Mustansiriyah University
College of Science
Department of Computer Science

Computer Skills



Computer System Component and How Computer Communicate

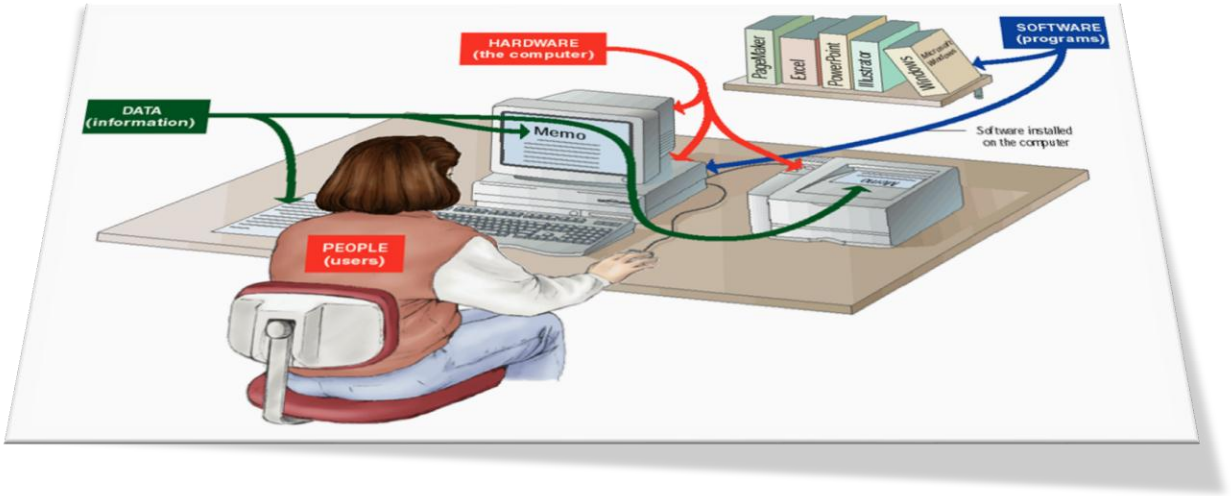
Computer

A computer is an electronic device that processes data, converting it into information that is useful to people.

Any computer regardless of its type is controlled by programmed instructions, which give the machine a purpose and tell it what to do.

A complete computer system consists of four parts:

1. **Hardware**
2. **Software**
3. **Users**
4. **Data**

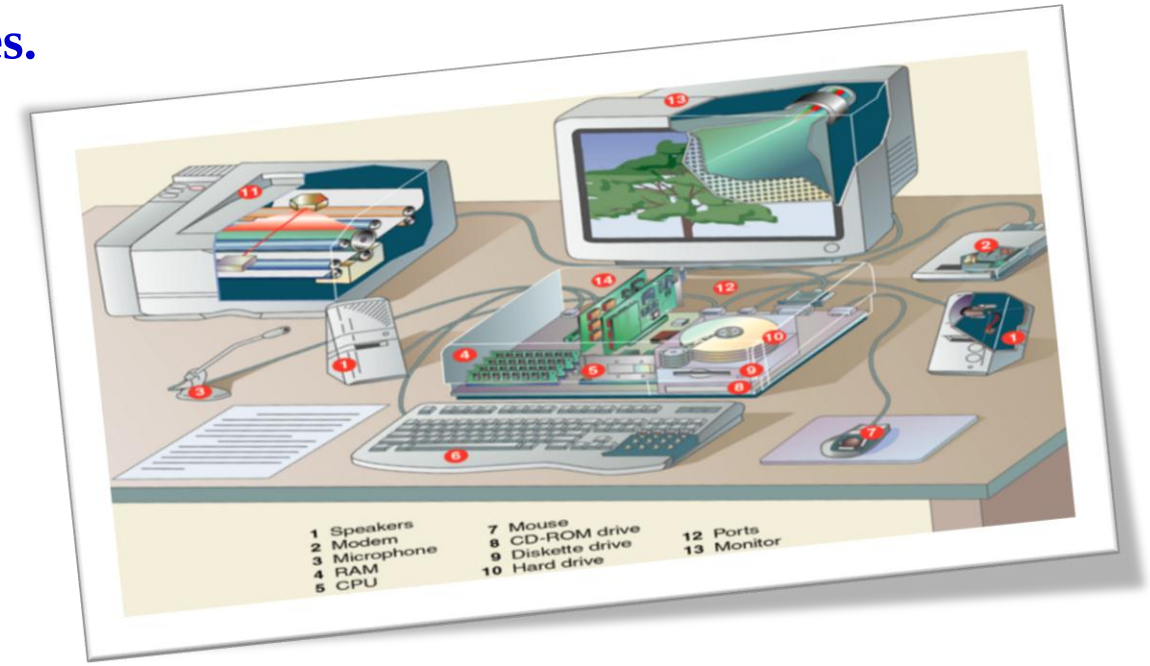


Hardware

The physical devices that make up the computer are called hardware (Hardware is any part of the computer you can touch).

- **A computer's hardware comprises interconnected electronic devices that you can use to control the computer's operation, input, and output.**

- **The hardware has many parts, but the critical components fall into one of four categories:**
  1. **Input and output devices.**
  2. **Memory.**
  3. **Processor.**
  4. **Secondary Storage.**



Input and output devices

A computer would be useless if you could not interact with it because the machine could not receive instructions or deliver the results of its work.

1- Input devices:

Accept data and instructions from the user or from another computer system.



- **The most common input device is the keyboard, which accepts letters, numbers, and commands from the user.**



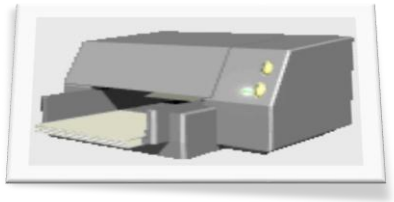
- **Another important type of input device is the mouse, which lets you select options from on-screen menus.**

2- Output devices:

Return processed data to the user or to another computer system.



- **The most common output devices are the monitor and the printer.**
- **The computer sends output to the monitor when the user needs only to see the output.**



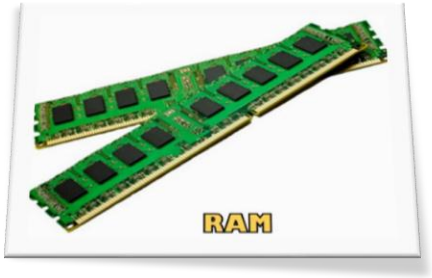
- **It sends output to the printer when the user requests a paper copy also called a hard copy of a document.**

Memory

RAM:

Random-access memory, often abbreviated as RAM, is a hardware element of a computer where programs, operating systems, and data that are currently being used are stored so that the processor can retrieve it quickly.

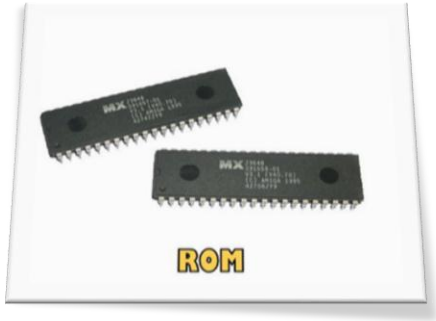
- **Think of RAM as a memory bank for the computer. The amount of multi-tasking you can do and the games you can play on the computer or phone depend heavily on the amount of RAM available**



ROM:

ROM, on the other hand, is a type of memory where data has been pre-recorded. It contains the programming that helps a computer or smartphone 'boot up'.

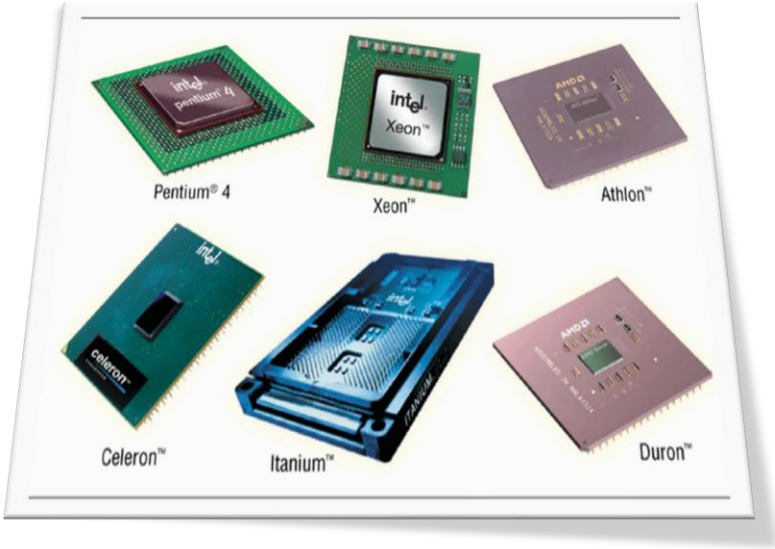
- **Commonly referred to as Read Only Memory, ROM retains its contents even after the computer is turned off; that's why a computer can be switched on in the first place**



Processor

The processor is like the brain of the computer.

- **In a personal computer, the processor usually consists of one or more microprocessors, which are slivers of silicon or other material etched with many tiny electronic circuits.**



CPU consists of: It organizes and carries out instructions that come from either the user or the software.

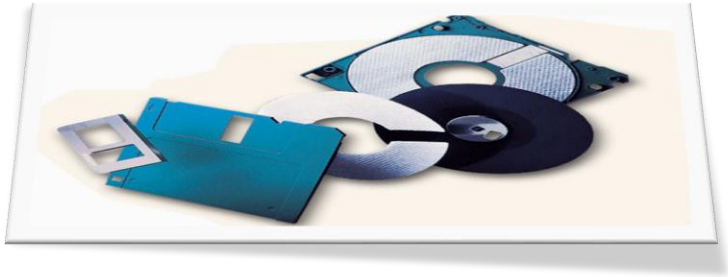
1. **Arithmetic and Logic Unit.**
2. **Control Unite.**

Secondary Storage

A computer can function with only processing, memory, input and output devices.

- **To be really useful, however, a computer also needs a place to keep program files and related data when they are not in use.**
- **The purpose of storage is to hold data permanently.**

- **There are many types of storage devices, including tape drives, optical drives, and removable hard drive.**
- **However, the most common storage medium is the magnetic disk.**



There are three major distinctions between storage and memory:

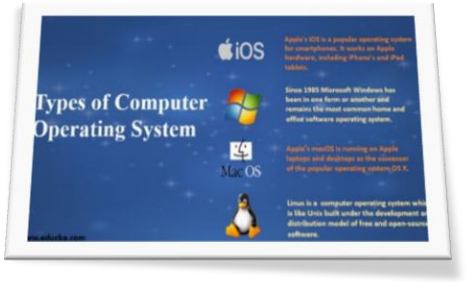
1. **There is more room in storage than in memory.**
2. **Contents are retained in storage when the computer is turned off.**
3. **Storage is very slow compared to memory.**

Software

The software refers to a set of computer programs that are required to enable the hardware to work and perform these operations effectively.

A computer program is a set of logical instructions written in a programming language that tells the computer how to accomplish a task. The software is, therefore, an essential interface between the hardware and the user.

- **We can say that software gives life to the hardware, and therefore, the software is popularly referred to as the "soul" of the computer system, while the hardware is the "heart."**



- **Computer software performs two distinctive tasks .**

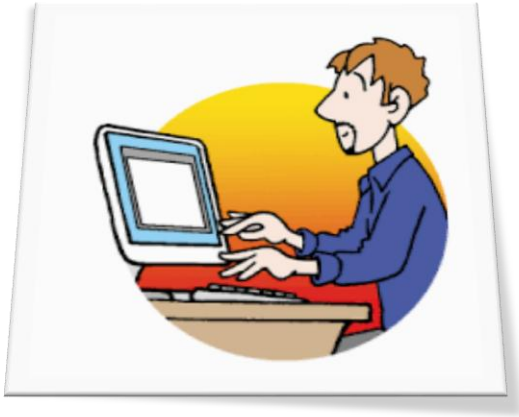
1. **The first task is to control and coordinate the hardware components and manage their performances; the software used to achieve these tasks is known as the system software.**
2. **The second one is to enable the users to accomplish their required tasks; the software used to achieve these tasks is the application software .**



Users

Computer systems are designed by the people, for the people. People, therefore, include those who design and build hardware and software (known as systems people) and those who actually use computer systems for their applications (known as users).

Systems people include hardware engineers, software engineers, programmers, etc. Users might include people working in different areas of applications, such as education, business, entertainment, training, etc. Users may use or develop the standard software depending on their requirements.



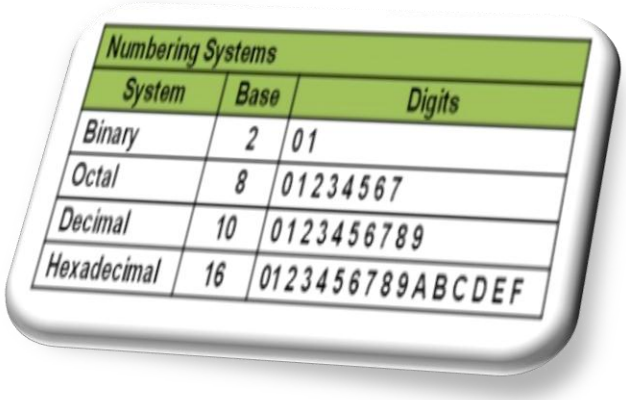
People are the computer operators, (also known as users).

- **It can be argued that some computer systems are complete without a person's involvement; however, no computer is totally autonomous. Even if a computer can do its job without a person sitting in front of it, people still design, build program, and repair computer systems.**

Data

A computer is a digital system that stores and processes different types of data in the form of 0s and 1s

- **The different types of data a computer system handles include numbers, alphabets, and some special characters. Therefore, there is a need to change the data entered by the users into a form that the computer system can understand and process.**
- **Different codes have been developed and used to represent the data entered by the users in the binary format. The binary system represents each data type in binary digits ,0s, and 1s .Since these codes convert the data into binary form, the computer codes are also called binary codes.**



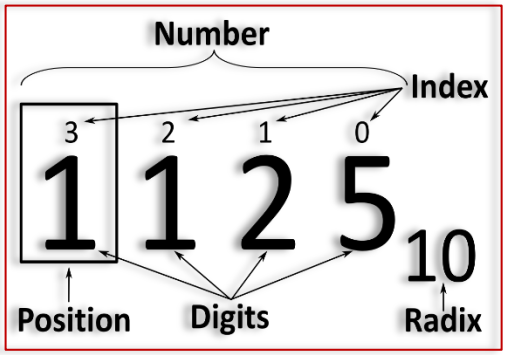
Numbering Systems		
System	Base	Digits
Binary	2	01
Octal	8	01234567
Decimal	10	0123456789
Hexadecimal	16	0123456789ABCDEF

- **The decimal system is not the only number system used by computer users. Computer professionals use different number systems according to their requirements to communicate with the computer system. Therefore, before understanding the various computer codes, we need to understand the concept of number systems.**

1- Decimal System

Is the most common number system used by human beings. It is a positional number system that uses 10 as a base to represent different values. Therefore, this number system is also known as the base 10 number system.

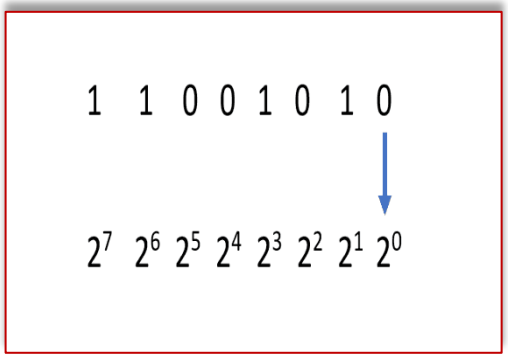
- **In this system ,10 symbols are available to represent the values. These symbols include the digits from 0 to 9 .**
- **The common operations performed in the decimal system are addition (+), subtraction (-), multiplication (×), and division (/).**
- **The decimal system can be used to represent both integers as well as floating-point values.**



2- Binary System

Is the most dominant number system that is employed by almost all modern digital computer systems.

- **The binary system uses base 2 to represent different values. As this system uses base 2 ,only two symbols are available to represent the different values in this system .**
- **These symbols are 0 and 1, which are also known as bits in computer terminology. Using a binary system, the computer systems can store and process each type of data in terms of 0s and 1s only.**



3- Hexadecimal System

The hexadecimal system uses base 16 to represent different values. Therefore, this number system is known as the base 16 system. In this system,16 symbols are available to represent the values in this system. These symbols are the digits 0-9 and the letters A, B, C, D, E, and F.

Base 16	Base 2
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

4- Octal System

The octal system uses base 8 to represent different values. Therefore, this number system is also known as the base 8 system. As this system uses base 8, eight symbols are available to represent the values in this system. These symbols are the digits 0 to 7.

OCTAL	BINARY
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

How Computers Communicate

- **Early computers did not communicate easily with one another.**
  Data was typically carried between computers on floppy disks and other low capacity removable disks, or using slow dial-up modems.
- **Network connections were difficult to set up and transferred data very slowly.**



- **Nowadays, however, communication technology has advanced greatly, and there are many choices for making computers connect.**



1- Ethernet Networking

Most computers today are part of one or more networks. A network is a group of computers that share resources (such as printers or Internet services) and/or data (such as files).



- **The most common network standard is Ethernet.**
- **Ethernet networks can be either wired or wireless (or a combination of the two), but the term Ethernet is most often applied to the wired kind of connection.**
- **Most PCs have a network adapter, which provides network connectivity services and a port into which you can plug an Ethernet cable.**

Wireless Ethernet is more often called Wi-Fi, or 802.11



- **Most portable devices such as tablets and phones use wireless connections and do not have the capability for wired networking**

In a small network, such as in a home or small business, one end of an Ethernet cable plugs into the computer, and the other end plugs into a controller box called a router that manages the network traffic between the connected devices.



If you have broadband (always on) Internet access, the device that brings that service into your home or business is frequently called the router, and then the router shares the Internet connection among all the computers.



If you have a Wi-Fi wireless router and a wireless network adapter in the computer, the computer can connect to the router via radio frequency (RF) waves, so no cables are required.



2- Bluetooth Networking

Bluetooth is a short-range wireless alternative to wireless Ethernet (Wi-Fi), used primarily to connect wireless devices directly to specific computers.

For example, you might have a Bluetooth wireless headset for your cell phone or a Bluetooth speaker for your MP3 player.

Bluetooth's limited range (10 meters) makes it impractical as a replacement for Wi-Fi, but it provides an easy and economical way for one device to connect with another within a limited space without Ethernet hardware.



3- The Internet

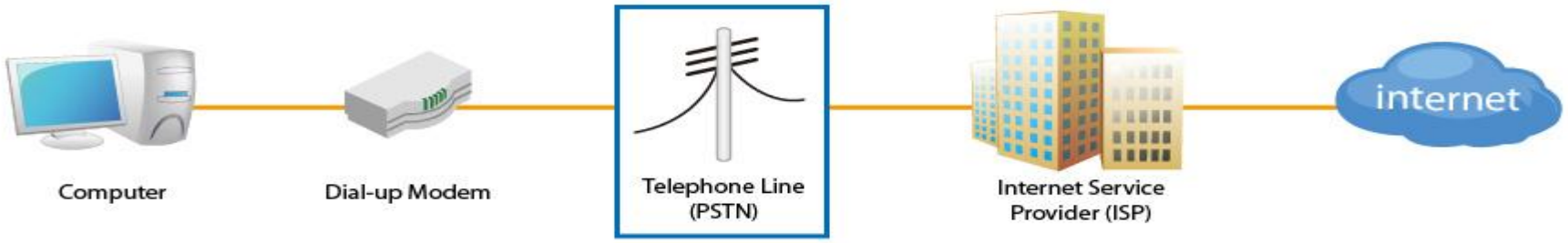
The Internet is the world's largest network. When you use the Internet, your computer becomes a member of this giant network, and you can communicate with any other computer on the Internet, to the extent that if its owner has chosen to make it available.



For example, you can exchange email messages, download files, and view web pages stored anywhere in the world.

Individual computers don't connect directly to the Internet, however; they go through an Internet service provider (ISP), a company that provides a connection to the Internet for a fee.

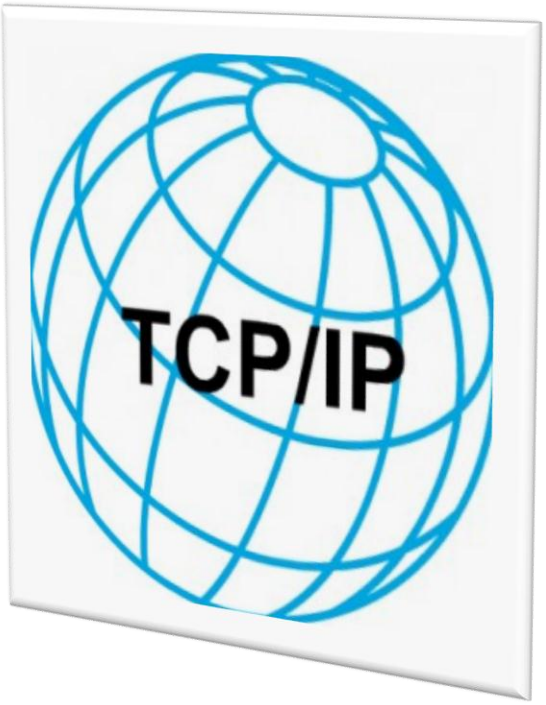
- **Your ISP may be your local phone or cable TV company, or at work it may be a service that your school or employer partners with.**
- **An ISP provides a device (a modem or terminal adapter) that translates your computer's requests into Internet-compatible data.**



The Internet functions using a set of standards called Transmission Control Protocol/Internet Protocol (TCP/IP). It is this shared communication language that makes global communication possible.

TCP/ IP defines

How data will be treated as it is broken up into packets for transmission, sent through a series of routers across the world, reassembled into its original form at the receiving end.



The End