



COMPUTER SKILLS

CHAPTER 1: HARDWARE



Basic concepts in information technology

Computers play significant roles in our life. They are used in banks, offices, warehouses, factories, schools, etc. The impact of computers increased dramatically when they were connected together through the internet. Information exchange become easy which lead to better productivity and less cost. However, new issues appeared such as legal restrictions and intellectual proprietary rights that require you to know your limits on the network and your use of licensed software.



Computer

A computer is an electronic device that processes data by following a set of instructions.

It has the ability to

- Receive input data
- Process data and convert it to information
- Provide the output data



Computer systems

1. **Hardware :**

The term Hardware refers to the physical components like the system unit , monitor , keyboard , mouse ,camera , printer , etc.

2. **Software :**

software is the intangible component of the computer that refers to the programs that provide instruction for the computer hardware.

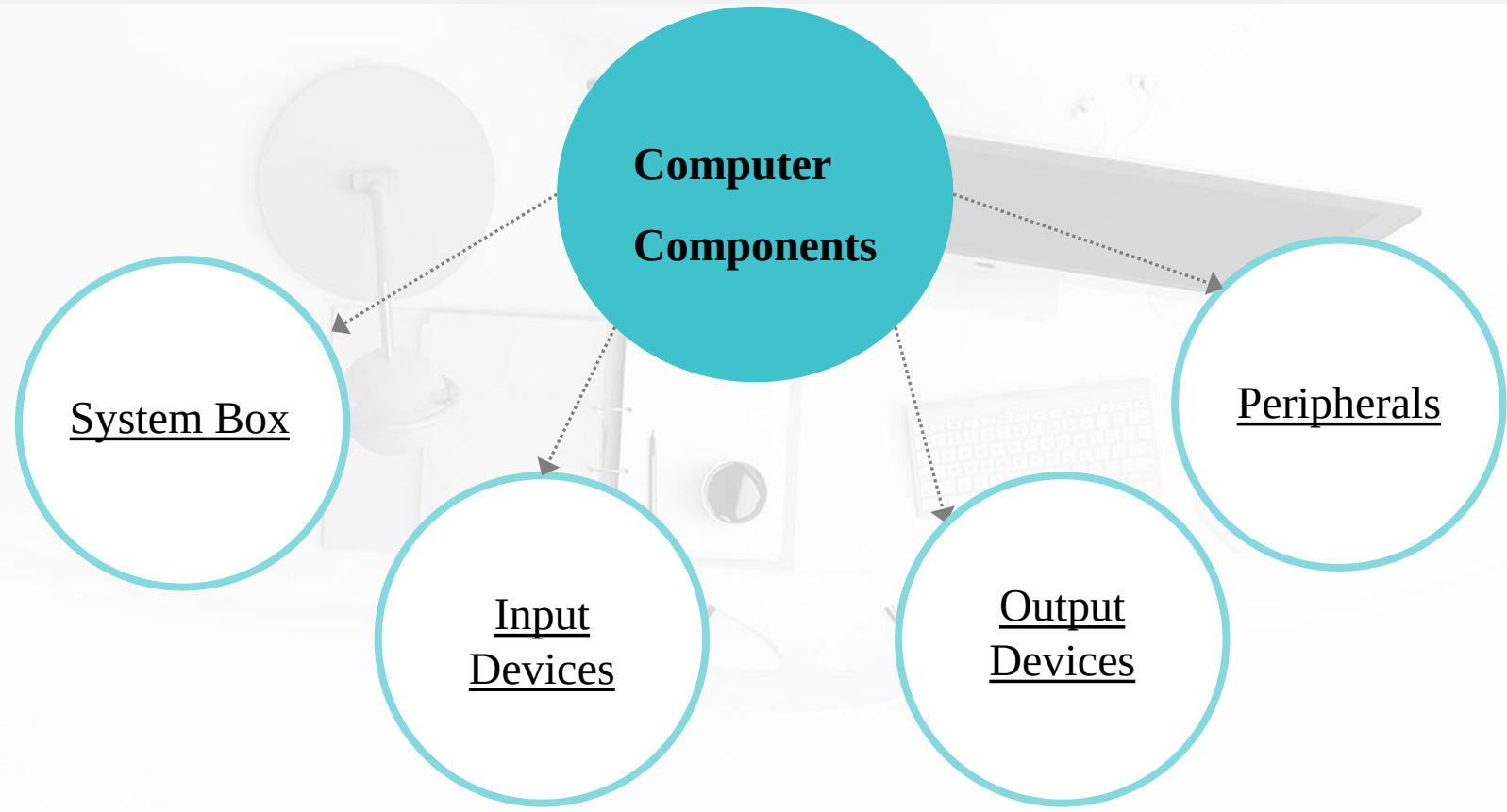
3. **Users :**

Hardware and software are useless without users. A computer user is a person who use computer software to perform specific tasks.



Information Technology

A set of tools that are used to: receive, process, store, retrieve, print and transmit information in an electronic form. These forms can be: text, sounds, picture or video



1- System Box

The box which contain the CPU, main memory, disk drives and power supply. The system box can stand vertically and called tower or horizontally and called desktop.



2- Input Devices

Are components which are used to feed commands and data into the computer. These include devices such as keyboards and mouse.



Keyboard



Mouse



Joystick



Trackball



Scanner



Webcam



Microphone

This image displays a variety of computer peripherals. At the top left is a webcam on a stand. To its right is another webcam on a flexible arm. Further right is a set of three speakers: a large central one and two smaller side ones. In the center is a desktop monitor showing a landscape, with a keyboard and mouse in front of it. To the left of the monitor is a large, light-colored inkjet printer. Below the monitor is a pair of black over-ear headphones. To the right of the headphones is a smaller, dark-colored printer with a photo of a green landscape emerging from its output tray. Each item is labeled with its name in a bold, black, sans-serif font.

Webcam

Webcam

Speakers

Monitor

Printer

Printer

Headphone



4- Peripherals

Devices such as printers, monitor, keyboard and mouse which are connected to the main unit by various types of cables and connectors are called peripheral devices.





Types of computers

1. Mainframe computer
2. Super-computer
3. Networked computer
4. Laptop computer
5. Palmtop computer
6. Personal computers



1. Mainframes

- Room-sized, Very powerful, used by large organizations such as banks to control the entire business operation.
Very expensive!
- They are connected to a large number of terminals that could be Dumb.



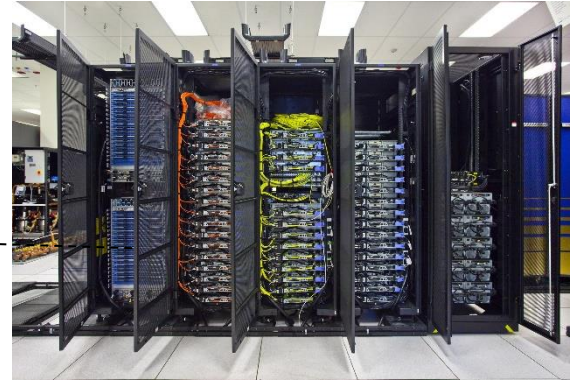
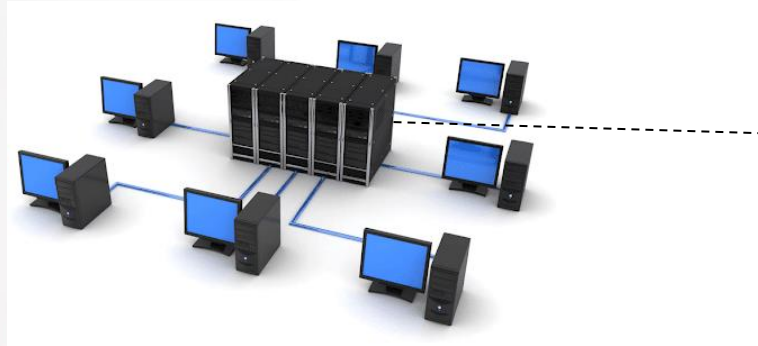
2. Super Computer

Are high capacity, expensive, are used for research and weather forecasting, oil exploration and aircraft design.



3. Network Computer

A large Pc-type computer called a Server is connected to smaller PCs called Clients or Terminals, therefore it is unable to work independently.



4. Laptop Computer

This kind of computers is small, briefcase-sized and portable. It has a small screen and a small keyboard. It can run on batteries as well as on the main power. It is as powerful as a PC but more expensive. The new term Notebooks refers to very small laptop that is specially used by salespersons.



5. Palmtop Computer

A Palmtop Computer: is a hand-held computer, which is called a Notepad. It performs some special functions and is considered to be cheap.



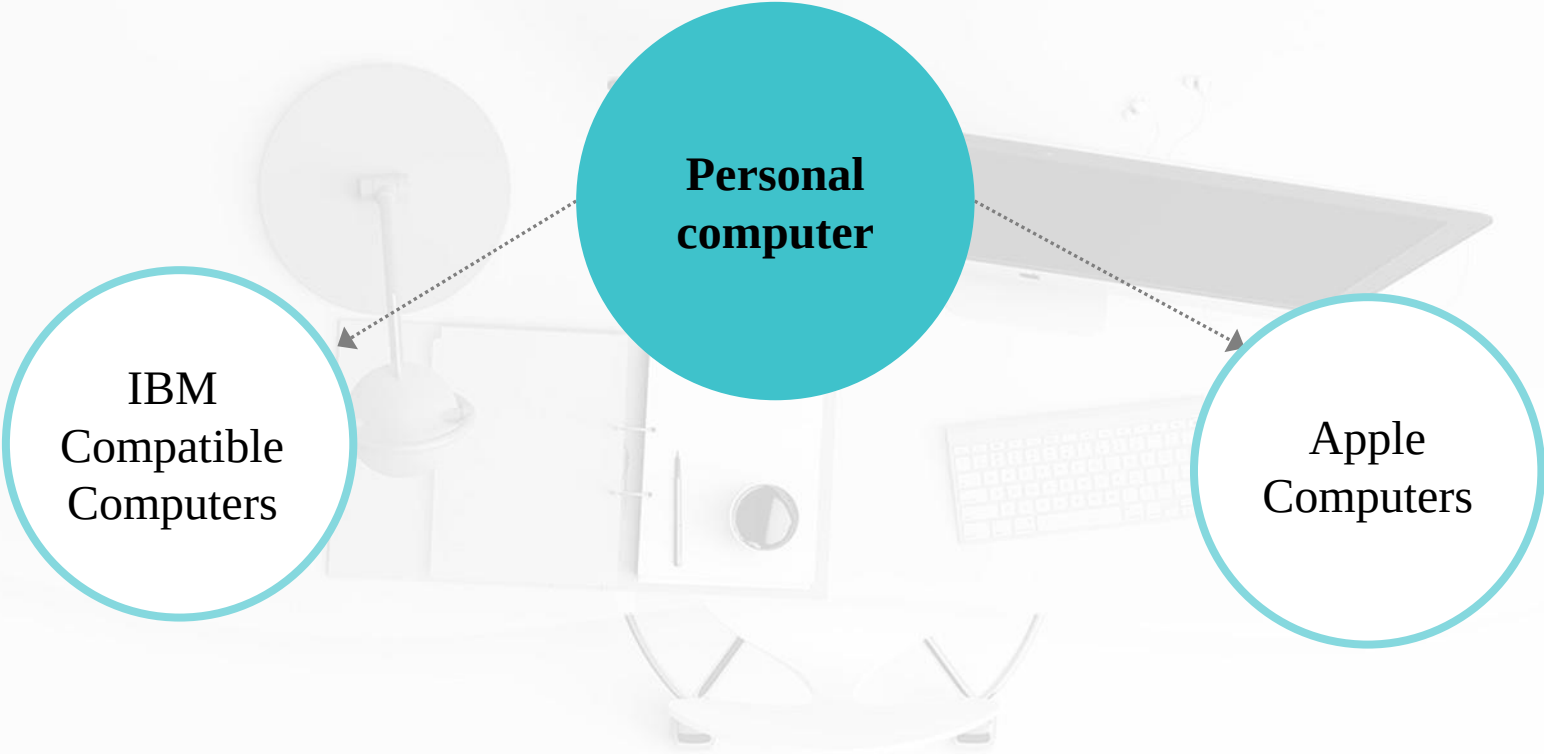
6. Personal Computers

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.

In 1981, IBM produced its first personal computer. That is small enough to fit on top of a desk offices and at home. It is still very popular because it is fast, cheap and has large capacity. There are two kinds of PCs:

- IBM Compatible Computers
- Apple Computers





**Personal
computer**

**IBM
Compatible
Computers**

**Apple
Computers**



IBM Compatible Computers

which can run the same programs as computers made by IBM. The term PC compatible relates to PCs manufactured by companies other than IBM that are compatible with the traditional specification. These computers run an operating system called Windows



Apple Computers

This kind of computers uses a different operating system and requires special versions of application programs. Moreover, the hardware add-ons have to be customized to some extent to be able to be connected to a Mac.



Hand-held Portable Digital Devices

- Digital Assistants Personal (PDA)
- Mobile Phone
- Smartphone
- Multimedia Player



Digital Assistants Personal (PDA)

Are small, controlled pen handheld computers. Instead of using the keyboard to type , you can use a special pen to write out commands screen on the computer. PDAs can be used to send, and receive faxes e-mails, write memos, play games and keep an appointment calendar.





Mobile Phone

Is an electronic telecommunication devices often referred to as a cellular phone or cellphone. Mobile phones connect to wireless communication network through radio waves or satellite transmissions. Most mobile phones provide voice communications; Short Message Service (SMS), Multimedia Message Service (MMS), and newer phones may also provide Internet services such as Web browsing and e-mail checking.

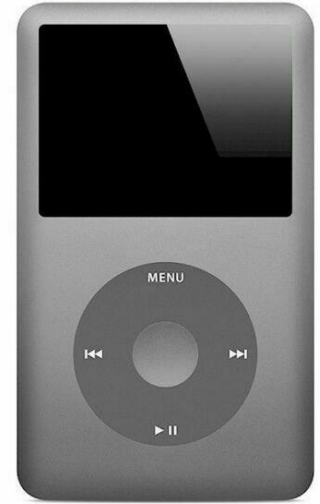


Smartphone

Is a mobile phone with a PC-like functionality. It runs complete operating system software providing a standardized interface for application developers. It has advanced features like e-mail checking Internet surfing, a built - in camera and the ability to play music and read documents . Some smartphones have keyboards built into them, while others have touch screen.

Multimedia Player

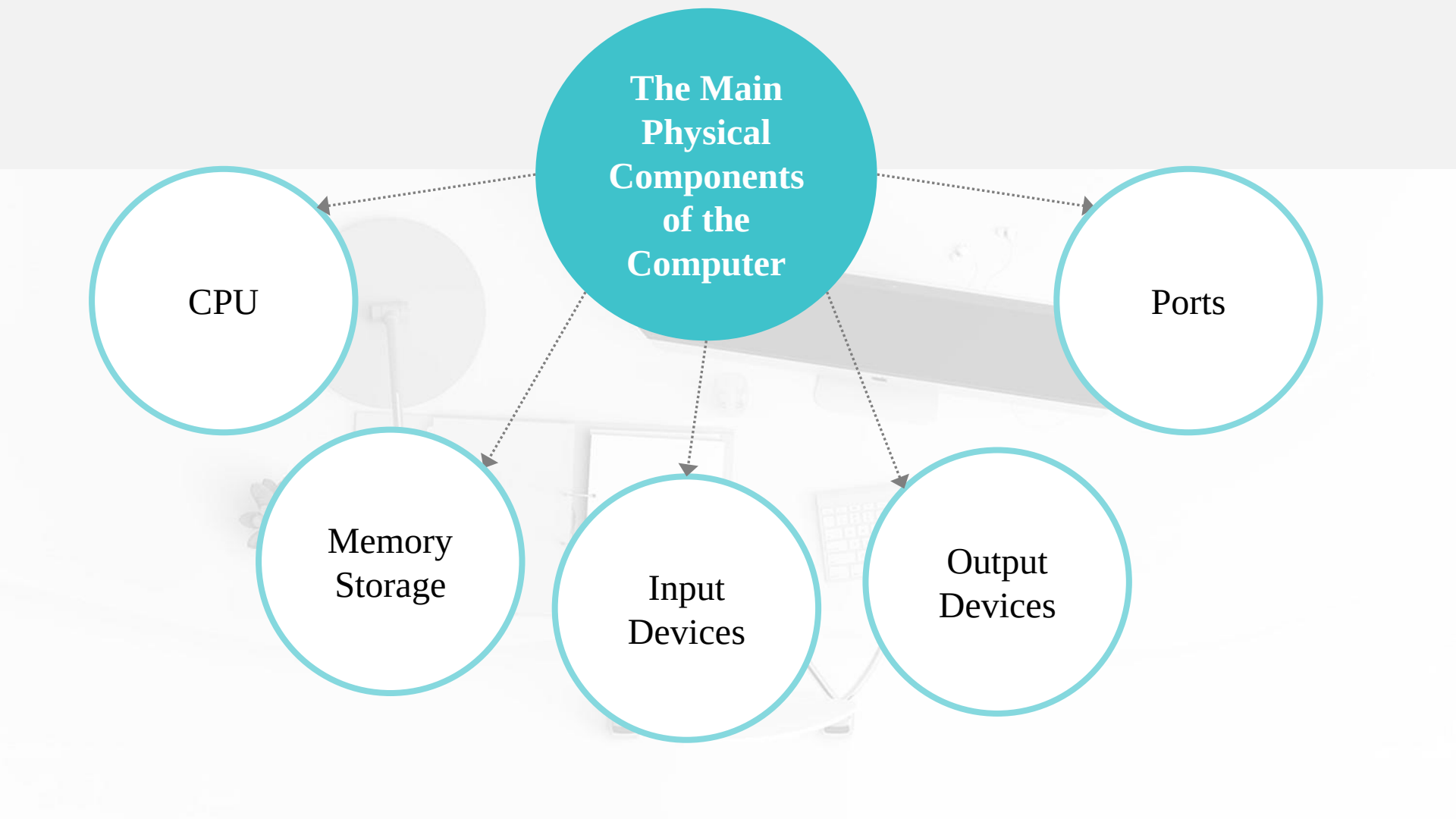
allows you to store digital music and video. A famous example on a multimedia player is the iPod from Apple. iPods can now be purchased with up to 60 GBs of hard drive capacity and color screens capable of playing television shows videos or movies uploaded from PC.





The Main Physical Components of the Computer

1. Center Processing Unit (CPU)
 - a. Control Unit (CU)
 - b. Arithmetic Logic Unit (ALU)
 - c. Registers (Cache Memory)
 - d. Buses
2. Memory Storage
 - a. Primary
 - b. Secondary
3. Input Devices
4. Output Devices
5. Ports

A diagram showing the main physical components of a computer. At the top center is a teal circle containing the text 'The Main Physical Components of the Computer'. Five dotted arrows point from this central circle to five surrounding white circles with teal borders. The circles are labeled 'CPU', 'Memory Storage', 'Input Devices', 'Output Devices', and 'Ports'. The background is a light gray with a faint image of a computer monitor and keyboard.

The Main Physical Components of the Computer

CPU

Ports

Memory
Storage

Input
Devices

Output
Devices



1- Center Processing Unit (CPU), or Processor:

which is the most important Part in PC. It performs all calculations speed unit and determines how fast your computer will run. The CPU is measured by Megahertz (MHz) or Gigahertz (GHz). Common manufactures of processors are Intel, AMD, and IBM. The most commonly used CPU in PCs is made by Intel. The CPU contains the following elements:

- 1) Control Unit (CU)
- 2) Arithmetic Logic Unit (ALU)
- 3) Registers
- 4) Buses



- 1) Control Unit, which is responsible for controlling the sequencing and timing of the other elements making up the CPU.
- 2) Arithmetic Logic Unit (ALU), which performs arithmetic logical operations and controls and the speed of those operations.
- 3) Registers, where the data used by the ALU and the program instruction which are used by the Control Unit, are stored.
- 4) Buses are a collection of wires through which data is transmitted from one part of computer to another.



2- Memory Storage

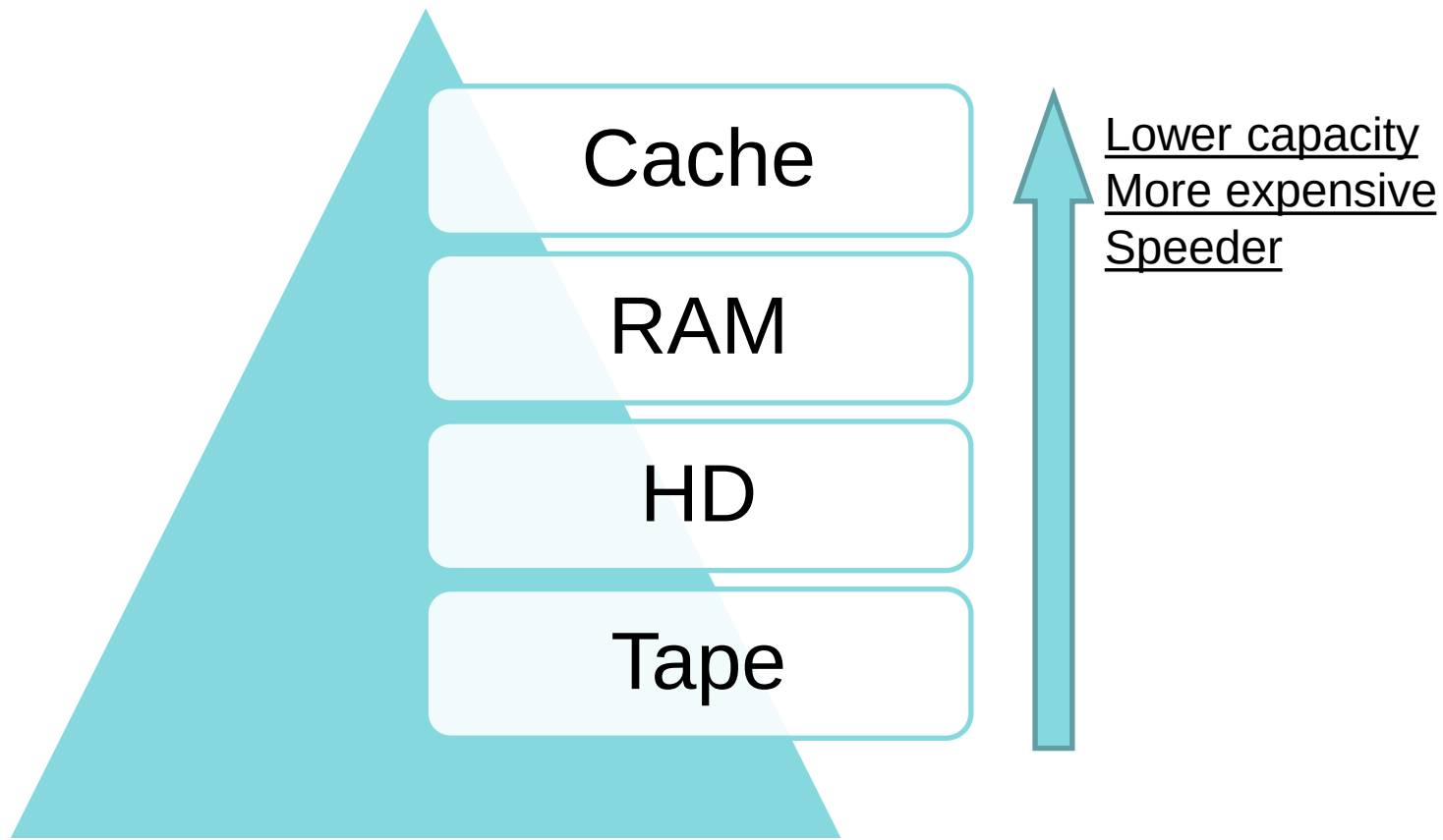
The term memory refers to the computer's Primary and Secondary storage.

Primary Storage:

- 1) Cache Memory
- 2) Random Access Memory (RAM)
- 3) Read Only Memory (ROM)

Secondary Storage:

- 1) Hard Disks (HD)
 - a) Internal Hard Disks
 - b) External Hard Disks
- 2) CD-ROM
- 3) CD-R
- 4) CD-RW
- 5) DVD
- 6) Tape Storage
- 7) Network Drive
- 8) Online File Storage





Primary Storage

- 1) **Cache Memory**: It is linked to the CPU; has very fast chips and keeps frequently used programs and data . Therefore it helps to increase the speed of the computer. It reduces the gap speed between the RAM and the CPU
- 2) **Random Access Memory** (RAM): which is the main memory in a computer. It where data and programs are stored (temporarily), until they are no longer needed . RAM is volatile, which means that the data is only there while the computer is turned on (when the computer is shut off, the content of RAM is erased). RAM is manufactured on microchips or chips that are assembled on small cards that can be inserted into slots inside the system unit. You can upgrade your computer, purchase extra memory and insert them in the appropriate slots.
- 3) **Read Only Memory** (ROM): It is another part of the main memory but with a very small capacity. It keeps software for reading only such instructions that make the computer work when turning it on. It is not volatile. The computer cannot write on it.



Secondary Storage

- 1) **Hard Disks** (HD): Is used to store data and software permanently.
 - a) Internal Hard Disks: are located within the system unit. They are the most important storage media in the computer system. They are thin but rigid metal platters which are covered with a substance that allows data to be held in the form of magnetized spots. Hard Disks are used to store programs and large data files. They are very fast, and their capacity is measured by Gigabyte (GB). They hold between 20 to 1024 gigabytes of data. Hard disks are tightly sealed within enclosed unit to prevent any foreign matter from getting inside.
 - b) External Hard Disks: are disks connected to a USB port on the system unit. They are ideal for backup data and are slower but more expensive than internal disks. They have the same capacity as the internal disks.



Secondary Storage

- 2) **CD-ROM** (Compact Disk Read Only Memory): It uses laser to read information.
- 3) **CD-R** (CD-Recordable): Can be written to Once. After that can be read many times but cannot be written to nor can user erase its contents.
- 4) **CD-RW** (CD-Rewritable): Are very similar to CD-R, except that you can change, erase, and add more data.
- 5) **DVD** (Digital Versatile Disk): is a high capacity development of CD-ROM.
- 6) **Tape Storage**: Is a magnetic tape that used as a recording media to store data. It used mainly for backup and archiving data for long term storage.
- 7) **Network Drive**: A connection to the hard drive of a remote computer, that allows you to access shared files and programs.
- 8) **Online File Storage**: Is an internet hosting services designed to host large files.



Representing Data in the computer

The decimal system that we are accustomed to has 10 digits (0-9).
The binary system has only two digits (0,1). Thus, in computers, 0 can be represented by the electronic circuit being off and 1 by the circuit being on. All data and programs in computer are represented in terms of these binary numbers.

Computers use a **Transistor** which is a tiny electrically operated switch that can alternate between on and off millions of times per second. In the field of Electronics, if you want to transfer data from one place to another, a data must be converted into a series of electronic impulses and received data can be manipulated at the other end in the form of electronic signals and then converted to data once again, and so on and so forth. For comparison between decimal and binary numbers, see the following table.



Binary system	Decimal system
0	0
1	1
10	2
11	3
100	4
101	5
110	6
111	7
1000	8
1001	9
1010	10



Memory Capacity Measurment

Memory is one of the most important parts of the computer. If the memory has enough space, the computer will be fast. The following terms are used to denote capacity: Each 0 or 1 is called a **bit**, which is short for binary digits. A group of eight bits is called a **byte**.

Data transmission rates are often given in **bits per second (bps)**.

Memory is typically measured in megabytes (million bytes). Bytes are commonly used to measure data storage. See the following table.



bit

1,0

Byte

8 bits

Kilobyte

2^{10} byte

Megabyte

2^{20} byte

Gigabyte

2^{30} byte

Terabyte

2^{40} byte

Input Devices

Keyboard

Contains the standard typewriter keys plus a number of specialized keys.

Mouse

Is a small hand-held device, which has the shape of a mouse. receiver.

Trackball

Is a mouse turned upside down. I saves the space, which is taken up by the mouse.

Touch Pad

Is a touch-sensitive device. It used in laptops and some keyboards.

Scanners

Convert pages contents into electronic signals that can be stored in a computer.

Joystick

Is a small hand-lever that can be moved in any direction to control the movement on the screen.

Microphone

Is used to record sounds on the computer.

Digital Camera

Is like the ordinary camera, but it uses flash memory to save images.

Output Devices

Monitor

It displays the results of processing. Its size is always measured by inches diagonally, from corner to corner.

Projector

Connect to computers to display outputs on large boards.

Speakers

Are used in Multimedia to produce sounds.

Speech Synthesizer

Is software produces sound that resembles human speech.

Printer

It presents the processed information on paper. Hard copy refers to the printed output. There are different types of it.

Laser Printer

It uses laser light beam and ink-like toner. It produces high print quality at high speed, and are very quiet.

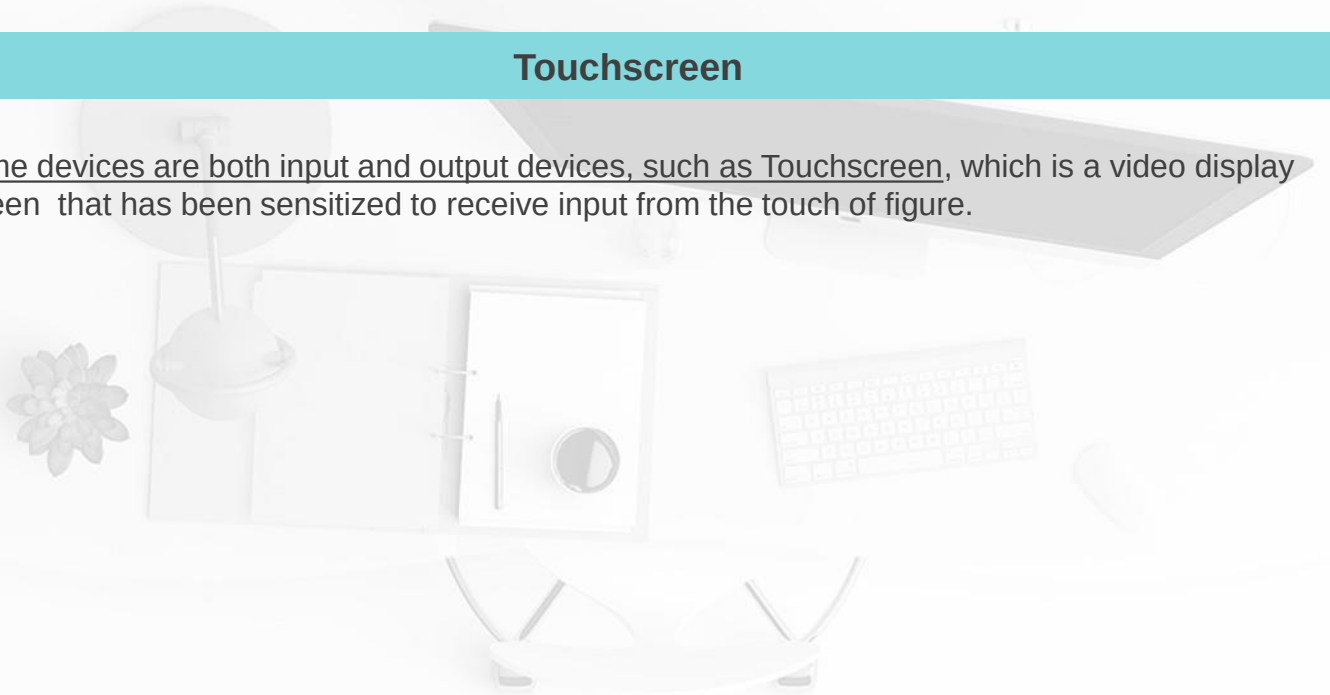
Inkjet Printer

It sprays small droplets of ink at high speed onto paper. It is quiet but slower than the laser printer.

Input and Output Devices

Touchscreen

Some devices are both input and output devices, such as Touchscreen, which is a video display screen that has been sensitized to receive input from the touch of figure.



Input /Output Ports

A Port is a socket on the outside that is of the system unit connected to an expansion board, in the inside of the system unit. There are three types of ports, as explained below:

USB Port

A USB Port allows you to plug in devices designed for USB like printer, digital cameras and scanners.

Serial Port

Enables you to connect items to the computer such as a modem. They are commonly labeled as COM1 or COM2.

Parallel Port

uses a 25-pin connector and is used to connect printers. It is faster than serial ports because it sends and receives 8 bits of data, parallel ports are commonly labeled as LPT1, LPT2.

Network Port

The Network Port serves as the interface between computer and the network. It comes in different physical shapes.

FireWire

The FireWire is commonly used to connect digital data cameras and scanners. It has a data transfer rate of 400 megabits per second (Mbps).



Computer Performance Factors

The Computer's Performance Factors means the factors that affect the speed of the CPU processing. There are many factors that can the performance of a computer.

1. **Clock Speed**: The processing speed of processor is a represented by its clock speed which is related to the number of times the CPU can process data or instructions in a second. The faster the clock speed is , the more efficient the computer will be. The clock speed is measured by Megahertz (MHz).
2. **Random Access Memory** (RAM): The more memory you have the faster the computer will appear to operate.
3. **The Hard disk speed** is the access speed at which the content can be read and written on a hard disk. The hard disk capacity is measured in Gigabytes, 1 Gigabyte is equal to 1024 Megabytes.



Computer Performance Factors

4. **Free hard disk space:** If there is no space, Windows will not be able to load your programs. Windows needs to create temporary files to move data between RAM and Hard disk.
5. **Defragmenting Files:** As time passes by , the files break up to small parts all over the hard disk . Defragmenting means taking all the broken pieces and joining them back together again.
6. **The CPU Speed** determines how fast your computer will run. The higher the value of the CPU speed the faster the CPU will operate. The CPU speed is measured by Megahertz (MHz) Gigahertz (GHz)
7. **The Number of Running Applications:** The performance of the computer will decrease if you run many applications at the same time.



Thank you