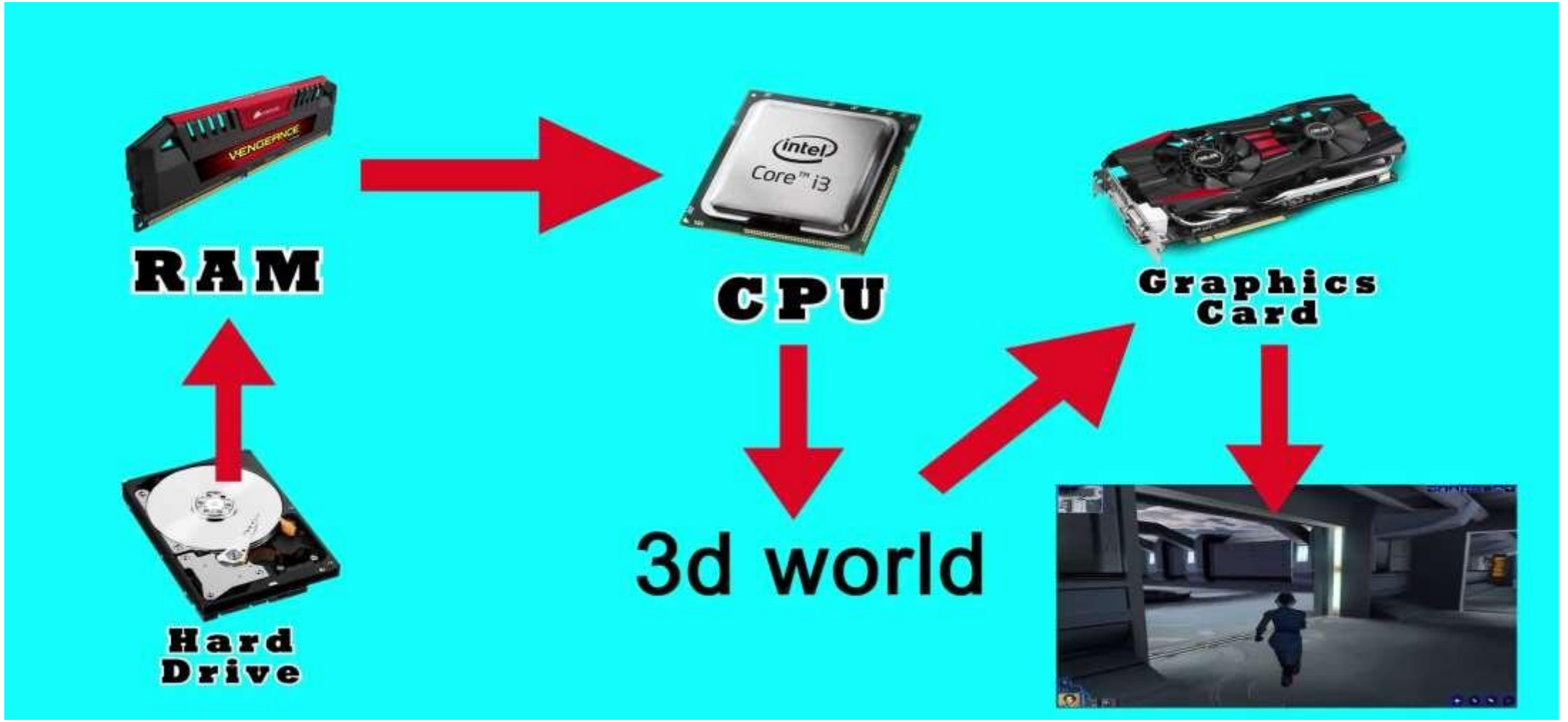
Instead of writing the correct conversion number of 1024 (= 2^{10}), it is simpler to just write it as 1000.




Speed
Registers
Cache
Main Memory
Size

• Graphic Card :

Responsible for displaying good quality of advanced images & 3D



Input&output devices:

- These devices are used to **enter information** and instructions into a computer for storage or processing and to **deliver the processed data** to a user.
- **Input / Output** devices are required for users to communicate with the computer.

In simple terms,

Input devices

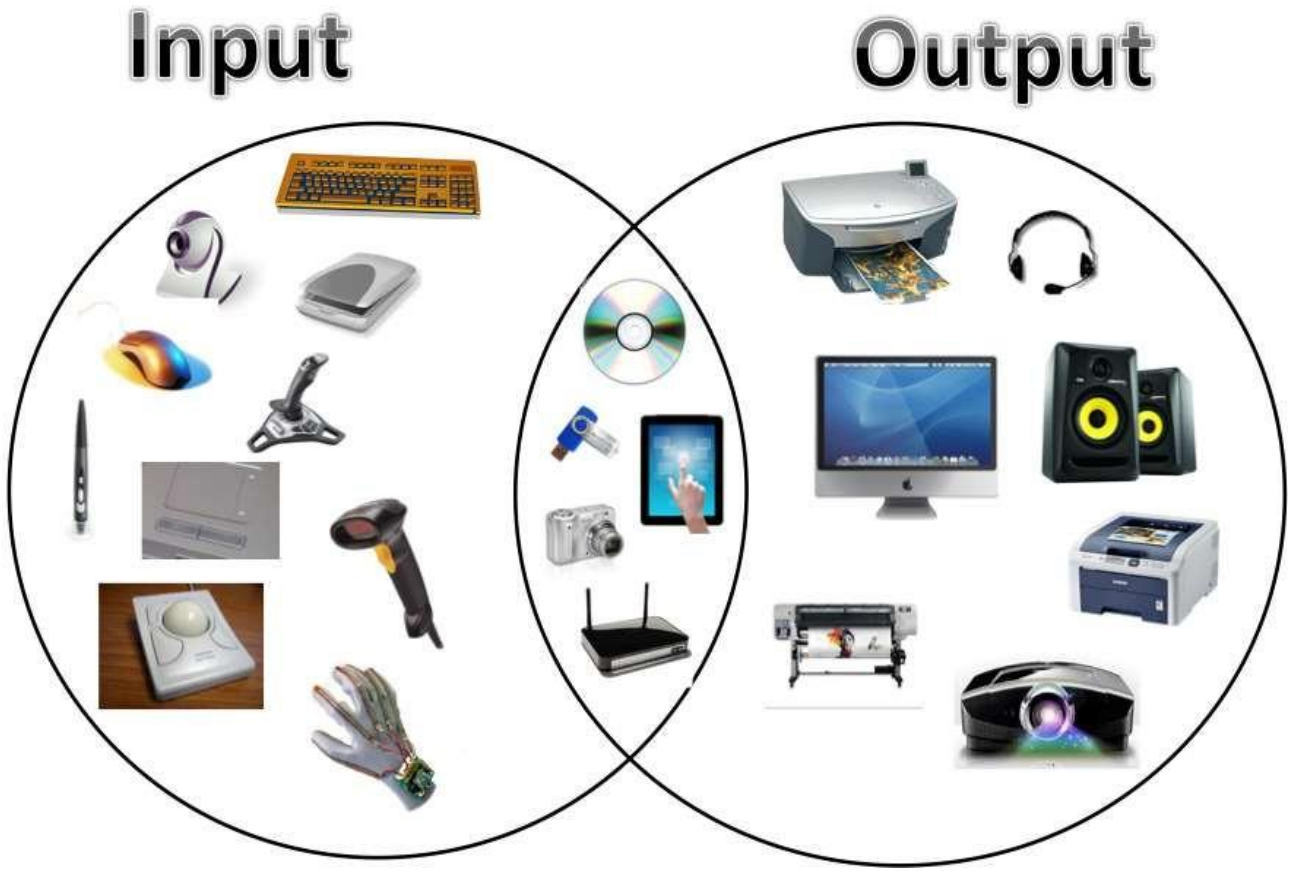
→ bring information <u>INTO</u> the computer and

output devices

→ bring information <u>OUT</u> of a computer system.

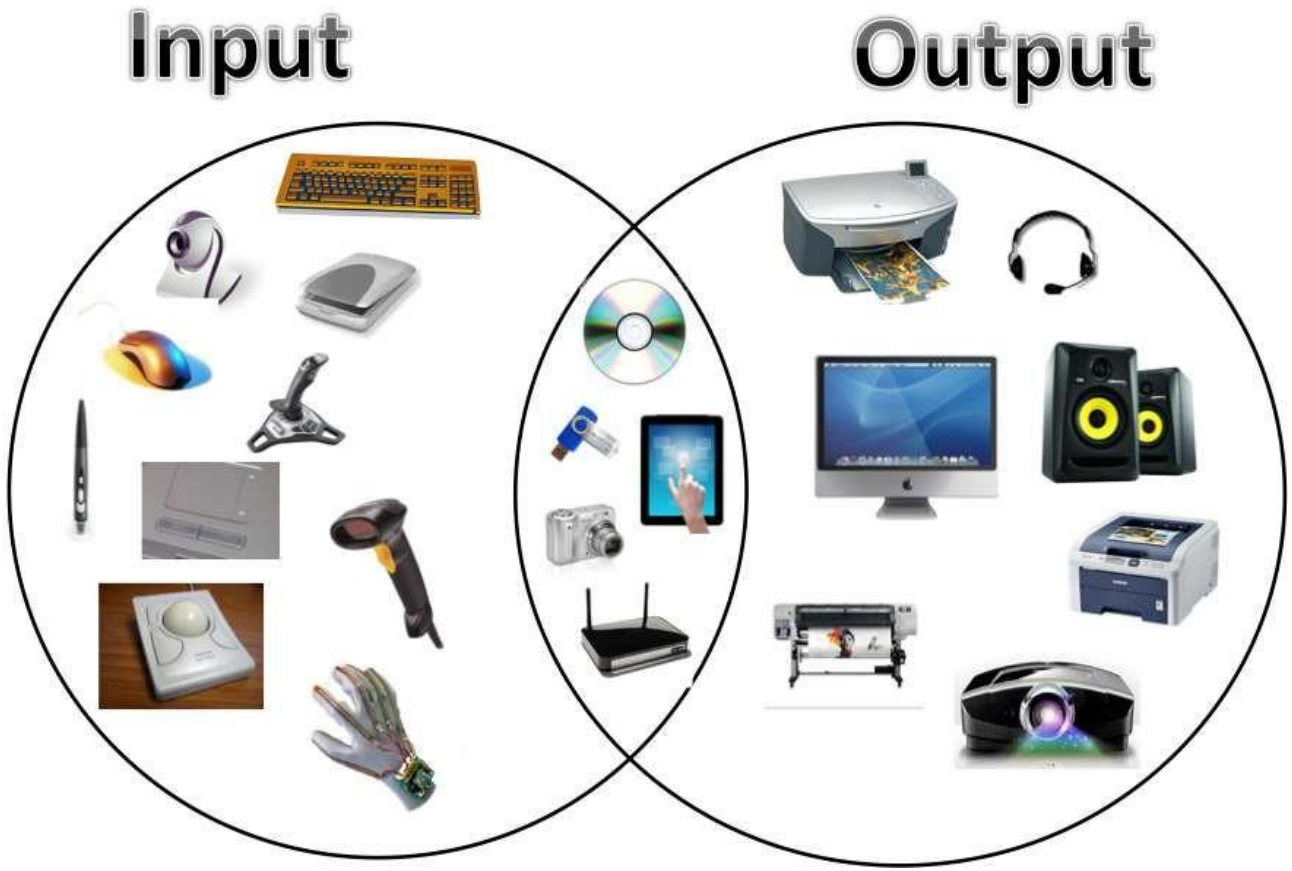
Input Devices: (Any Device transmit data into computer)

- **Keyboard**
- **Mouse**
- **Trackball**
- **Touchpad**
- **Touchscreen**
- **Light Pen**
- **Bar code reader**
- **Scanner**
- **Mic**



Output Devices: (Any Device transmit data out of computer)

- Screen
- Fax
- Printer
- Plotter
- Sound card & Speaker
- Data show



GOOD LUCK

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