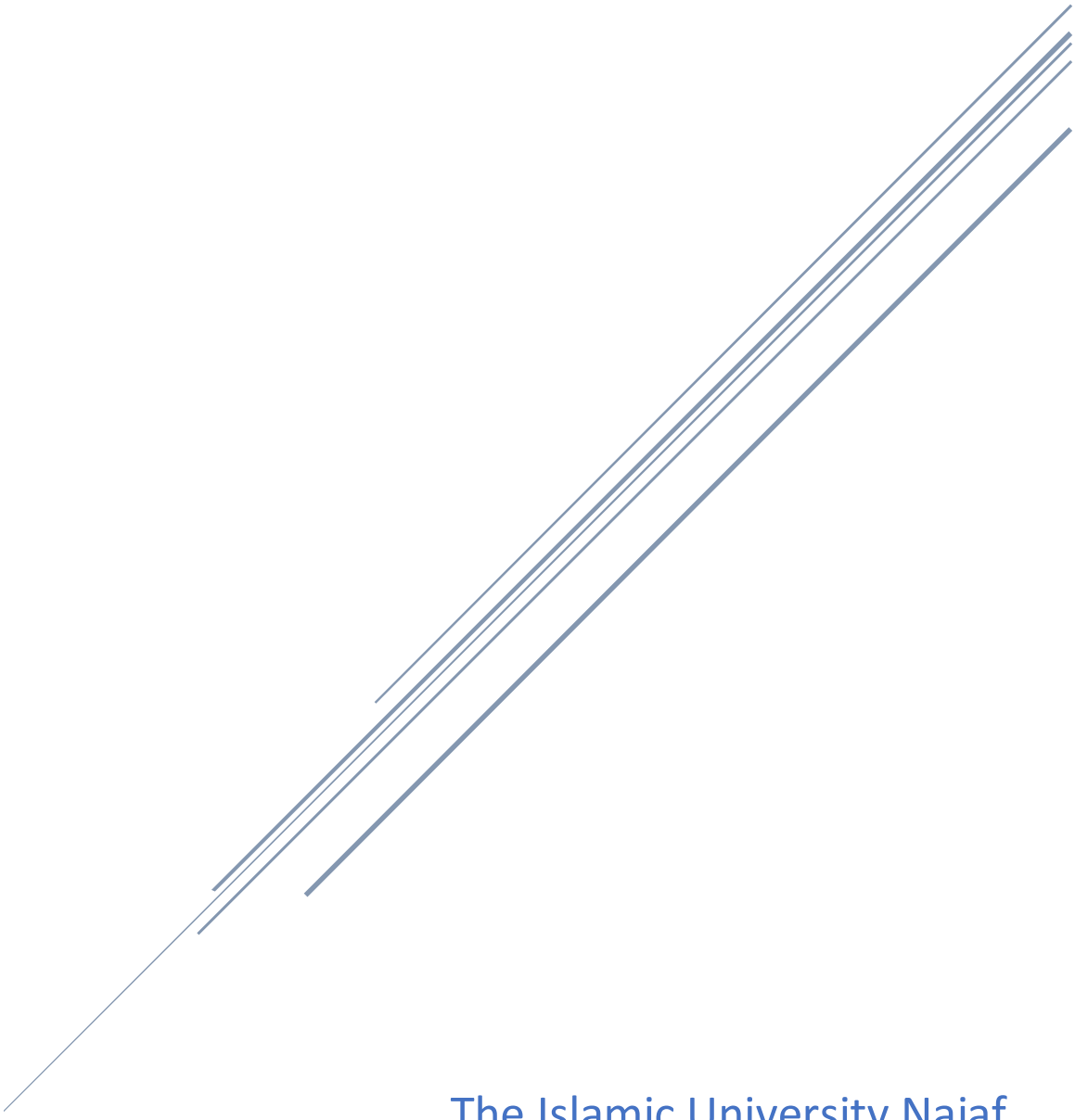
# Computer

## Introduction



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# 1. General Introduction:

Through the long history of human life, it becomes clear that man has a continuous and urgent need to manufacture many devices and machines that help him accomplish tasks and make his life more comfortable. And if we take any period of time represented by several decades of years, we see that there are many devices in human life, some of which have become necessities of life, after they have gone through many stages of development, and another section is still in the stage of development according to the benefit of people. As a result of the constant need for new devices that enter human life, there are ideas to innovate and manufacture such devices.

# 2. Computer Components:

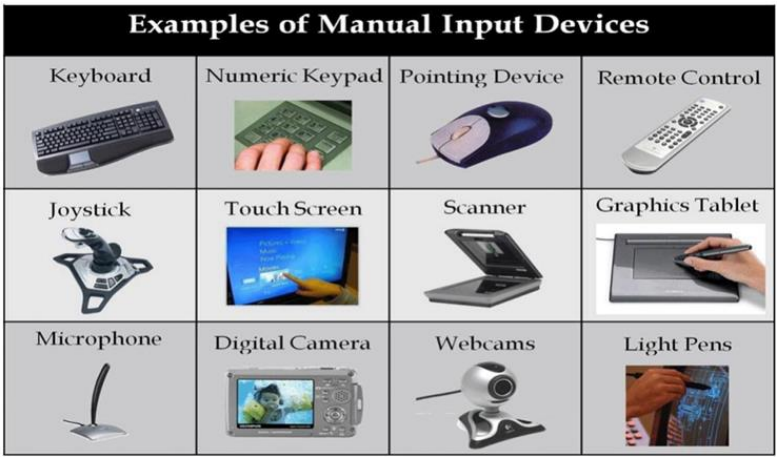
Any kind of computers consists of HARDWARE and SOFTWARE.

## 2.1. Hardware:

Computer hardware is the collection of physical elements that constitutes a computer system such as the monitor, mouse, keyboard,..etc.


### 2.1.1. Input Devices

An input device is essentially a piece of hardware that sends data to a computer. Input device translate data from form that humans understand to one that the computer can work with. Most common are keyboard and mouse.




**Example of Input Devices:**

1. Keyboard
2. Mouse (pointing device)
3. Microphone
4. Touch screen
5. Scanner
6. Webcam
7. Touchpads
8. MIDI keyboard
9. Gamepad
10. Graphics Tablets
11. Cameras
12. Pen Input
13. Video Capture Hardware
14. Microphone
15. Trackballs
16. Barcode reader
17. Digital camera
18. Joystick
19. Electronic Whiteboard

Note: Generally standard Keyboard has 104 keys.

### 2.1.2. Central Processing Unit (CPU)

A CPU is brain of a computer. It is responsible for all functions and processes. the CPU is the most important element of a computer system.

The CPU is comprised of two main parts :

* *Arithmetic Logic Unit (ALU)*: Executes all arithmetic and logical operations. Arithmetic calculations like as addition, subtraction, multiplication and division. Logical operation like compare numbers, letters, or special characters.

* *Control Unit (CU):* It is controls data processing in the appropriate time and order.

### 2.1.3. The Memory

**A. Primary Memory:-**

***RAM* ( Random Access Memory):** it is known as reading and writing memory, and it is a temporary memory as the information is lost from it as soon as the power turned off (volatile), as it is used to temporarily retain data while working on the computer. When the operating system is loaded, the application programs or games are copied and loaded into it.

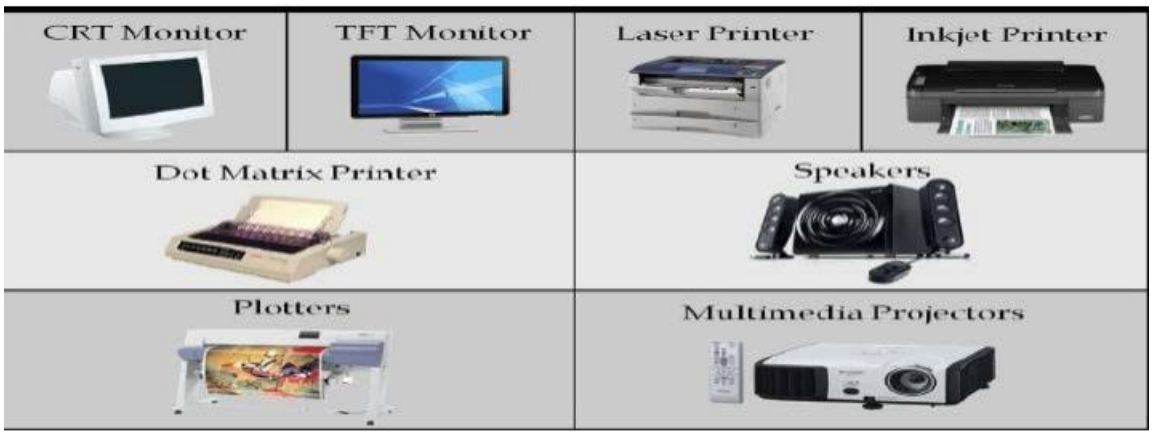
***ROM (Read Only Memory):** it is only intended to save the basic information for Input/ Output System (BIOS), and it is a special chip that is installed in the computer and it contains the necessary programs to make the computer work with the operating system. This memory does not lose its contents when the power is turned off.

**B. Secondary Memory:-**

Stores data and programs permanently: its retained after the power is turned off storage is the process of saving digital data permanently. It stores all the applications and their data, as well as the computer contains the main storage unit, the hard disk, in addition to the possibility of optical drives (CD & DVD) and USB drives (Flash Disk).

### 2.1.4. Output devices

The devices in which we receive the information from the computer or that is used to output the information.



**Example on Output Devices:**

a) Monitor
b) Printers (all types)
c) Plotters
d) Projector
e) LCD Projection Panels
f) Computer Output Microfilm (COM)
g) Speaker(s)

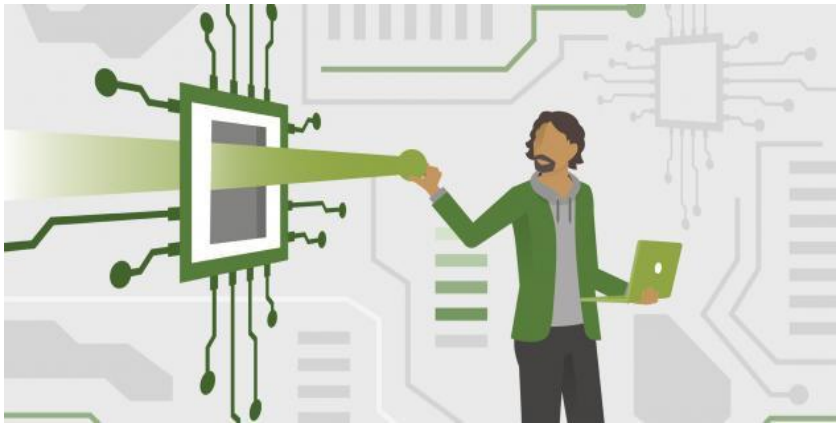
**Note:** Basic types of monitors are a.Cathode Ray Tube (CRT). B. Liquid Crystal Displays (LCD). c.light-emitting diode (LED).

Printer types: 1-Laser Printer. 2-Ink Jet Printer. 3-Dot Matrix Printer

## 2.2.Software:

The hardware components of the computer need software to run them, and the software components are programmed applications in different computer languages that represent the communication link between the device and the user.

**A. System software** such as Operating System programs which are considered one of the most important programs that no computer can operate without. It is the first program to be loaded into the computer's RAM, after which the computer is ready to receive and execute the user's commands and to load and run the programs.



**B.** Application software Computer-based software such as Microsoft Word, Excel, PowerPoint, multimedia applications, and games.

Comparison Application Software and System Software

| | System Software | *Application Software* |
|---|---|---|
| *Example:* | 1) Microsoft Windows<br>2) Linux<br>3) Unix<br>4) Mac OSX<br>5) DOS | 1) Opera (Web Browser)<br>2) Microsoft Word (Word Processing)<br>3) Microsoft Excel (Spreadsheet software)<br>4) MySQL (Database Software)<br>5) Microsoft PowerPoint (Presentation Software)<br>6) Adobe Photoshop (Graphics Software) |
| Interaction: | Generally, users do not interact with system software as it works in the background. | Users always interact with application software while doing different activities. |
| Dependency: | System software can run independently of the application software. | Application software cannot run without the presence of the system software. |

## 3. Computers classification

Computers can be generally classified by size and power as follows, though there is Considerable overlap:

- **Personal computer:** A small, single-user computer based on a microprocessor. In addition to the microprocessor, a personal computer has a keyboard for entering data, a monitor for displaying information, and a storage device for saving data.

- **Workstation:** A powerful, single-user computer. A workstation is like

a personal computer, but it has a more powerful microprocessor and a higher-quality monitor.

• **Minicomputer:** A multi-user computer capable of supporting from 10 to hundreds of users simultaneously.

• **Mainframe:** A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.

• **Supercomputer:** An extremely fast computer that can perform hundreds of millions of instructions per second.

## 4. Computer features

The computer has the following characteristics:

a) The speed of completion of operations and the speed of data entry and information retrieval.
b) The accuracy of the results, which also depends on the accuracy of the information entered into the computer.
c) The ability to store information.
d) Reducing the role of the human element, especially in automated factories.
e) The ability to work the computer continuously without getting tired.
f) The possibility of making decisions by searching for all solutions to a specific issue and presenting the best of them in accordance with the conditions set and the requirements of the issue at hand.

## 5. Areas of Computer Use

The uses of the computer have expanded in all fields, and it is almost one of the necessary devices for human life in our current era, and the person has become unable to do without the computer, as it is present in his library, his mobile phone, his car, and his home appliances. There are many uses that cannot be counted, and some of those uses can be summarized:

a) **Commercial**, economic and administrative fields, such as calculating budgets, profits, payments, receipts, salaries...etc. In financial institutions and banks,

and in banking operations such as withdrawals, deposits, profit calculation, verification of account numbers, project planning and management.

b) **Scientific and engineering fields**, research and experiments, such as physics, chemistry, mathematics, astronomy, and the study of outer space. Such as designing buildings, bridges, facilities, controlling industrial processes and educational fields, institutes, universities, schools, teaching...etc).

c) **Medical and military fields:** conducting and analyzing ECG, brain, and medical images, strategic weapons, intercontinental missile guidance, and early warning devices.

d) Lots of personal uses such as drawing, printing reports, and hobby games.

## 6. Programming languages:

They are languages for communication between (the programmer and the computer) that have their own rules and principles and are divided into:

### 6.1. Low Level Language

It was named by this name because its vocabulary is far from the human language, and it is the languages that use the binary system (0 and 1), zero and one, to express the various commands that make up the program, and they are difficult languages that only a few programmers who have experience and skill in programming can use.

Lower-level languages are based on Machine Language.

### 6.2. Middle Level Languages:

They are languages characterized as intermediate between machine language and high-level languages, and use a mixture of M Symbols and signs are called assembly language.

### 6.3. High Level Languages

This name is named because the programmer can write the program without knowing the details of how the computer performs these operations, such as storage

locations and precise computer details, and the expressions of high-level languages are expressions that are very similar to the natural language that a person uses in his life and communication with others. It is easy to write and easy to detect software errors. Like c/c++

## 7. Numbering systems in the computer:

They are defined as ways to represent and write numbers, and there are several types, such as:

- ❖ Binary System
- ❖ Octal System
- ❖ Sixteenth System (Hexadecimal System)

These systems are used in the computer, i.e. they are Low Level Languages, and some of them can control the work of the registers. They are the way to write or read from the registers, especially the sixteenth Hexadecimal coding system. The basis of the binary system is the number (2), because this system includes only two numbers, they are (0 and 1), and the basis of the octal system is the number (8), so the largest number in this system is (7). The basis of the sixteenth system is the number (16), as this system consists of a code consisting of nine numbers, the largest of which is the number (9), and letters written in large letters (A to F). Any other way possible

## 8. Your Personal Computer:

The personal computer (PC) is available in types such as desktop or laptop, with specifications that are compatible with applications such as word processing, electronic spreadsheets, databases, web browsers, email clients, and games. Current personal computers allow connection to the local area network either through a wire, a cable, telephone, or wireless connection to connect to the Internet, obtain information, or perform a specific task.

A computer can be used at home, in the office, government departments, commercial and scientific institutions to accomplish many tasks, and this requires sharing between the hardware and software of the computer and this component is known as the platform.

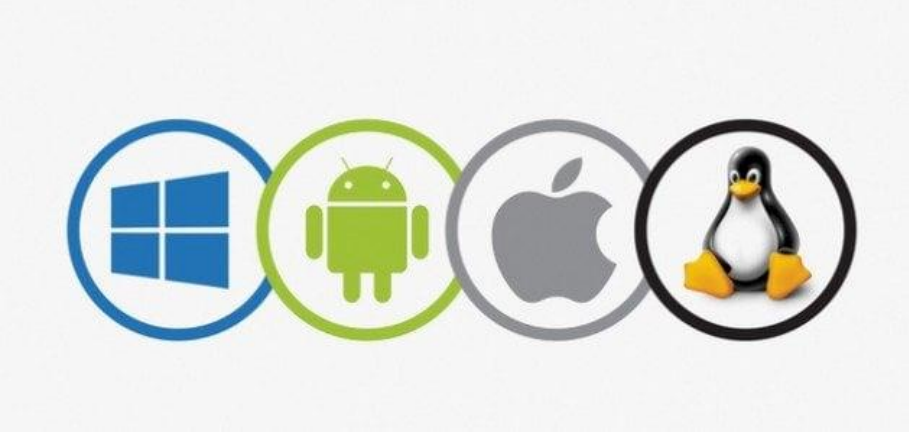
**Computer Platform:**

The integration between computer equipment and the operating system is called the Platform, which facilitates the task of working between them through joint work (compatibility between the processor and the operating system.

Among the most famous operating systems, are:

- ✓ Microsoft Windows running on an Intel (Pentium) processor or AMD and VIA processor.
- ✓ The Mac OS from Apple runs on Intel processors in all its forms.
- ✓ Linux operating system on an Intel processor.

It is important when choosing the type of platform that the platform is compatible with old programs and provides the ability to adapt to drivers and peripheral devices (printer, scanner...) while taking into account modernity in the computer field in the future.



## 9. Factors to consider when buying a computer

When it is intended to acquire a computer, we must first determine the functions required to be performed and the financial budget allocated for that, then we can decide on the specifications of the computer, taking into account that the computers are integrated with its components and can be equipped with future modifications and provide after-sales services, as follows:

**a. Create a preconceived idea:** Looking at the types available in the local markets with the ability to browse websites on the Internet to see the types of computers and their specifications, so that the person has an idea of what he is looking for, and choose the type of computer based on quality, price and technical support.

**b. Determination of the Purchase Price:** Knowing the prices of computers according to the specifications and type of computer to be purchased, and this is possible through stores specialized in selling electronic devices, or browsing the websites of international companies on the Internet, or consulting someone who has information about computers and their purchasing value.

**c. Purpose of Computer**: This feature determines the type and specifications of the computer to be purchased and the nature of work on it, for example:

- The computer is used for personal purposes at home or is used at work (government institutions and departments, for example) or both, and from it the desktop computer or laptop may be better.

**d. Determine the pre-installed programs** that we want to use to manage the computer (operating system) such as Windows and programs to be used such as anti-virus software, word processing software, electronic spreadsheets, databases, and image editing software....

**e. Choosing the warranty period** and after-sales maintenance, as the development of the computer in the future must be taken into account, so it is important to accurately choose the parts and specifications of the computer, such as the type of motherboard and its ports, expansion cards, processor speed and memory capacity.

## 10. The main features of the personal computer:

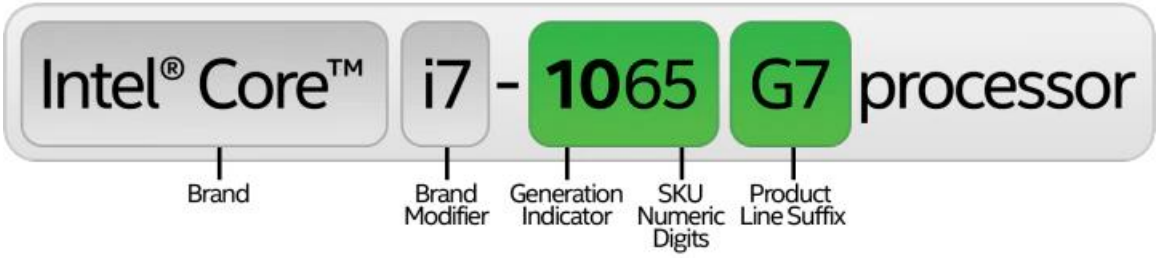
**A. Operating System:** Many people prefer to choose the Windows system over other operating systems such as Macintosh, and others choose this system because many of the applications and games they have on their computers are fully compatible. Windows files and programs, as well as options from several versions

of Windows such as Windows XP, Vista, 7 and 8, and copies recommended by Home Premium.

Microsoft recently discontinued support for XP because other versions of the same operating system appeared company.

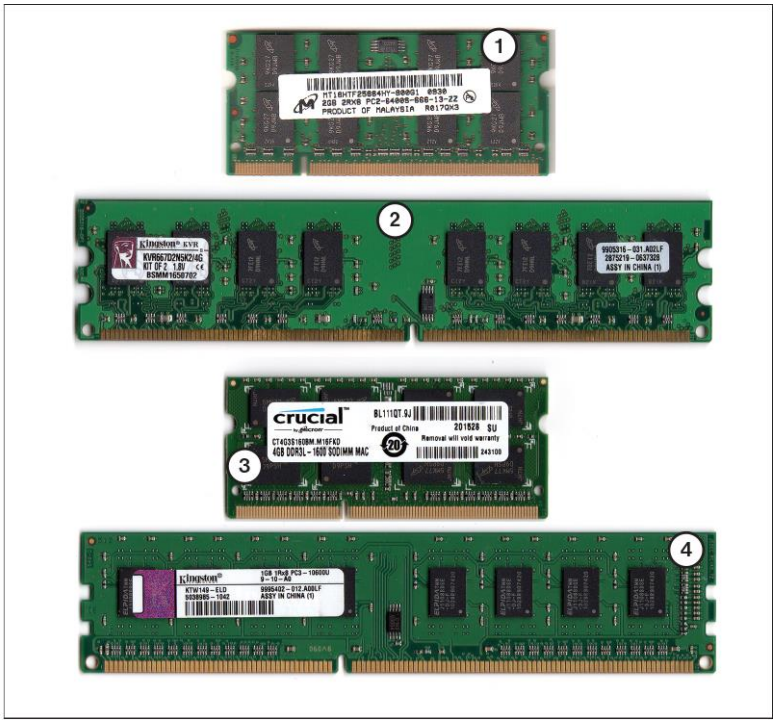
Home Premium as Windows 7 for most home computer users. Although the Macintosh system is more expensive, but it has a more elegant appearance and is more secure than viruses and spyware, and Apple released the latest version of the OS X operating system,

**B. Processor:** It is also known as the CPU, and it is the brain in the computer, so it is recommended to use middle- or upper-class processors to ensure a longer life of the computer and a great speed even if it is not needed now - to ensure the development of the computer with the increase of modern applications. Intel and AMD are the dominant manufacturers in processors, and the Intel family includes processors such as Celeron, Corei7, Pentium, and examples of AMD are Sempron, Phenom, and Athlon processors. Intel Core 2 Duo processors are sufficient to run modern games and more powerful applications. The Intel Core Quad 2 processor is recommended. If we want to run games and applications with super power, Intel Core i7 is recommended - Intel offers several processors such as Pentium 4 processors with hyperlink technology with 64-bit technology for compatibility with systems.



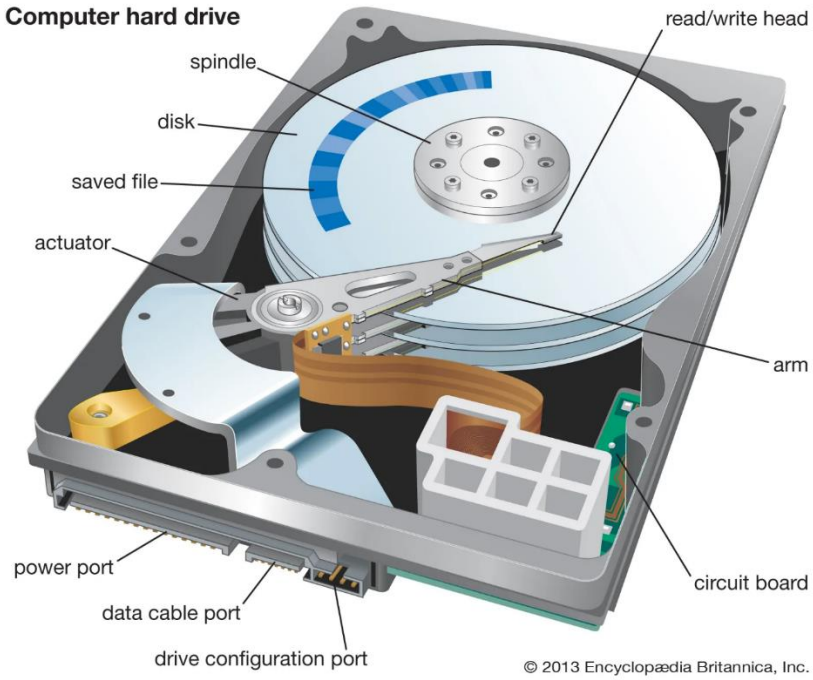

**C.** Random memory RAM It is recommended that the total memory not be less than 2GB as a minimum and currently 8GB is available in the market, and it is preferable to install two pieces (two slices) in the event that the processor supports the Memory Dual Channel technology, which among its advantages is obtaining

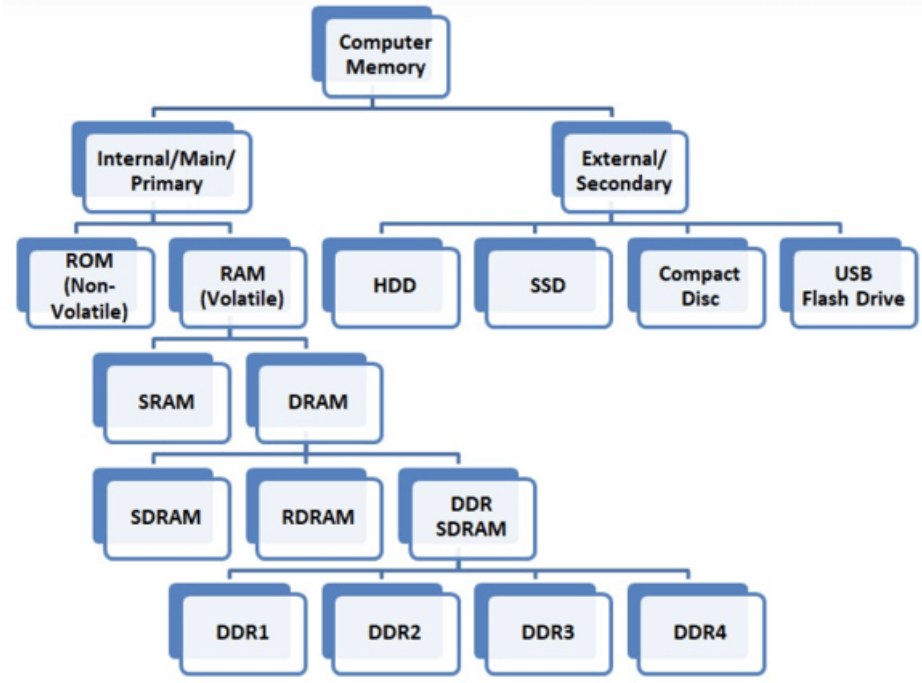
twice the frequency bandwidth and thus increasing the performance The computer, and the memory should be of the type of DDR with a frequency of 400MHz. As for Pentium processors, it is better to purchase a memory of the type of DDR2, the speed of which is not less than 667MHz. As for running games and applications with greater power, it is of the type of DDR3, which is stronger and faster in response.




**D. Hard Drive:** With the development of the hard disk industry and the decrease in its price, it is recommended to acquire the highest capacity, knowing that the user's need determines the storage capacity, and Seagate and Hitachi are among the most famous hard disk manufacturers in the world. It is also recommended to purchase a Serial ATA hard disk with a cache memory of at least 8MB and a storage capacity of 200GB. It is preferable to install two separate disks, each of them with a capacity of 120GB, so that the total capacity becomes 240GB. The reason for this choice is to allow them to be connected to each other and run on the basis of Disk Array RAID technology, which is a technology supported by most modern motherboards, knowing that the capacity of modern disks is available 1TB 750GB 500GB at a speed of rotation per minute Each one is 7200RPM and supports the Serial ATA bus, with

a data transfer capacity per second of 3GB/S and a cache of 6MB. The benefit of installing this type of disk is to obtain a faster data transfer.




**E. Monitor:** Thin LCD and plasma screens are one of the popular options now compared to traditional CRT screens, as they provide color quality comparable to regular screens, i.e. they give a higher degree of clarity (pixels), and they consume

less energy, and it is recommended to choose a response time rate of 5ms Response Time. Especially for those interested in watching movies, which is the time it takes for each pixel to respond to the visual effect on the screen to change colors according to the displayed variables.

A screen must also be chosen with a Contrast Ratio between 1 and 1000, which is the difference between the percentage of dark black color and bright white color, and a wide screen must be chosen because the field of transverse movement of the eye is wider and greater than the field of longitudinal movement. Therefore, screen manufacturers and film production companies have adopted wide screens. The aspect ratio is (16:9). The clarity of the screen is an important factor, for example, the 15-inch LCD screen gives an original resolution of 1024 x 768 pixels, while the 17, 18 and 19-inch screens give a resolution of 1280 x 1024 pixels. And if you set the resolution lower than the original degree, part of the light points (pixels) will not work, and therefore the image will not be good.

Currently, there is a DVI digital video port and an HDMI port (the perfect choice for watching a high-resolution image on modern screens, in addition to the usual VGA port). 80,000 hours, which is the expected period for its optimal operation.