First stage//Department of Computer
College of Computing and Information Technology
Al-Qadisiyah University

Information technology IT

- Hardware
- Software
- Computer Language
- Developing an information system
- Information representation
- Networks
- Internet

Lecture (1)

Conclusion: This course includes presenting the main facts about computers in order to understand many of the computer issues involved in any of these.

an introduction:

The computer plays a decisive and influential role in all areas of life, for its numerical uses in various institutions (banks, schools, hospitals, universities, military institutions, ministries, etc.). This effect increased greatly when it became possible to connect several computers to each other across the world, which facilitated the exchange of information and gave greater productivity with better quality and lower cost. For example, we find that books and research are kept in libraries far from us, such as America and Russia, via the Internet.

Computer: An electronic device assembled from separate components that are linked and then connected using special commands to process data by performing

the following three basic operations:

- Receiving the entered data: is to obtain the abstract facts.

-Processing data: to obtain information, including in making calculations and comparisons

- Show output information: include in obtaining the existing results.

Basic concepts of information technology:-

1- **Computer system**
2- **Information technology**
3- **Types of computer**
4- **Parts of computer**

1-The computer system

consists of:

1- Hardware: These are the tangible physical parts of a computer, such as the screen, keyboard, mouse, printer, processor, memory, and storage units.
2- Software: It is the intangible components of a program and a set of instructions that control the work of the computer and work on graphic files.
3- Users: Users of software operating on equipment to perform tasks.

2-information technology

The computer system is the foundation upon which the goal of information technology is built.

Information technology: It is a set of tools that help to receive, process, store, retrieve, print and transmit information in electronic form, whether it is text, sound, image or video, using a computer.

These tools include: computer, printer, scanner, modem, disk, internet and multimedia applications. The term information technology has evolved in the education sector to become information and communication technology.

Lecture (2)

3-Types of computer :

Although computers differ in terms of size, shape, performance and price, their collection works on processing data to obtain information and is divided into the following five sections:

1- Supercomputers: They are expensive, expensive, and have enormous processing power. One of the most famous is Cray4 at Cray, and it is used as a central device for controlling and monitoring the network, and it is used in:

A -The fields of industrial scientific research centers.

B -Meteorological centers to forecast the weather.

C -Monitor wind movement and pressure to which the structure is exposed. see Figure(1)

Figure(1)

2- Main Frames : They are large, powerful, fast, and expensive computers that serve hundreds of users simultaneously.

Among the most famous is the giant and cluster IPM, and these computers carry out millions of instructions per second and their size is close to the size of a cabinet or the size of a relatively large room.

They are used in large and medium companies such as banks to work with millions of paid networks, bills and orders. And it is used as a central computer in a multi-branch organization, where hundreds or thousands of users work from far away to work on it through terminals that are placed in a controlled isolated place to keep it cool and away from dust. see Figure(2)

Figure(2)

Lecture (3)

3- Mini computers: Similar to Main frames , but in a smaller area size, as they form an average type in the size of computers ,and their energy is the size of a file cabinet and are classified in the middle in terms of strength, size and cost between main computers and Micro computers. It is used in a rather large and complex business and is multi-use (up to 200 users). Use when personal computers are not suitable and main computers are more expensive, see Figure(3)

Figure(3)

4- MicroComputing: It is the smallest types of computers in terms of price and size, but the most common and used, including:
Personal computers: It is the most common and most used miniature, as we find it in work offices and homes, and it was made of small size and it is one of the cheapest computers and its price

depends on its components and is constantly developing. see Figure(4)

The first company produced it was IBM in 1981. The most famous of these accounts:

1- IBM: compatible computers that run on Intel processors.
2- Apple Macintosh computers: They work on processors that are not compatible and have different operating systems and application software with versions specific to each.

Figure(4)

a- Laptop computer : It is a personal computer the size of a handbag that can be moved with ease, as it has a rechargeable battery that can operate the computer for about two hours or is connected to an electrical current for charging and can be used during travel. It includes a screen, a small keyboard, and a special large touch pad for reading.
The basic components of computers are a processor, memory and a secondary storage unit. It can be linked to the desktop computer through a special device that has the same power as

the personal computer, except that it is more expensive. It was used only by businessmen, but the spread and its reasonable price for some have become widely circulated.

b- Palmtop computers : They are small handheld computers also called (Notepads), and they have a small screen and keyboard. Some of the functions that Laptop computers do work in a limited way, and data can be transferred from them to the computers.

The prices are low, including the personal digital assistant (PDA), which uses a pen or a mini keyboard instead of the regular keyboard. It is used for calculations, scheduling appointments and meetings, sending and receiving e-mail, and reviewing important notes before the meeting.

In the figure(6) below, a comparison between the three types(main,mini,micro)

Microcomputer	Mini computer	Mainframe computer
It was introduced in 1970.	It was introduced in 1960.	It was introduced in 1975.
Its generally consists of one processor.	It generally consists of two or more processors.	It generally consists of multiple processors.
Its storage capacity is in GB.	Its storage capacity is in TB.	Its capacity is in PB.
Its memory is in MB.	Its memory is in GB.	Its memory is in GB.
It can normally be used by 1 user at a time.	It can serve two to thousands connected users at a time.	It can serve hundreds to thousands connected users at a time.
Its size is very small.	Its size is bigger than microcomputer.	Its size is bigger than micro and mini computers.
Its price is $500 to $5000.	Its price is $18000 to $500000.	Its price is $500000 to $5 million.
It is used at home, offices and educational institutes.	It is used by business institutes and departments.	It is used by large organizations like banks.
Examples are IBM-PC & Apple Macintosh.	Examples are VAX-8800 and MV-1500	Example are IBM-370 and NEC.

figure(6)

5- Network Computers: It may be main or mini computer and it is called the server that receives a large group of workstations or terminals such as personal computers called clients, see Figure(5)

Figure(5)

Network computers : It is a system consisting of a screen, a keyboard and a small box that contains a micro-processor and a main memory less powerful than that of personal computers with disk drives.

The network computer is used to enter to the network and depends on the server for processing and storage operations.

Lecture (4)

Computer parts:

- The system unit
- Input units
- Output units
- Periphersls

- **<u>The System unit:</u>** It is a box with several holes, entrances and small light sources inside it that contains the basic elements that make up the computer:

a- Motherboard:

It is the main circuit board in the computer and carries the CPU (microprocessor) and some types of memory as well as control circuits.

b- Memory:

It consists of chips that are installed directly on their own small boards that are, in turn, attached to the motherboard in specific presses. The memory capacity ranges from 256 MB to 16 GB.

c- Power supply:

It is the electrical supply that supplies the calculator circuits with the electrical energy necessary to operate them. This converter is installed on one of the outlets and contains a transformer to reduce and regulate the voltage level of the electric current entering the computer to become (± 12) volts and ± 5 volts DC.

d- Plugs or Ports:

They are the ends located behind the system unit and are used to connect external devices and various terminals with the motherboard.

There are types of plugs, namely:

- Consecutive plugs: Transfer data bit by bit.
- Parallel Plugs: Convey a group of bits together.
- SCSI ports: Fast simultaneous bitrate transfer and can connect up to 10 devices.
- USB ports: it can connect (127) devices with a computer such as printers and scanners.
- Expansion holes: It is an internal connector for inserting panels that connect directly with the motherboard via buses.

These boards are called additional boards, card, or Adaptor. These boards increase the capabilities of the computer and have 4 or 8 depending on the device.

From these additional boards, we mention:

Screen card

Network card

Sound card (added to old devices to work on sound)

There are other boards (cards) like a camera.

e-

Device controllers:

It is a set of chips installed on the motherboard and works on operating part of the equipment such as the screen player, mouse and keyboard.

f-

Disk drives:

It is a part of the equipment for reading and writing data on magnetic disks and there are two types of disks:

Floppy Disk Drive (it is not used at this time)

Hard Disk Drive

g-

The System clock:

It is an essential part of every computer , as it is directly linked to the central processing unit (CPU) and conveyor control lines.

It consists of a chip that contains a crystal that flashes at a specific frequency about several million times per second. One of its functions serves the synchronization of operations in many computer components ,and its speed is measured in the number of beats or clock cycles per second. Computer speed is measured in gigahertz, or billion cycles per second.

h-

Lights(Led Displays) : They are lights of different colors to indicate the state of work of the computer and its level of activity.

Note// The difference between data and information

Data :they are dispersed facts and raw material not yet treated . While ,the information is the data that has been processed.

- **Input units**: used to enter data and give orders to the computer, including:
  - ✓ keyboard
  - ✓ Scanners
  - ✓ The mouse
  - ✓ Camcorder
  - ✓ The micro
  - ✓ Barcode reader
- Output units: used for information output, including:
  - ✓ The screen
  - ✓ Speaker
  - ✓ Printers
- Peripherals

They are devices that are connected to the computer to help in better performance of tasks such as modem.

Lecture (5)

Software

Computer hardware needs programs to operate and exploit it.

The program: It is a set of sequential instructions that run the computer in the way that the program wants.

Softwares : It is a general term used for any single program or group of programs, data and stored information.

There are two types of software:

1- System software.
2- Application software.

1- System software.

They are used by the computer in order to operate it and can be considered as a mediator between the normal user or programmer on the one hand and the computer equipment on the other side and include: operating systems, translators of programming languages, as well as their interpreters.

Now we explain programming languages: They are the mechanisms used to develop computer programs and consist of instructions that must be written according to certain rules, such as natural languages that people use in their daily life.

There are many programming languages, including old ones such as Fortran and Pascal, and used such as CoBol, C, C ++, and Java.

Generations of programming languages:

The first generation:

It is called the Machine Language,Programs written in machine language consist of strings of numbers in the binary system to express instructions:

The addresses of the memory locations in which the necessary data are weighed.

The second generation:

It is called the Assembly Language.Instructions used in this language are in the form of easy-to-remember symbolic abbreviations such as Mnemonic Sym tools

MUL is short for multiplication

ADD is short for addition.

STO is an abbreviation for Storage Process.

Likewise, memory locations used to represent variables can be expressed using symbolic addressing

Numbers can be used in The Octal, Hexadecimal, The binary or decimal systems to express numerical data.

We find clearly that assembly language is easier than machine language, but it remains like machine language linked to computer architecture and directed to work on a specific computer architecture.

Unlike machine language, the program written in assembly language must be compiled by a special program called Assembler before executing it.

The third generation:

High Level Language,they are more structured languages, where the program can express assignment and conditional control instructions and jump to any other instruction, as well as repeat with reserved words such as:

Statement in Pascals: If x> 10 then x = x * 10; x = x + 1

Statement in the Fortran: Do 77 i = 1,10 x = 10 x + 10 77 continue

In addition to the use of other words or symbols by the user to express what he wants to do.

Among the high-level languages are Fortran, the defunct Pascal language, and the C language, which are characterized by fast execution of programs written in them.

Fourth Generation:

Application Generators,database languages include Data Base, which helps the user in creating files and designing screens and reports without using the previously mentioned programming languages.

For example: the programmer can use Access or Oracle / SQL.

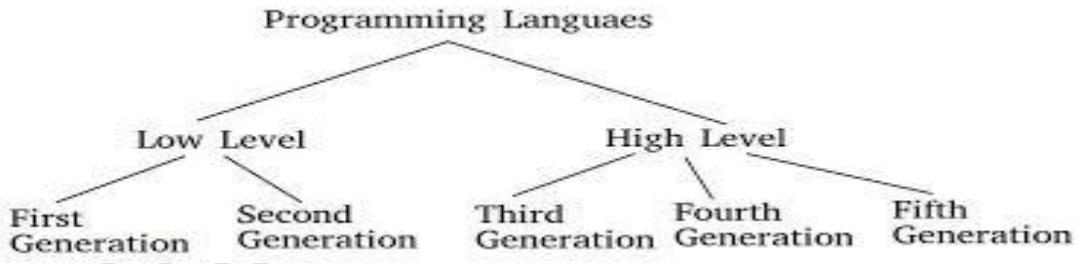
Create a group of related files between them according to a specific design, as well as designing screens that enable the user to update data such as adding and deleting. Printable reports can be designed, for example by using an instruction in the form of a simple sentence.

Fifth Generation:

Object Oriented Language,the programmer was able to use a set of objects to model specific quantities and concepts.

Objects consist of data and methods that can be used (this process is called sending messages). Security data cannot be accessed through roads and this feature is called encapsulation.

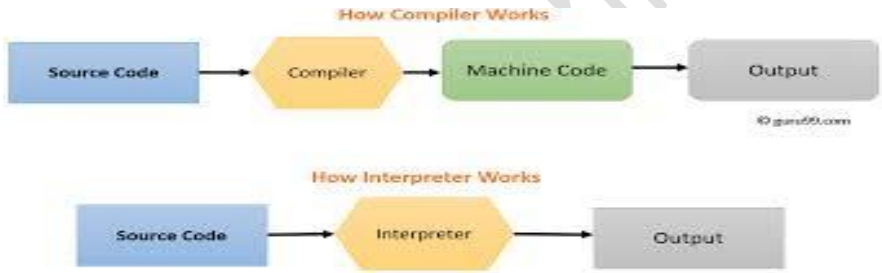
Among the most famous of these languages is Java in the late 1980s, which was used in very complex projects such as game design ,Excel and word .



Compilers and Interpreters:

They are programs to convert a program written in a high-level language called the source code into a machine-language program called the object code.

The translator program that converts source code in high level language into machine code line by line is called Interpreter.
A Compiler is a computer program that translates code written in a high level language to a lower level language, object/machine code. The most common reason for translating source code is to create an executable program (converting from a high level language into machine language).



operating system

It is a group of programs that control and supervise the computer equipment and application software installed on it. The computer cannot be run unless there is an operating system that is loaded from the hard disk to the main memory of the most common operating systems: DOS, Linux, Windows, Unix, Mac OS Mac, OS.

Operating System Functions:

1- Preparing to work after the start of the computer
2- The user can use other software.
3- Managing the main memory, input and output units, processing unit, as well as secondary storage units.

4- The operating system monitors the entire system and returns unauthorized operations such as canceling viruses and enabling the user to copy, move and delete them.
5- Maintaining the speed of the system and preventing illegal access to the data and system software such as the password.

2. Application Software

They are programs to implement useful functions such as (Word, Excel, drawing programs, as well as presentation, drawing and e-mail programs , and web browsers such as Mozilla, Internet explorer.

These programs are sold by companies specialized in developing and marketing these programs, such as Microsoft and Adobe.

Lecture (6)

Number System

1. Decimal System :It is the system that we use in our daily life and it is composed of numbers (0-9).
2. The binary system: In this system we only have the numbers 0 and 1, which represents the machine language
3. The Octal system: This system consists of 8 numbers, which are (0-7).
4. Hexadecimal system: It consists of 16 characters, which are numbers (0-9) and English letters ((A B C D E F)

Transferring from one system to another is as follows.

Conversion of binary to decimal (base 2 to base 10)

Example: convert (1000100)2 to decimal
= 64 + 0 + 0+ 0 + 4 + 0 + 0
= (68)10

Conversion of decimal to binary (base 10 to base 2)

Example: convert (68)10 to binary
68/¸2 = 34 remainder is 0
34/ 2 = 17 remainder is 0
17 / 2 = 8 remainder is 1
8 / 2 = 4 remainder is 0
4 / 2 = 2 remainder is 0
2 / 2 = 1 remainder is 0
1 / 2 = 0 remainder is 1

Answer = 1 0 0 0 1 0 0
Note: the answer is read from bottom (MSB) to top (LSB) as 10001002

Conversion of decimal fraction to binary fraction

•Instead of division , multiplication by 2 is carried out and the integer part of the result is saved and placed after the decimal point.
The fractional part is again multiplied by 2 and the process repeated.
Example: convert (0.68)10 to binary fraction.
0.68 * 2 = 1.36 integer part is 1
0.36 * 2 = 0.72 integer part is 0
0.72 * 2 = 1.44 integer part is 1
0.44 * 2 = 0.88 integer part is 0
Answer = 0. 1 0 1 0…..
Example: convert (68.68)10 to binary equivalent.
Answer = 1 0 0 0 1 0 0 . 1 0 1 0….

Octal Number System

•Base or radix 8 number system.
•1 octal digit is equivalent to 3 bits.
•Octal numbers are 0 to7. (see the chart down below)
•Numbers are expressed as powers of 8.

Conversion of octal to decimal (base 8 to base 10)

Example: convert (632)8 to decimal
= (6 x 82) + (3 x 81) + (2 x 80)
= (6 x 64) + (3 x 8) + (2 x 1)
= 384 + 24 + 2
= (410)10

Conversion of decimal to octal (base 10 to base 8)

Example: convert (177)10 to octal
177 / 8 = 22 remainder is 1
22 / 8 = 2 remainder is 6
2 / 8 = 0 remainder is 2
Answer = 2 6 1
Note: the answer is read from bottom to top as (261)8, the same as with the binary case.

Conversion of decimal fraction to octal fraction

Is carried out in the same manner as decimal to binary except that now the multiplication is carried out by 8.

Decimal, Binary, Octal, and Hex Numbers

0 0000 0 0

Decimal Binary Octal Hexadecimal
1 0001 1 1
2 0010 2 2
3 0011 3 3
4 0100 4 4
5 0101 5 5
6 0110 6 6
7 0111 7 7
8 1000 10 8
9 1001 11 9
10 1010 12 A
11 1011 13 B
12 1100 14 C
13 1101 15 D
14 1110 16 E
15 1111 17 F

Hexadecimal Number System

•Base or radix 16 number system.
•1 hex digit is equivalent to 4 bits.
•Numbers are 0,1,2…..8,9, A, B, C, D, E, F.
B is 11, E is 14
•Numbers are expressed as powers of 16.
•160 = 1, 161 = 16, 162 = 256, 163 = 4096, 164 = 65536, …

Conversion of hex to decimal (base 16 to base 10)

Example: convert (F4C)16 to decimal
= (F x 162) + (4 x 161) + (C x 160)
= (15 x 256) + (4 x 16) + (12 x 1)

Conversion of decimal to hex (base 10 to base 16)

Example: convert (4768)10 to hex.
= 4768 / 16 = 298 remainder 0

= 298 / 16 = 18 remainder 10 (A)
= 18 / 16 = 1 remainder 2
= 1 / 16 = 0 remainder 1
Answer: 1 2 A 0
Note: the answer is read from bottom to top , same as with the binary case.
= 3840 + 64 + 12 + 0
= (3916)10

Conversion of binary to octal and hex

•Conversion of binary numbers to octal and hex simply requires grouping bits in the binary numbers into groups of three bits for conversion to octal and into groups of four bits for conversion to hex.
•Groups are formed beginning with the LSB and progressing to the MSB.
•Thus, 11 100 1112 = 3478
•11 100 010 101 010 010 0012 = 30252218
•1110 01112 = E716
•1 1000 1010 1000 01112 = 18A8716

Binary to Hex conversion

Since hex numbers are used in computer displays, it is useful to convert binary↔
hex and back.
Convert each 4 binary digits to hex digit according to this table:

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

Example 1

Convert $(01001110)_2$ to hex:

$(0100)_2 = (4)_{16}$

$(1110)_2 = (E)_{16}$

So

$(01001110)_2 = (4E)_{16}$

Example 2

Convert $(0100101000000001)_2$ to hex:

$(0100)_2 = (4)_{16}$

$(1010)_2 = (A)_{16}$

$(0000)_2 = (0)_{16}$

$(0001)_2 = (1)_{16}$

So

$(0100101000000001)_2 = (4A01)_{16}$

Hex to binary conversion

Convert each hex digit to 4 binary digits according to this table:

Hex Binary
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

Example1

Convert $(4E)_{16}$ to binary:

$(4)_{16} = (0100)_2$

$(E)_{16} = (1110)_2$

So

$(4E)_{16} = (01001110)_2$

Example2

Convert $(4A01)_{16}$ to binary:

$(4)_{16} = (0100)_2$

$(A)_{16} = (1010)_2$

$(0)_{16} = (0000)_2$

$(1)_{16} = (0001)_2$

So

$(4A01)_{16} = (0100101000000001)_2$

Convert each 4 binary digits to hex digit according to this table:

Binary Hex

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

Example one

Convert $(01001110)_2$ to hex:

$(0100)_2 = (4)_{16}$

$(1110)_2 = (E)_{16}$

5

So

$(01001110)_2 = (4E)_{16}$

Example two

Convert $(0100101000000001)_2$ to hex:

$(0100)_2 = (4)_{16}$

$(1010)_2 = (A)_{16}$

$(0000)_2 = (0)_{16}$

$(0001)_2 = (1)_{16}$

So

$(0100101000000001)_2 = (4A01)_{16}$

Lecture (7)

Networks

Computer networks today enable you to:

- Send a message consisting of several pages, pictures, sounds and animations to a group of people anywhere at once and in a few minutes.
- Connect from your home or business computer to global information banks, companies and libraries to obtain information that is important to you.
- Holding interactive conferences and seminars for various parties via the Internet.
- Online education and study, as well as e-commerce and e-governance..

What is a computer network?

A computer network is a group of computers and other devices connected with each other, as they have the ability to share a large number of users of data, software, and hardware devices. The network is also a means of electronic communication between people.

Benefits of computer networks

1. Participation in the use of Hardware devices:

We mean that any user of the network makes use of the capabilities of the main computer instead of owning a

separate computer, as well as making use of all devices attached to the network such as printers.

2. Software participation:

We mean that any user of the network makes use of the software stored on the main computer or any other computer connected to the network, such as sharing files and using e-mail.

3. Data sharing:

We mean the use of one database that contains all the information used by all those connected to the network, as is the case in banks and when booking travel tickets.

Components of computer networks

A computer network consists of several parts, each part has its own function in the network system, and these parts are:

1. Main Computer - Server
2. Work stations
3. Communication Lines
4. Network Interface Card
5. Modem
6. Peripherals devices
7. Communication Switches
8. Network Programs

1. Main Computer – Server
   - ✓ It is the main device for operating the network and it is called the main service device or server, which is a computer characterized by high speed and large storage capacity to accommodate the data and software that will be handled by the participants in the network.

   - ✓ This device controls all parts of the network by using special software to run the Network Operating System, such as: Windows 2003 Server - Unix - Novel.

2. Work stations

Also called Clients, which are personal computers of all kinds (office - portable - digital assistants - ...) or Terminals and terminal units connected to the main device so that their users benefit from the data and software stored on the main service machine.

3. Communication Lines

It is the means by which data will be exchanged between the main computer and the sub-computers, and it includes cables of various kinds, as well as wireless lines.

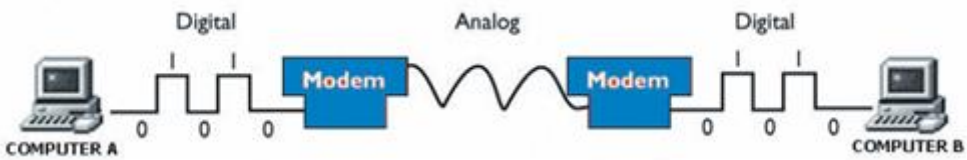
4. Network Interface Card

It is a card that is installed in the computer to prepare it to connect to the network, and the card is either internal to

be installed on the mother board inside the computer or external.

5. Modem

It is an electronic board or chip added to the computer and used to prepare the computer to connect to the Internet through the telephone line .The modem converts the digital signals used by the computer to modulate into standard signals used by the phone and perform the reverse operation as well; Modem is short for Modulate - Demodulate.



6. Peripheral devices

Some devices can be used and networked to the network, such as printers, fax machines, etc., and any subscriber in the network can use these devices.

7. Communication Switches

They are devices used to connect network computers with each other and between networks and to direct data between network computers, and among these devices: Bridge / Bridge - Gateway / Gateway - Distributor / Hub - Router / Route.

8. Network Programs

It is the communication programs that will control the operation of the network system and these programs are

stored on the main computer Server. Examples include Windows 2003 Server - Unix - Novel.

Lecture (8)

Types of computer networks

First: Classification of networks in terms of size:

1. Local Area Network - LAN
2. Wide Area Network - WAN
3. The intranet
4. The Extranet
5. The internet

Second: Classification of networks in terms of topology:

1. Bus Network
2. Token Ring Network
3. The Star Network

First: Types of computer networks in terms of size

1. Local Area Network - LAN

It is the connection of a group of computers to a main computer in geographically converging places, which may be a single room or building or several closely related buildings, where this connection is made through direct wired or wireless connections. These networks are used in small companies, schools, homes, etc.

Local network features:

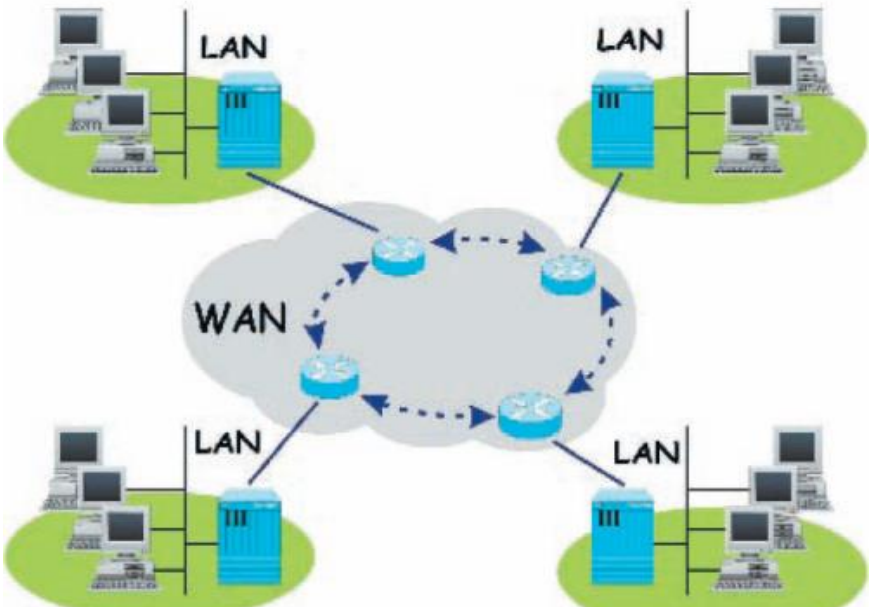
Limited in location, it is designated for a specific purpose, such as a school, university, or company laboratory.

- Transmission speed to shorten the distance between devices.
- Used by a specified number of users.
- This network is managed in schools and universities or private companies and institutions.

2. Wide Area Network - WAN

It is the connection of a separate group of computers or a group of local networks to a mainframe computer, which may be in the same country or in another country or another continent, and the main computer is usually of the large type Mainframe or Minicomputer.

* These networks are used in government agencies, institutions and large companies that have fled



3- The intranet

- Intranet is called the practical application of using Internet technologies in the internal network of an organization or company, with the aim of raising the efficiency of administrative work, raising productivity, improving mechanisms for sharing resources and information, and benefiting from shared computing technologies.

- The intranet provides access to the Internet service while preventing the opposite (that is, it is not possible for non-registered on the intranet to access it via the Internet), thus securing the intranet a strong wall called the name of the firewall around its contents, while preserving the right of access for workers on it To external sources of information on the Internet.

4-The Extranet

It is an intranet network that allows some authorized persons to access it and benefit from some services without compromising the privacy of the local intranet.

5- The internet

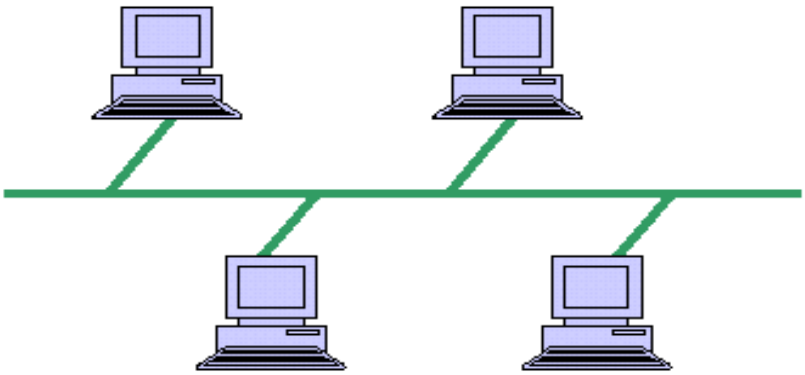
It is the largest extended computer network covering all parts of the world, connecting personal computers, local networks and extended networks.

Any person can be a member of this network from his home or office, and he can then access a huge amount of information on any topic.

Second: Types of computer networks in terms of topology:

1.Bus Network

- ✓ All devices within the network are connected in one coaxial cable similar to a television cable, and the end and beginning of this cable do not meet, and the data is transferred from one computer to another in any direction.
- ✓ This network works in the same way that people talk, as every computer in the network waits for its turn to send information.
- ✓ This type of connection is considered slow in transferring data, but it is simple to connect to this network and is inexpensive as all devices are located on the same cable, while other connection methods require more cables.

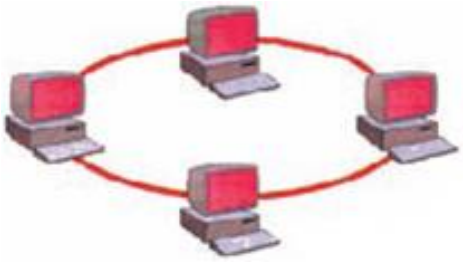


2.Token Ring Network

Computers are connected on a single cable in a loop.

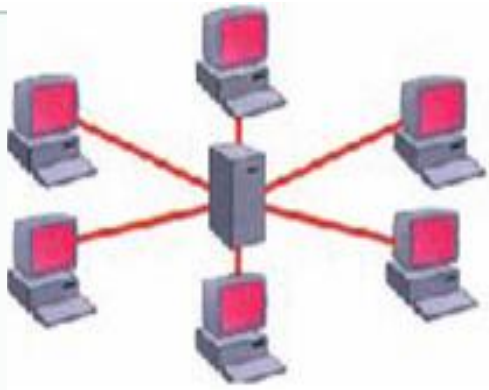
Data is transferred between computers in one direction via the cable until it reaches the desired computer.

One of the disadvantages of this connection is that the network stops completely when one of the terminal units fails, but it is characterized by speed and efficiency.



3. The Star Network

- ✓ The simplest type of connection, and the main computer is connected to the peripheral computers directly via a cable or wireless connection, and no connection is made between one computer and another or another network except through the main computer.
- ✓ This connection is effective and efficient due to the direct connection of all peripheral computers to the main computer.
- ✓ This connection is used in organizations that change their data quickly, such as banks, stock market, airlines, etc.



Data Transfer Protocols

Data transfer protocols are agreed upon systems and rules whose function is:

- Control the transmission of information over the network.
- How to send data from one site to another.
- How to deal with errors in the network.
- It defines how devices communicate with each other.

Types of protocols used:

1- Transmission Control Protocol / Internet Protocol (TCP IP):

It is a protocol used on the Internet to send data from one website to another, and it actually consists of two protocols:

(TCP) Transmission Control Protocol and Internet Protocol (IP).

2- File Transfer Protocol (FTP):

This protocol is concerned with the transfer and exchange of files over the Internet and uses the TCP IP protocol to transfer data.

3- Telnet Communication Protocol (TCP):

It specializes in operating remote computers and connecting computers to the server machine.

4- Wireless Application Protocol (WAP):

Responsible for sending data to mobile devices such as smartphones using the mobile network, including these

Data, emails and web pages.

Lecture (9)

Internet

The first roots of the Internet go back to the late sixties, when a project called ARPANET was invented and developed by the US Department of Defense, and the word ARP is the initials of the sentence: Advanced Research Project Agency, meaning the Advanced Research Projects Agency, where this network connected a group of American universities through supercomputers. supercomputer The benefit is evident in the possibility of the participation of scientists and researchers in various parts of the country and the development of their skills.

The practical success of ARPANET led to its transformation during the seventies and eighties to become an Internet network, where at first the Internet included military computers and devices in universities,

then gradually expanded to include many companies and individuals, but now millions of people around the world are connected to the Internet.

We observe, during this short period, how the Internet has turned from a mere experimental project to a global network that has an impact on human civilization.

The Internet (NET) has become a magic tool for many people because of the benefits it brings for some and the bad for others.

The future of the Internet

Despite the successes achieved by the Internet, it was not spared from several problems, the most important of which was the slow pace in dealing with it in terms of fetching information and reviewing it, and it was necessary to rely on lines faster than telephone lines, with a larger bandwidth, and these researches resulted in projects aimed at dividing the Internet into Two generations are:

1. The second generation of the Internet

2. The third generation of the Internet

As for the second generation, it is called internet2 or the CAnet2 network, and it is funded by the US federal government. This generation adopts an advanced version of the Internet protocol, IPv6, and it supports two features:

1. Multicasting (synchronous transmitter)

2. Quality of Services (QoS)

As for the third generation of the Internet, it is still under research and it is expected that it will support all the

advantages of speed and strength, and among the most prominent projects presented: 3 CAnet and the SuperNet project. This generation supports two features:

- Exploiting optical fibers in switching and routing, and this term was called dark fiber, where the infrastructure depends on the capabilities of optical fibers that have not been exploited until now, and this will revolutionize the field of technology.

- The use of DWDM technology, a technology that uses optical fibers to transmit at speeds up to 400 gigabits per second.

Lecture (10)

What is the Internet?

The Internet has four main components: **computers**, **cables**, **program**, and **data**.

Cables connect computers to each other, allowing **program** to exchange data between each computer and the next. Network computer administrators generate data in a variety of formats, ranging from simple text and graphics, to neat pages with technical output and program files. There are so many benefits to be reaped from the Internet, and people are still inventing new ways to make use of its potential for information exchange. All that is required is knowledge of the services provided by the

network, and the required program to take advantage of them. The Internet services can be divided into four groups :

1- WWW Web

The World Wide Web is one of the latest Internet services, by means of which the transition has been made from the old style of the network, based on texts, to a graphic style that depends on multimedia technologies, in the dissemination of information and access to it, which helped to spread it amazingly in recent years. The web has hundreds of millions of elegant pages with paper-like art output and on the increase. Companies and organizations (as well as many individuals) create pages to introduce themselves and publish their information. Special programs called "browsers" are used to visit websites and read their pages. One of the most popular browsers today is chrome, firefox.

2- Email

It is a system for exchanging messages between Internet users, symbolized by B and is characterized by its low cost and great speed, as the message reaches its destination within a few seconds in the general case. One of its important features is the ability to attach files to messages. Attachments can contain pictures, documents, or programs. The addressee receives his e-mails when he connects to the Internet and checks the contents of his e-mail inbox. And there are now a large number of programs that allow messaging in the Arabic language, the

subscriber to the Internet usually gets his own mail account from the service provider associated with him, and there are also many sites that give a free postal account, to whomever he wants, that can be browsed anywhere in the world.

3- News groups

Newsgroups are like wall newspapers, or general mailboxes, that any Internet user can see and participate in. There are currently more than 16,000 news groups, each one concerned with a specific direction . There are groups to discuss political matters,

Another is for sports, a third for religions, and so on. The popular browsers provide the functions of dealing with news groups, so they offer the user a list of all groups' names, to choose from them what interests him, and he can see the messages addressed to his favorite groups,

And send an e-mail to express his opinion on the topics under discussion. Most of the Arab browsers believe in the ability to participate in the Arabic language newsgroups

4- File transfer protocol ((FTP))

The Internet was initially created to exchange files between computers, or "file transfer protocol". FTP This service is usually denoted by a list of file names on an FTP computer that displays programs, and the user can select the files he wants to "download" from his device to upload from, or the files that he wants to download to the remote device.

Companies usually place hot spots along with the file names and programs that they provide to visitors to their webpages.

The user only has to click the hot spot, and the browser asks for the directory in which he would like to store the file, on his hard disk, then the process of fetching the file begins .

Protocol

There are different types of protocols on the Internet, for example:

HTTP: Computers on the Internet use the Internet Information Transfer Protocol to talk to one another. It is the language that your web browser speaks to request pages and images from your service provider. We can see that the web browser uses the HTTP protocol when it appears at the beginning of the website address, such as http://www.yahoo.com/

FTP: File Transfer Protocol, a standard Internet protocol, is the simplest way to transfer files between computers and the Internet.

Also, in many cases, people who write and maintain web sites use an FTP program to send the data that produces the website, from the hard drive where it is created, to the service provider's computer.