Components of a Computer (Hardware)

Computer Maintenance and Protection

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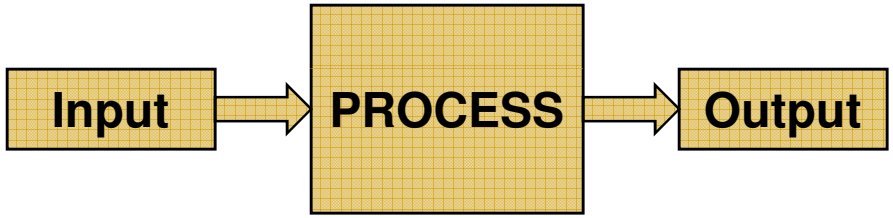
Introduction (Recap)

- A computer as an electronic machine that accepts input, process it (due to some instructions that are stored into its own memory) to give output, and optionally store the given output for future uses.



- Basically Components of a computer are *Hardware* and *Software*

Mathematically: *Hardware + Software = Computer*

Computer Hardware

- **Computer hardware** are all physical equipments of a computer. They can be physically seen, felt and touched.
- They consists of many electric, electronic, and mechanical components. All are tangible materials.
- Computer hardware are divided into five main categories;
    1. Input devices
    2. Output devices
    3. System Unit
    4. Communication devices and
    5. Storage devices.

1. Input Devices

- **Input devices** are hardware components that allows you to enter data or instructions into a computer.
- Input devices are necessary to convert our data or instructions in to a form which can be understood by the computer.
- A good input device should provide timely, accurate and useful data to the main memory of the computer for processing.
- Most useful input devices are: Keyboard, Mouse, Scanner and Microphone.

2. Output Devices

- **Output devices** are hardware components which are used to get information out of a computer.
- Output devices are necessary to convert information from a form which is understood by the computer to a form that we understand.
- There are various output devices used in our computers. Some of the most useful output devices are: Visual Display Unit (VDU) or the Monitor, Printer and Speaker.

3. The System Unit

- It is a box-like case which contains many electronic components that are used to process data.
- All peripheral devices (input and output devices) must be connected to it: Input devices will be taking data in to it for processing, whereas output devices will be taking processed data (information) from it.

The System Unit…

- The system unit is an indispensable category of computer components. It contains:
  - the ***Central Processing Unit (CPU)*** **or** ***Processor,*** and
  - the ***Memory Unit (MU),*** all mounted on the system unit's motherboard

The Processor

- The **Central Processing Unit (or the Processor)** is the brain of a computer.
- This is where all computer processing is done. It is called processor because it is the one concerned with data processing.
- The processor consists of two components;
  - the *Control Unit (CU)* and
  - the *Arithmetic Logic Unit (ALU).*

- These two components works together to perform processing operation.

Processor…

- The **Control Unit (CU)** is the component of the processor that directs and coordinates most of the operations in the computer.
- It acts like the supervisor seeing that things are done in proper fashion.
- The control unit determines the sequence in which computer programs and instructions are executed. Things like
  - processing of programs stored in the main memory,
  - interpretation of the instructions and
  - issuing of signals for other units of the computer to execute them.

Processor…

- The CU also acts as a switch board operator when several users access the computer simultaneously. Thereby it coordinates the activities of computer's peripheral equipment as they perform the input and output.
- Therefore it is the manager of all operations in a computer; Data input, process, storage and output.

Processor…

- After data being entered through the input device it is stored in the main memory. The actual processing of the data and instruction are performed by **Arithmetic Logical Unit (ALU).**
- The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison.
- Data is transferred to ALU from storage unit when required. After processing the output is returned back to storage unit for further processing or getting stored.

The Memory Unit

- When a CPU wants to process data, it needs to be instructed on how to do the processing.
- Instructions needed by the CPU are held into the *Memory Unit.*
- The memory unit has two components;

A. *Primary/Main Memory*: holds data and instructions that are needed immediately by the CPU.

B. *Secondary storage*: holds data and instructions permanently.

A: Main Memory

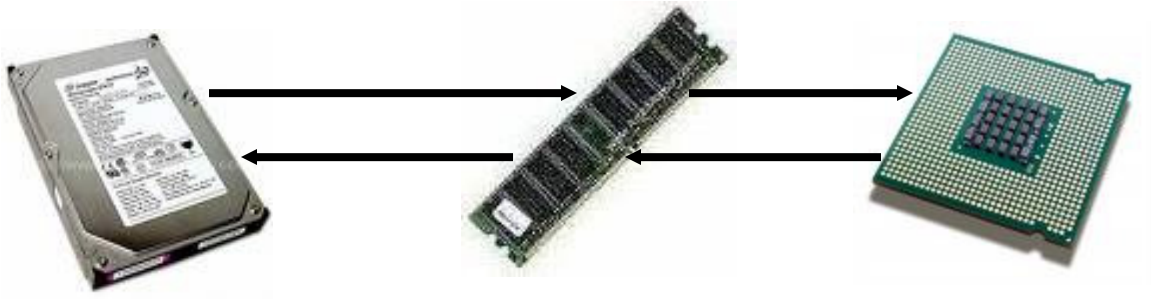
- Main Memory is characterized by high speed, fast access to information, low memory capacity and high costs.
- As program or the set of instructions is kept in primary memory, the computer is able to follow in-stantly the set of instructions.
- Two vital examples of Main memory are:
  - Random Access Memory (RAM) and
  - Read Only Memory (ROM).

RAM

- **RAM** is a memory chip which holds instructions and data temporarily.
- These data and instructions remains in the RAM as long as a computer is on, when a computer is switched off all contents in the RAM are lost.
- Because of this tendency, storage in a RAM is also referred as a *volatile storage*.
- RAM is also called read/write memory.
- Two main types of RAM are *Static RAM (or SRAM)* and *Dynamic RAM (or DRAM)*.

RAM…

- At any time a computer wants to execute any program such as audio, video, graphics, or text processing that program must be loaded to a RAM first where the processor will access it



Secondary Storage (Hard disk)

Main Memory (RAM)

Processor

ROM

- **ROM** refers to a memory chip storing data and instructions permanently.
- The data on most ROM chips cannot be modified thus the name *read-only*.
- Unlike RAM, ROM is *non-volatile.* Its contents are not lost when power is removed from the computer.
- Manufacturers of ROM chips often record data, instructions, or information on the chips when they manufacture the chip.
- Types of ROM are: PROM, EPROM, EEPROM.

ROM…

- **PROM**: *Programmable Read Only Memory (PROM)* allows the user to alter it only once after the content is written on it
- **EPROM**: *Erasable Programmable Read Only Memory (EPROM)* has a transparent quartz window through which its contents can be erased by exposing it to Ultra Violet (UV) light, and then reprogrammed for another use.
- **EEPROM**: *Electrically Erasable Programmed Read Only Memory (EEPROM)* can be erased and reprogrammed using electricity.

B: Secondary Storage

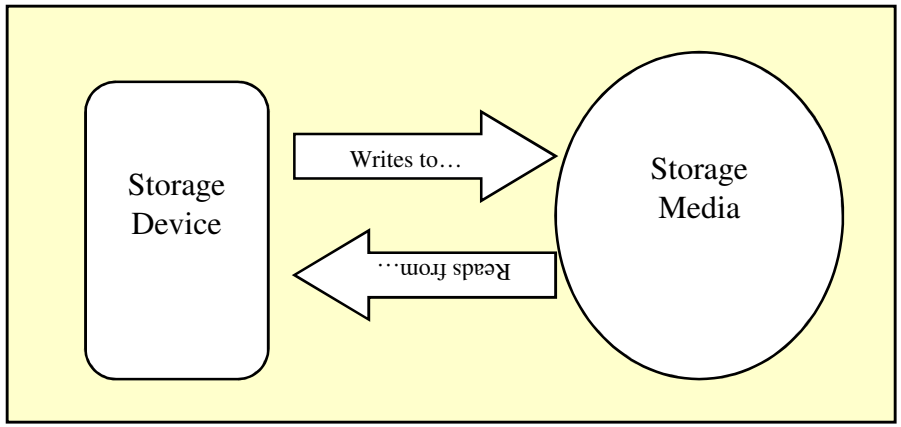
- Unlike Main memory whose operating speed should be as fast as possible to cope up with the CPU speed ***Secondary storage*** is characterized by slow speed hence slow access to information, huge memory capacity and low cost.
- Huge volume of data are stored in the secondary storage on permanent basis and transferred to the primary storage as and when required.
- Secondary storage can either be built inside the system unit such as the *hard disk,* or those which are outside the system unit such as external hard disc, Optical disks, Magnetic disks, Floppy disks or USB flash disks

4. Storage Devices

- This is the fourth category of computer hardware.
- Storage holds data, instructions, and information for future use.
- For example, a computer may hold particulars of customers such as *Customer Name*, *Customer ID, Item Purchased, Quantity Purchased* and *Date of Purchase*.
- Storage holds these items permanently.

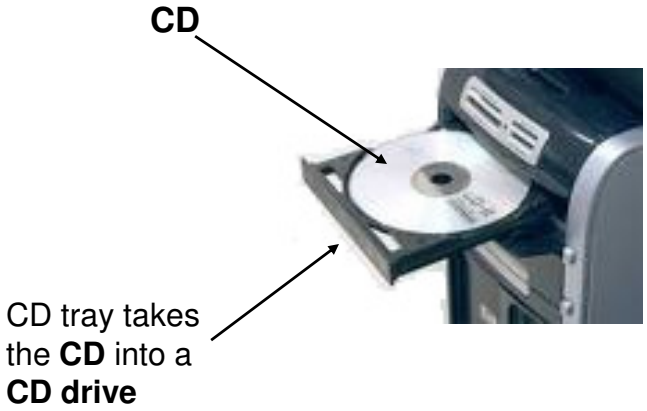
Storage Devices…

- A computer keeps data, instructions and information on *storage media*. Examples of storage media are floppy disks, USB flash disks, hard disks, CDs, DVDs, and memory cards.
- A *storage device* records (writes) and/or retrieves (reads) to and from the storage media.



Storage Devices…

- Example of a storage devices are drives and readers/writers. A CD drive (storage device) accepts a CD (storage media), a CD drive can read or write into a CD. A card reader/writer (storage device) accepts memory cards (storage media), it reads and/or writes into a memory card.



5. Communication Devices

- A communication device is a computer hardware component that enables a computer to send (transmit) and receive data, instruction to or from one or more computers.
- Communication occurs over physical communication media such as cables, telephone lines, and over wireless communication media such as radio waves, infrared, Bluetooth, satellite or other transmission media. People around the world communicate with each other using transmission media.
- Communication devices are there to make this happen.
- A famously known communication device is a modem.

Thank You!