PABLO

Computer

System

ComputerSystem

Computer system consists of two parts:

1. Computer Hardware
   - A generic name for the various devices that make up a computer system
2. Computer Software
   - Set of instructions that direct the computer hardware to perform a particular task

Hardware

- Any visible part of a computer which can be seen and touched is known as hardware.

- Hardware components are involved in the data processing cycle as an input, output or as both.
- On data processing cycle, there are hardware devices used to enter data which are known as input devices and other hardware devices used to display the information are known as output devices but there are also devices used as both input and output devices.
- Moreover others are involved in the processing cycle such as CPU, RAM, ROM.

Hardware Components

1. **Input Unit** – feeds data & instruction to the computer system

2. **Output Unit** – displays / prints the results of the processing

3. **CPU** – is the brain of the computer that caries out the processing of the data as per the instructions

4. **Memory** – stores data and programs within and/or outside the computer system
5. **Power supply** – used to convert AC into DC and provide appropriate power for each of internal components of a PC.

Input Devices

- **Input** is all information put into a computer.
- Input can be supplied from a variety of sources:
  - A person
  - A storage device on computer
  - Another computer – A peripheral device
  - Another piece of equipment, such as a musical instrument or thermometer

Input Devices…

- Input devices gather and translate data into a form the computer understands.
- Primary input devices:
  - **Keyboard** - Most common input device; used to type in commands and data.
  - **Mouse** or **trackball:** enhances user's ability to input commands, manipulate text, images.

Input Devices…

- **Scanners:** are peripheral input devices which allow users to import:
  - Text
  - Graphics
  - Images

- Specialized software aids in translating information into a format the computer can understand and manipulate.

Input Devices…

- **Digital Cameras:** are peripheral input devices that allow users to create pictures and/or movies in a digital format.

- Some require specialized software to import images into the computer.
- Some record digital images directly to a disk that can be read by the computer.

Some input devices

- Mouse
- Keyboard
- Scanner
- Touch pad

Output Devices…

- Light pen
- Joysticks

- Microphones
- Digital Cameras
- Touch Screen
- Bar Code Reader
- Trackball
- CD-ROM

Output Devices

- Used to display processed information to the user either in **softcopy** or **hardcopy**

Output Devices…

- **Soft copy** – output displayed on a computer screen. It is the primary output medium.
  - **E.g. Monitor, speaker, LCD projector**
- **Hard copy** – output produced on paper or micro film.
  - **E.g. Printers, plotters, …**

- **Monitors:** are the most commonly used output device.
- Most monitors use a **bitmap** display.

- Allows user to resize the display.
- Divides the screen into a matrix of tiny square "dots" called **pixels.**
- The more "dots" a screen can display, the higher the **resolution** of the monitor.

Output Devices…

- Monitors are connected to a computer system via a port integrated on the **video adapter** or **graphics card**.
- Graphics cards convert digital data output from software to analog data for display on monitors.

Printer

- Most widely used output devices to prepare printed paper documents

- There are **Impact** and **Non-impact printers** •

  Impact printers

  - Form characters by striking an inked ribbon with hammers against paper
    - E.g. **Dot matrix printers & ink printers**

Output Devices…

- **Non-impact printers:**

Output Devices…

- Form characters without physical contact between a printer and paper
  - E.g. Laser jet printers

Plotters

- capable of drawing complex shapes with multiple colors

Output Devices…

- VDU







- Flat screen monitors
- Printer
- Plotters
- Speakers
- Headphone
- Projectors

Central Processing Unit

- **CPU or microprocessor** is often described as the brain of a computer.

- CPU is an integrated circuit or “chip” which processes instructions and data.
- It is the place where data processing takes place
- The system's memory also plays a crucial role in processing data.
- Both the CPU and memory are attached to the system's motherboard, which connects all the computer's devices together, enabling them to communicate.

CPU Speed

- CPU speed is measured by the number of completed **instruction cycles** per second
  - –Currently, CPU speeds range from 600 megahertz (MHz or million cycles per second) to 4 gigahertz (GHz or billion cycles per second).

- Always check new software's requirements for CPU type and speed before purchasing.

Main parts of CPU

- Arithmetic and Logical Unit (ALU)
- The control unit

- Registers

The Control Unit

- Controls the entire operation of the computer.
- Directs the flow of data through the CPU, and to and from other devices.
- The control unit stores the CPU's microcode, which contains the instructions for all the tasks the CPU can perform.

The Arithmetic Logic Unit

- The actual manipulation of data takes place in the ALU.
- Performs the arithmetic operations and the logical comparisons
- Controls the speed of calculations;
  - Larger & powerful computers speed are measured in:

    Pico seconds

Nano seconds, etc.

Registers

- A special storage location within CPU which temporarily hold data and program instructions while they are being processed.
- Small amount of very fast memory built in CPU
- Registers are normally measured in the number of bits, 8, 32, 64. It means it can store 8, 32 and 64 bits of data respectively.
- Both the ALU and control units are connected to registers, such that to execute an instruction the control units

retrieves data from main memory and places it into a register and after processing the results are stored in register.

Bus

- Refers to an electronic highway through which information are transmitted between the various components
- A bus(transmission path) is a path between the components of a computer. Data and instructions travel along these paths.

- Different types of bus
- Data bus
- Address bus
- Control bus

Bus...

- The bus width determines how many bits can be transmitted between the CPU and other devices.

- A 64 bits wide bus carries 8 characters at a time
- The wider the data bus the more data it can carry at one time

Computer Memory

- Computer memory refers to devices that are used to store data or programs (sequence of instructions) on temporary or permanent basis.

- You can store data on your hard disk, that used to store data permanently, while data which is being processed is stored in RAM (Random Access Memory)

How computer memory is measured?

- Bit:1 or 0 level of storage
- Byte: A byte consists of eight bits.
- Kilobyte: A kilobyte (KB) consists of 1024 bytes.

- Megabyte: A megabyte (MB) consists of 1024 kilobytes, approximately 1,000,000 bytes.
- Gigabyte: A gigabyte (GB) consists of 1024 megabytes, approximately 1,000,000,000 bytes.
- Terabyte: A terabyte (TB) consists of approximately 1,000,000,000,000 bytes.

Types of Computer Memory

- Computer memory or storage devices are classified into two broad categories:

i. Primary memory / storage

   Internal storage

   RAM and ROM

ii. Secondary memory / storage

   External storage

   CD / DVD, Hard disk, floppy disk, magnetic tape

Primary Memory

Two types of primary memory:

- Main memory (RAM):

The main working area of the computer

The CPU can utilize only those instructions and data that are stored in main memory

- ROM:

  Stores small programs permanently

RAM

- Stands for **R**andom **A**ccess **M**emory • “Waiting room” for computer’s CPU.

- Working place of computer used to store data temporarily.
- Holds instructions for processing data, processed data, and raw data.
- The amount of RAM in a PC has a direct impact on the system's speed.

RAM…

- The more RAM a PC has, the more program instructions and data can be held in memory, which is faster than storage on disk.
- Ram is measured by:
  - –Capacity (in Megabytes or Gigabytes)
  - –Speed (in Nanoseconds)

RAM…

- All software applications will have RAM specifications listed on their packaging.
- Many applications list both a **minimum** and a **recommended** amount of RAM necessary to run the software.
- Be cautious about buying software for a system based on minimum requirement.

ROM

- Read Only Memory (ROM) as the name suggests is a special type of memory chip which holds software which can be read but not written to.
- A good example is the ROM-BIOS chip, which contains read-only software.
- Often network cards and video cards also contain ROM chips.

Comparison

RAM

- Volatile
- Working area of computer (stores data and program code needed by the CPU)

ROM

- Non-volatile
- Permanently stores programs
- Allows read only

- Allows both read and write

Secondary Storage Devices

- Storage devices designed to retain data and instruction in a more permanent form.
- Non-volatile storage media.
- **Capacity** and **speed** are important considerations when selecting a new storage device for a PC.
- Currently used ones:
  - hard disks,

- floppy disk,
- optical disk (CD)
- Versatile disk (DVD)
- Flash disk

Storage Technology

- **Magnetic storage devices** store data by magnetizing particles on a disk or tape.

- **Optical storage devices** store data as light and dark spots on the disk surface.

Magnetic storage devices

Hard Disks:

- Capacity is measured in gigabytes(GB)or Terabytes(TB).
- Typically permanently installed.
- Used to store operating system, application software, utilities and data.

Exercise:

What is Hard Disk Drive?

Magnetic storage devices..

Internal Hard Disks:

- Store all your files and folders permanently.
- **Speed:** Very fast. The speed of a hard disk is often quoted as “average access time” speed, measured in milliseconds. The smaller this number, the faster the disk is.
- **Capacity:** Enormous, Measured in Gigabytes Terabytes.

- **Cost:** cheapest way of storing data.

Magnetic storage devices…

External Hard Disks:

- Another type of hard disk is an external hard disk that is placed outside the computer.
- This is helpful for computers that have no space inside the cabinet for installing extra hard drive.
- A big advantage of this type of drive is that backup of data is easier.
- **Speed:** Normally slower than internal disks, but more expensive than internal disks.
- **Capacity:** Same as internal disks.

- **Cost:** More expensive than internal disks.

Magnetic storage devices…

Floppy Disks:

- Capacity is 1.44 to 2.0 megabytes (MB or millions of bytes).
  - –Storage device with the smallest capacity
  - –Most portable storage media

Exercise

What is Floppy Disk Drive?

Magnetic storage devices…

Magnetic Disk /Tape:

- Generally used for system backups, becoming less common.

Exercise:

What about Flash Disk?

Optical storage devices

CD-ROM Drives:

- Typically installed on all new computer systems.
- Used to read data from CD and write data to a CD by a laser. **CD:**

Used to store data and programs.

Capacity is 600 to 750 MB .

Most mass-produced commercial software is packaged on a CD.

Optical storage devices…

DVD drives:

- Used to read data from the DVD and write data to the DVD by laser.
- Can also read CDs, now more common as a standard device on new computer systems.

DVD:

Store large amount of data.

Capacity is 4.7GB.

Exercise

- **List and discuss the common types of CD?**
- **List and discuss the common types of DVD?**