

# Computer Laboratory

## Lecture 2

### Basic Concepts of Information Technology (Hardware)

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- **Hardware**

- The term hardware refers to the physical components of the computer such as the system unit, mouse, keyboard, monitor etc.

- **Software**

- The software is the instructions (programs) that makes the computer work.
- Software is held either on your computer's hard disk, CD, or DVD and is loaded from the disk into the computers RAM (Random Access Memory), as and when required.

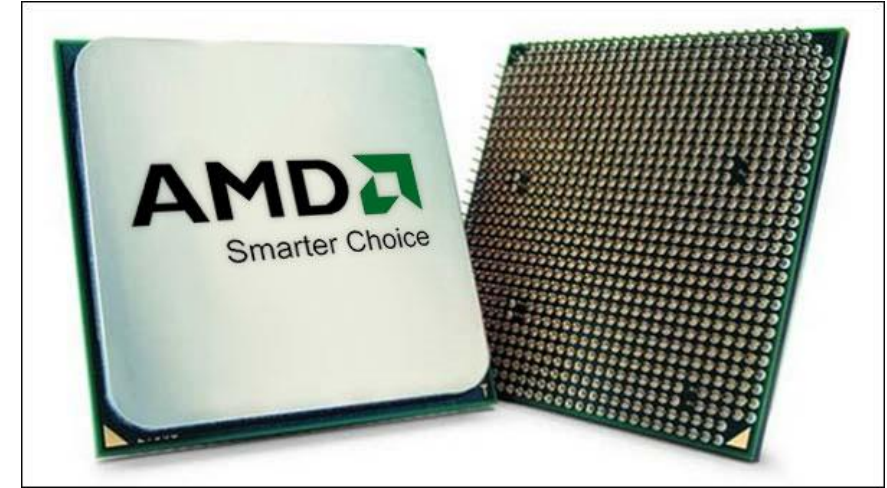


# Hardware

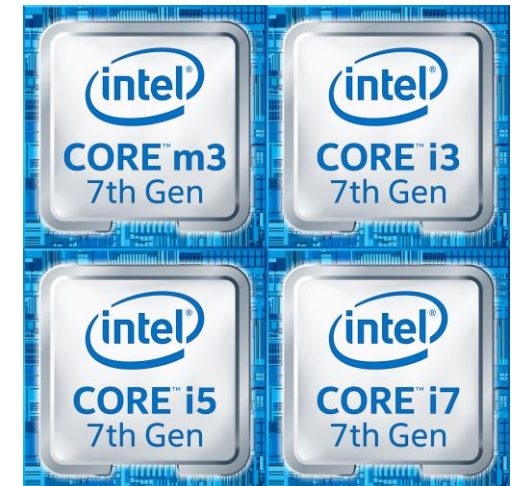
- Central Processing Unit (CPU)

# Central Processing Unit (CPU)

- CPU is the main part of the computer that performs all the work.
- CPU is also called brain of the computer.
- It performs processing, communication and all calculations of data within the computer.
- CPU is normally an **AMD** or **Intel**.
- It tells how fast your computer will run and its speed is measured in MHz or GHz.



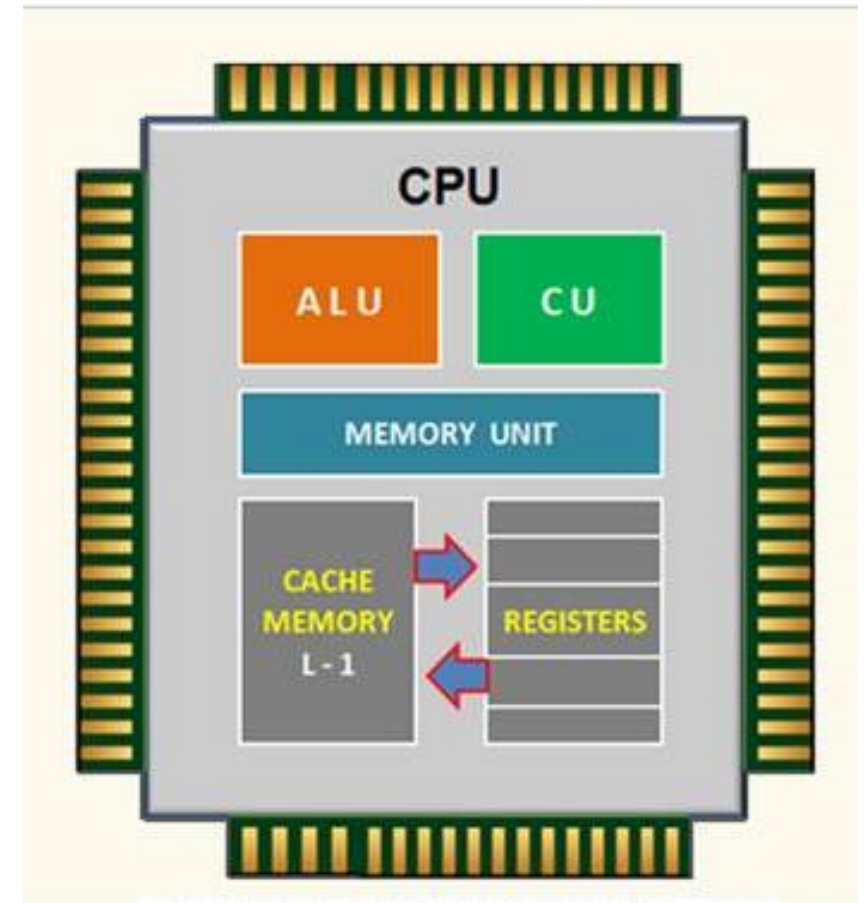
Ex: A 3.6 GHz intel Core i5 is much faster than a 1.2 GHz intel Core i5 CPU.



## Parts of the CPU

- **Control unit:** The control unit is responsible for loading and interpreting the individual instructions that include the computer program.
- **Arithmetic-logic unit:** The ALU is responsible for carrying out arithmetic operations such as addition and subtraction as well as logical decisions such as whether one number is bigger than another.
- **Registers:** These are small, high-speed storage locations within the CPU. They store data that the CPU is actively using or processing. Think of them as the CPU's short-term memory.
- **On-board cache memory:** Because the CPU can perform its operations much faster than data can be transferred from RAM, many CPUs have on-board cache memory.

## Central Processing Unit



## Parts of the CPU

- **Speed of the CPU:** The CPU operates as a result of electronic pulses sent to it by another device on the motherboard called the clock.
- The speed of a CPU is measured by the maximum number of pulses it can handle.
- This is measured in MHz (megahertz) or millions of pulses per second or GHz (gigahertz) thousands of millions of pulses per second.
- A good personal computer will use a CPU with a clock speed of over 2 GHz. This means it receives 2 000 000 000 million pulses every second from the CPU.
- However, it's essential to note that clock speed is just one factor influencing overall CPU performance.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer / Memory



## Storage in Computer

- It's where the computer keeps all the information it needs to operate, such as the operating system, programs, and your files.
- In Computer, we can save Data/Information in many forms and devices.
- All computers work on a binary numbering system, i.e. they process data
- in one's or zero's.
- This 1 or 0 level of storage is called a **Bit**.
- The smallest unit of computer Storage is Bit. It can store either 1 or 0.

Measurements of computer storage/memory are:	
8 Bits	1 Byte
1024 Bytes	1 Kilobyte (Kb)
1024 Kilobytes	1 Megabyte (MB)
1024 Megabytes	1 Gigabyte (GB)
1024 Gigabytes	1 Terabyte (TB)



## Storage Devices

Some storage devices are as follows:

- Hard disk
- Solid state drive
- Floppy disk
- Compact disk (CD)
- Digital Versatile Disk (DVD)
- Memory Stick/Flash Memory



## Hard Disk

Generally, Data and computer programs are stored in the hard disk.

There are two types of hard disk.

- Internal Hard Disk
- External Hard Disk



- Internal Hard Disks

- These are inside the system unit/Box.
- Their speed is very fast.
- They can store huge amount of data often in Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.
- Their costs are falling rapidly and normally these are the cheapest way of storing data.



## External Hard Disks

- These hard disks are outside the system box and we can connect them to computer using a USB port.
- These hard disk normally slower that internal hard disks
- These are more expensive than internal hard disks.
- Their performance is approximately same as internal hard disks.
- They can also store huge amount of data.



## Solid state drive

- is like a super-fast and durable electronic storage space for your computer.
- Instead of using spinning disks like a traditional hard drive, it uses memory chips to store information.
- it can find and retrieve information really fast, making your computer start up quickly and programs load in a snap and helps everything run smoothly.
- There are two types of SSD.
  - Internal
  - External



## Diskettes (Floppy Disks)

- Speed of Floppy disk is very slow.
- They can store small amount of data, normally 1.44 Mbytes.
- They are very cheap.
- They are not reliable.



## CD-ROM Disks

- CD-ROM is slower than hard disk but faster than floppy disk.
- They can store data around 650 Mbytes.
- CDs are also cheap as compared to hard disk.



## DVD Drives

- These are faster than CDs but slower than Hard disk.
- They can store data up to 17 Gbytes.
- They are a little bit expensive than CDs.





## Memory Sticks/Flash Memory / Memory Cards

- We can plug them directly into the computer using a USB port / specific ports and use them.
- They are small in size.
- They can store good amount of data.
- Digital cameras, phones, and other new devices have memory cards images/data.



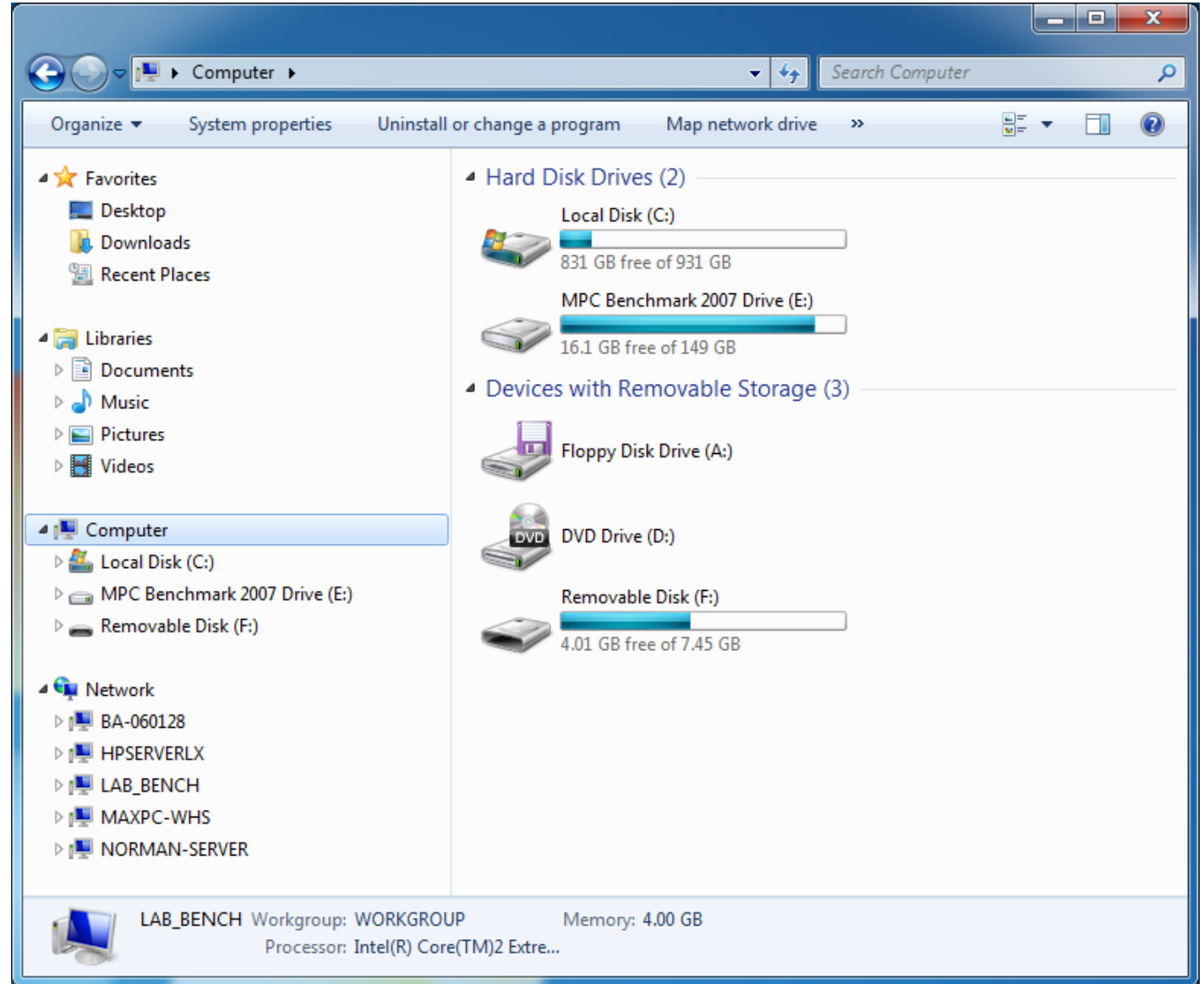
## Online file storage (Cloud Storage)

- Cloud storage is like having a virtual space on the internet where you can store your digital stuff.
- Instead of saving files, photos, or videos directly on your computer's hard drive, you can store them on servers maintained by a cloud storage provider.
- Many websites provide the facility to save data on the internet.
- We can access data using internet.
- Popular cloud storage services include Google Drive, Dropbox, Microsoft OneDrive, and many others.
- They provide different amounts of free storage and additional space that you can purchase based on your needs.
- Overall, cloud storage makes it convenient to store, access, and share your digital files.



# Storage Areas

- In Computer, storage areas are the places where we can store our data.
- Computer hard disk can be divided into many parts/sections.
- Each section is represented by an alphabet/character, e.g. (E:)
- We can also use Network drive which is available to all PCs in a network.



# Memory

In computer, all data and information to do a job/task is stored in memory.

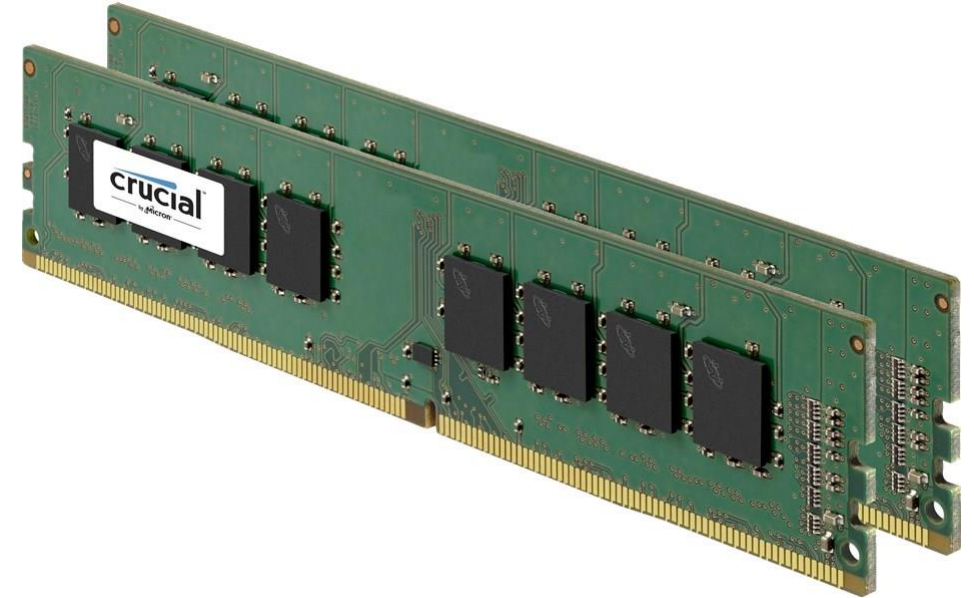
## Types of Memory

There are two types of computer memory.

- Random Access Memory (RAM)
- Read Only Memory (ROM)

# Random Access Memory (RAM)

- This is the main 'working' memory used by the computer.
- This is used to store data or program on temporary basis.
- When we use any data or program then it's loaded into RAM.
- When you first switch on the computer, the operating system is copied from disk into RAM.
- This is also called **Volatile Memory** because when we switch off the computer, all data is lost.
- Generally, a computer will operate faster if computer has more RAM.



## ROM – Read Only Memory

- It is a special type of memory chip that holds software or important information that a computer needs.
- Information in ROM can only be read but not written to.
- ROM retains information even after the powered is switched off. ROM is **non-volatile**.
- An example is the ROM-BIOS chip, which contains read-only software.
- Network cards and video cards also contain ROM chips.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer (Memory)
- Input Devices



# Input Devices

An Input Device is a device that is used to interact with and provide data to computer by typing, selecting, importing or downloading.

Some input devices are as follows:

- Keyboard
- Mouse
- Touchpad
- Trackballs
- Scanner
- Joysticks
- Graphic Tablet
- Digital cameras and Webcam
- Microphone



Keyboard



Graphic pad



Web cam



Mouse



Scanner



Joystick



Track Ball



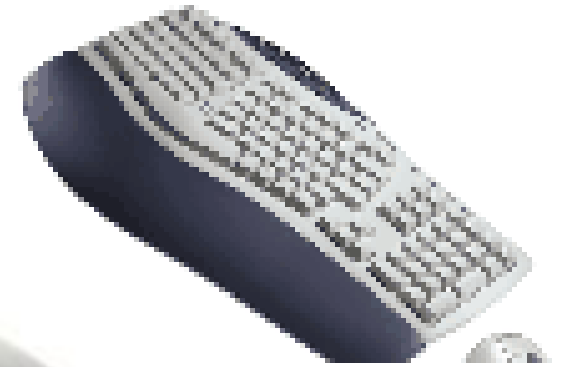
Digital Camera



Microphone

- **Keyboard**

- A set of keys that you press to input text and commands into the computer.



- **Mouse**

- A device that you move on a flat surface to control the movement of a cursor on a computer screen.



- **Touchpad**

- It senses the movement of the fingertip and moves the mouse pointer (cursor) on the computer screen.
- It is used in laptops.



- **Trackball**

- Its like mouse having a ball on the upper side.



- Joysticks

- It is used to play games more quickly and efficiently.



- Graphic Tablet

- It is touch sensitive pad. A Stylus (digital pen) is used for drawing or writing.



- Scanner

- Scanner is used to convert any printed material to digital form and to import into the computer.
- We can convert any printed text to a soft copy with a special computer software OCR.



- Webcam

- It is a small camera which is used to show live images over the internet.



- Digital Cameras

- These cameras can store images in digital form on a memory card and transfer to computer.



- Microphone

- Microphone is used to convert speech into text by using special software.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer (Memory)
- Input Devices
- Output Devices

# Output Devices

- Output devices are components of a computer system that present or display information processed by the computer.

## OUTPUT DEVICES

- Some Output devices are as follows:

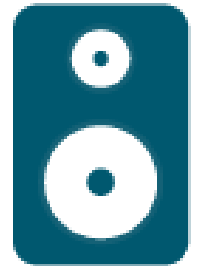
- Monitors and Projector
- Speakers and Headphones
- Speech Synthesiser
- Printers and plotter
- Touch screens and E-book Reader Screen



MONITOR



PRINTER



SPEAKER



HEADPHONES



PROJECTOR

# Output Devices

- **Monitors / Computer Screen/ VDU / Projector**

- This is the most common output device.
- Picture quality of monitor is called Resolution.
- Projector: Takes the computer's display output and projects it onto a larger screen or surface. It's often used in presentations.



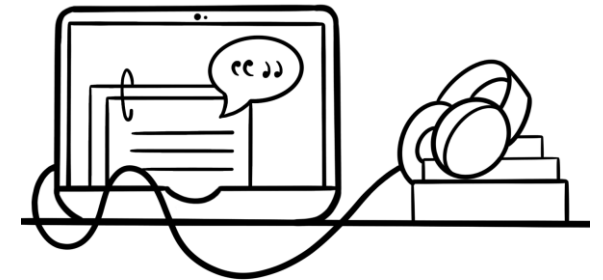
- **Speakers / Headphones**

- Speakers are used to take any audio output or result from the computer.
- Headphones: Similar to speakers but worn on the ears. They provide a more private way to listen to audio.



- **Speech Synthesiser**

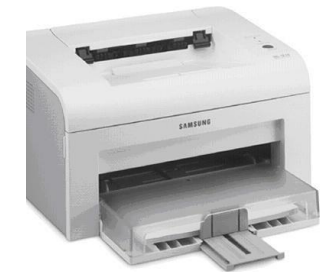
- These are special software used to translate any written text into an audio speech.





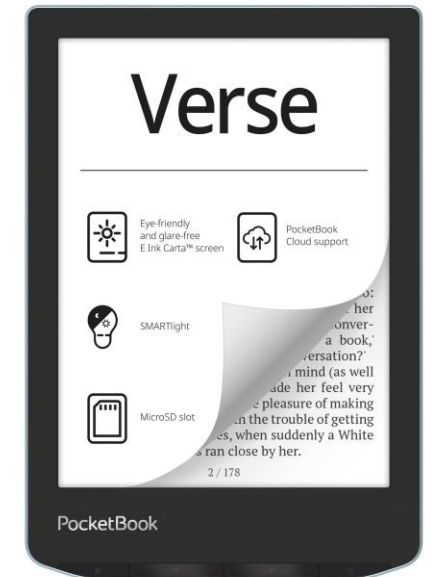
## • Printers / Plotter

- Printers are used to print paper copies of the text, pictures or any other data.
- We have Colour printers and Black & White Printers
- Dot matrix printers, Inkjet printers, Laser printers.
- Plotter: Outputs large-scale graphics or drawings. Plotters are used in engineering and design for creating detailed and precise



## Touch screens / E-book Reader Screen

- These are special monitors which are used not only to display information but also to take any input. These are used in smart phones and tablets.
- E-book Reader Screen: Devices use electronic ink (e-ink) displays to present digital books in a way that is easy on the eyes.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer (Memory)
- Input Devices
- Output Devices
- Input and Output Ports

## Input and Output Ports

A port is a place where we can connect any external device to computer.

Some types are as follows:

- **Serial Port**
  - This port connects devices like mice and keyboard and transfers data in a single stream.
- **Parallel Port**
  - This port connects devices like printers and transfers data in multiple streams.



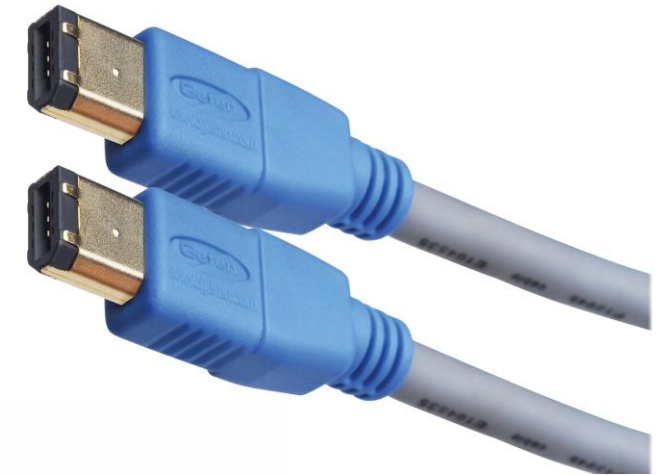
- USB Port

- This is most common port and widely used to connect many devices.
- This is without pin.



- FireWire Port

- It is used to connect digital cameras because it transfers data at a high speed.



- Network Port

- This port is used to connect the PC to other PCs in a network.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer (Memory)
- Input Devices
- Output Devices
- Input and Output Ports
- **Accessibility**

## Accessibility

Accessibility refers to how much easy a system is by **disable people**. There are many devices which are helpful for disable people.

- **Voice Recognition Software**
  - These software can translate speech/voice into text.
- **Screen Reader**
  - These software is helpful for blind people.
- **Screen Magnifier**
  - For low vision people, this software is used.
- **On-screen keyboard**
  - With this software, disable people can type data using a pointing device or joystick.



# Hardware

- Central Processing Unit (CPU)
- Storage in computer (Memory)
- Input Devices
- Output Devices
- Input and Output Ports
- Accessibility
- Factors that Impact on a Computer's Performance



# Factors that Impact on a Computer's Performance

We can know and judge the computer's performance by following factors:

- CPU speed
- RAM size
- Hard disk speed and capacity
- The number of applications running