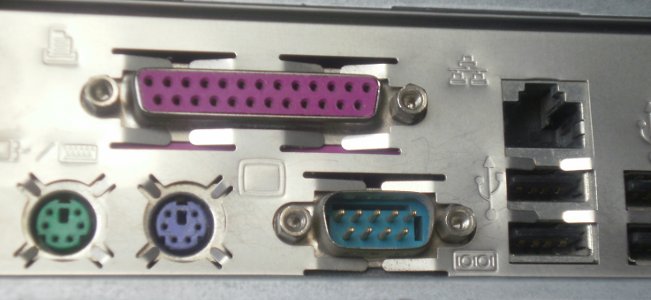
Syrian Arab Republic

Ministry of Education

The National Center for distinguished

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|  | ports …. |

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Supervisor : Mr.Amjad Taha.

Year : 2015 – 2016

The presence of technology in our lives has contributed to its transformation into a smarter , faster and easier life , It contributed to the development of science. For example ,today ,modern planes with Electronic Tech are more effective and much faster than the plans that lacks that property. As well as , we find modern weapons, which are called "smart" , and which are depend on information technology also more effective than weapons of the past .

These are the effects of technology in our lives , and it has several other effects in our daily lives and thus we discover and feel its importance and how it relates to our lives .One of the products of the technology revolution was the invention of the computer , which is one of the most important achievements of the twentieth century, then It was developed over the years until we got to the current form of computers .its presence was limited to companies and military fields .While these days it is above all of our offices and it is an essential part of every house , and is a necessity for every student ,employee and teacher .And here we reach to an important point , which is how we can use those computers without a way to take information from them and give them data , Here we find "ports" , that provide a connection between the user and the computer in most of the services performed by the computer ,

And If those ports doesn't exist , the computer will be unable to work because they are the most important ingredients in it - They are considered physical component - .We will find later there are some ports which are responsible for connecting the screen to the computer , as well as other ports are responsible for connecting a mouse and keyboard to it . and as we know that those are of the main components in the computer , and computer is cannot work without them , and even if it works its work will be useless.

We found that the ports are very important component in the computer  so what are the ports?? , What are the functions that give it this importance ?? what are the properties of those ports ??

Is it all the same in structure and functions?? , and equally important ??, or there are some of them is more important than others?? Are they all coincided with each other ?? what is the usb ?? what is it's specifications ?? why is it the most popular ports among the people ??

why is it contain the word " universal " ??

what is the LPT port?? does it have the same importance which is owned by usb??

Why is no longer used today ?? Are the ports all came straight ?? what is the other types of ports ?? what are they ?? . in general we can say , the ports are the most important equipments in the computer .. so let us read something about them .

In this research , we will talk about those ports and answer all those questions :

And that are the **goals of this research:**

1- be familiar with the ports and types of them and their properties and also the importance of each of them in the computer 's performance

2-talk about usb ports and its specifications .

3-talk about LPT ports and its specifications .

4-and talk about the other ports in a general way .

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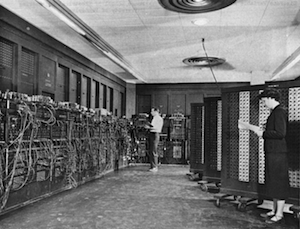
**References.......................................................................19**

**section one**

**the evolution of computer[[1]](#footnote-1)**

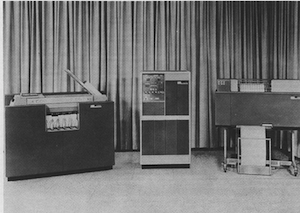
**first generation computers : (1940s – 1950s )**

First electronic computers used vacuum tubes, and they were huge and complex. The first general purpose electronic computer was the ENIAC ,It was digital, although it didn’t operate with binary code, and was reprogrammable to solve a complete range of computing problems . It was programmed using plug boards and switches, supporting input from an IBM card reader, and output to an IBM card punch. It took up 167 square meters, weighed 27 tons, and consuming 150 kilowatts of power. It used thousands of vacuum tubes, crystal diodes, relays, resistors, and capacitors **.**

****

**Second generation computers : (1955 – 1960 ):**

The second generation of computers came about thanks to the invention of the transistor , which then started replacing vacuum tubes in computer design. Transistor computers consumed far less power, produced far less heat, and were much smaller compared to the first generation, albeit still big by today’s standards. The first transistor computer was created at the University of Manchester in 1953. The most popular of transistor computers was IBM 1401. IBM also created the first disk drive in 1956, the IBM 350 RAMAC.



**Third generation computers : ( 1960s ):**

The invention of the integrated circuits (ICs), also known as microchips, paved the way for computers as we know them today. Making circuits out of single pieces of silicon, which is a semiconductor, allowed them to be much smaller and more practical to produce. This also started the ongoing process of integrating an ever larger number of transistors onto a single microchip. During the sixties microchips started making their way into computers, but the process was gradual, and second generation of computers still held on.



**Fourth generation computers : ( 1971 - present)**

The drive for ever greater integration and miniaturization led towards single-chip CPUs, where all of the necessary CPU components were put onto a single microchip, called a microprocessor. The first single-chip CPU, or a microprocessor, was Intel 4004. The advent of the microprocessor spawned the evolution of the microcomputers, the kind that would eventually become personal computers that we are familiar with today .



**section two**

**definition of computer ports and its properties:**

In addition to what we know about the ports as we talked in the foreground we can put another definition for them : Ports are connectors for external devices to a computer such as printer , screen , keyboard, mouse , speakers, microphone and other lots and lots of devices which we call peripheral devices , and every motherboard comes supported by a number of these ports.

What is a Port?

""A port:is a physical docking point which an external device can be connected to the computer using it .

can also be programmatic docking point through which information flows froma program to computer or over the internet.""[[2]](#footnote-2)

A port has the following characteristics:

* External devices are connected to a computer using cables and ports.
* Ports are slots on the motherboard into which a cable of external device is plugged in.
* Examples of external devices attached via ports are mouse, keyboard, monitor,microphone, speakers etc.[[3]](#footnote-3)

**section three**

**types of ports:[[4]](#footnote-4)**

And now we'll talk about the most important ports:

**PS / 2 ports :**

 Tow ports , are reserved for connecting a mouse and keyboard , and are similar in form but they are different in terms of color , the first is green , It is dedicated to the mouse and the other is purple color which is dedicated to the keyboard, the PS / 2 ports are considered a modern succession and their appearance has made the mouse be connected to the computer by them instead of connected to the serial port COM1 or COM2 and keyboards became connected by them instead of it be connect by the old port which is custom to keyboards .

**Serial and parallel ports :**

In general, the sequence is an event occurs at one time . It is often compared in parallel , which means that more than one event occurs at a particular time .In science of data transfer , the time- division and partition space techniques are used so that time is what differentiates between sending individual bits sequentially and the space used for the transmission of multiple bits in parallel .

**Serial ports :**

Serial communication port is used to connect the output and input units such as a mouse or modem or a printer or scanner or direct connect between two computers to transfer information between them .

The transfer of digital information to and from the computer through this port is sequentially and using a single transmission and reception line,

And connecting which is being via the serial port according toRS-232C protocol which is name the serial ports in the computer COM1 , COM3, COM4 , COM2 . its Great speed transport : 28400 bps.

**Parallel ports :**

They are called LPT1 and LPT2 and it is usually used to connect a printer or scanner or something like this . the parallel port which is used to connect the printer can also be used to exchangeInformation between two computers and also for connecting other devices.

The reason to be named (parallel ) is "the transfer of information boxes is in parallel ( branching )" .The transfer of digital information to and from the computer through the parallel port every 8 bit together and therefore we use 8 lines for the transfer of data and 8 lines to receive data .It is the fastest at least 8 times that of the serial link .The port LPT is consists of 25 pins .

**section one:**

why , why is the USB ??

The Universal Serial Bus was invented and standardized by a group of computer and peripherals manufactures in 1995.The idea was to take the whole area of serial port and serial bus and update it with the twenty-first century technology It is true that there were many standards of communication between host computers and peripherals, but the goal was to create a **technology that combines low speed and high speed bus activity. The technology enables shared access for both speeds, a technology which provides robust protocol, automatic configuring of devices and a serial bus which is simplified and easy to plug into**. All those requirements were met with the USB standards.[[5]](#footnote-5)

**usb :**

according to the references [[6]](#footnote-6): usb (or universal serial bus) is a high speed connectivity standard enabling simple plug and play connections to devices such as printers , digital cameras , camcorders , keyboards and mice. the standard is supported by many leading suppliers of computers and peripherals .An attractive advantage of usb is that the devices are hot pluggable .. meaning a live connection / disconnection without data loss or interruption .

currently there are two relevant revisions of usb 2.0 and usb 3.0 is an emerging standard that allows large amount of data or video to be transferred up to 10 times faster than usb 2.0 .

However , usb 2.0 is still much more common in the marketplace

and usb 2.0 expected to remain relevant for applications that do not require large amount of data to be moved.

Its important to note that in order to take advantage of the increased bandwidth usb 3.0 which is provided all components must be 3.0 compliant-host , cables and peripherals .

otherwise the bandwidth will perform to the lowest rated component .

initially usb products were used mainly to link computers and their associated peripherals . today usb is used in nearly every field including communications , entertainment , medical and automotive**.**

**section two**

why , why is the LPT ??

**A parallel port (LTP) :**

It is a type of the ports on the computer or other equipment in order to connect multiple devices and accessories and is also known printer port. Called parallel because it transmits data in parallel single-bit

It conveys more than a bit at the same time, unlike the serial port which transmits one bit per minute .[[7]](#footnote-7)

**types of parallel port :[[8]](#footnote-8)**

There are many types of parallel ports , the most important ones :

1-Compatibility Mode.

2-Nibble Mode.

3-Byte Mode.

4-EPP Mode.

5-ECP Mode.

It consists of 25 pin .[[9]](#footnote-9)

Divided into three main sections as follows :

data port 8 bit , status port 5 bit , control port 4 bit .

Values that are sent and received from the parallel port to be binary exclusively As the logical one is the 5 volts and it is called high-voltage pin, The logical zero, is 0 volts and the so-called low voltage pin ,It can not be dealt with one pin separately, but are dealing with all the pinsIf we want to send the value 4 to the pin , it must be sent on the form 00000100

**section three**

**other types :**

**ps/2 ports :**

ports that are used to connect a mouse or a keyboard to the computers . Also it is called mouse port. Most of the old computers provide two PS/2 port, each for mouse and keyboard.

**Serial ports :**

Used for external modems and older computer mouse . but it’s the oldest and the slower port at all . so its not used longer . its speed is about 115 kilobyte/second and its acceptable when it used to connect a external modem to a computer . but not acceptable at all to connect a peripherals that demand high speeds to transfer their data like scanners or digital cameras .[[10]](#footnote-10)

**Sockets :**

Ports that connect a microphone, speakers to sound card of the computer in general .

**Firewire :**

It transfers large amount of data at very fast speed .And connects camcorders and video equipments to the computer . Data travels at 400 to 800 megabits per seconds .and they was Invented by Apple .

**VGA Port :**

It connects monitor to a computer's video card. It has 15 holes.

And it is similar to serial port connector but serial port connector has pins, it has holes.

At the end we found that ports are very important parts in computer’s performing .and without them we can not take advantages of computers because we wont be able to exchange data (send and receive it) .

We can see also that each port have it’s own Characteristics and we can’t replace one of them instead one another , yes because each port offer us a special services we don’t find it in another port .

Also we noticed that ports are developed according to the humanity needs , like USB ports or firewire ports they are found to meat our needs to have more and more speeds while travelling data .

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1. بنية الحاسب , منافذ التوسعة والنواقل , الوحدة الأولى

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5. - EMI Filtering, USB Upstream Line Termination and ESD Protection Using the STF202 Device , article , Publication Order Number: AND8074/D , January, 2015 − Rev. 5 [↑](#footnote-ref-5)
6. https://www.l-com.commultimediatipstip\_what\_is\_usb.pdf  [↑](#footnote-ref-6)
7. [http://www.marefa.org/index.php/%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"85HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"86HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"81HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%BHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"0HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"\_%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"85HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%AA%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"88HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%AHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"7HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%BHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"2HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"A](http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A)). [↑](#footnote-ref-7)
8. [http://www.marefa.org/index.php/%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"85HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"86HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"81HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%BHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"0HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"\_%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"85HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%AA%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"88HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%AHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"7HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%BHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"2HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%DHYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"9HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"%HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"8HYPERLINK "http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0\_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A"A](http://www.marefa.org/index.php/%D9%85%D9%86%D9%81%D8%B0_%D9%85%D8%AA%D9%88%D8%A7%D8%B2%D9%8A) [↑](#footnote-ref-8)
9. http://www.tutorialspoint.com/computer\_fundamentals/computer\_ports.htm

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10. بنية الحاسب , منافذ التوسعة والنواقل , الوحدة الأولى . [↑](#footnote-ref-10)