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**Assignment 4**

**Distributed systems:**

began to talk about in the second half of the eighties to obtain a computer with greater capacity for data, in order to obtain a computer center to serve a large number of institutions, that is, we had one computer with great capacities and rescue to it through remote terminals. At a later stage, the idea of ​​specialized computers appeared for a specific type of application, so that the focus is on one aspect of the business according to the field in which it works, for example: high computational capacity, and thus we turned to the concept of specialization. From the moment we turned to specialization, the need to divide work into several parts appeared (work no longer exists on a single computer, but rather on several computers).

**Definition of distributed operating systems :**

Most of the current systems are distributed systems, and distributed systems are systems that work on many devices linked together with a network, which are operating systems that appear to the user as if he works on a central system, but in fact it works on several central processing units that work at the distribution level.

**Advantages of distributed systems:**

1- Reliability: The concept of reliability was specific to the world of manufacturing. When we say equipment with high reliability means that it does not break down, and then this term moved to the software and a question arose for us as long as we were puzzled, which is when we consider the system reliable? The concept of reliability differs according to the acceptable error rate, so reaching reliability was difficult by traditional methods, and to raise the reliability by 20%, the cost should be raised 50%. One works the other.

2- Sharing of resources: There was a great necessity to share resources because they were expensive and the idea of ​​distributing them appeared.

3- Aggregate computing power: obtaining, utilizing and utilizing enormous capacity by distributing work to devices.

4- Openness / Scalability: Computer systems are scalable and open systems that we can develop and integrate with in a moment.

**Disadvantages of distributed systems:**

1- Security: The security problem is one of the very important problems in distributed systems, and here it should be noted that security is the most important branch currently in computers. The more widespread computing in the areas of public life, the greater the risk and fear of penetration of computer systems. Among the security problems is DOS (Denial Of Service) attacks, which is the sending of a large number of requests to the server so that it stops working and becomes unable to receive new requests.

2- Physical distribution of resources vs demand.

3- Computing power per node is limited: This problem appears when we want to use distributed systems as an alternative to parallel systems. For example, some simulation systems need half a million devices to solve a single operation.

**Distributed operating systems:**

There are many requirements that must be met in order to judge the system as a distributed operating system, and they are as follows:

1- Transparency: it means giving the user the impression that he is not working on a distributed operating system.

2- Hide the whereabouts of the resources.

3- Providing techniques to protect resources, which means the ability of the system to protect resources from various risks through unauthorized access to control by a user.

4- The ability to secure communications and prevent information theft.

**Architecture of Distributed Systems:**

There are several known architectures for distributed systems, which we will show as follows:

1- Clint / server model: In these systems, the application is modeled as a set of services provided by the server, and as a group of clients who use these available services that the customer knows in advance, and it is not necessary for him to care about other customers and he will not need to know them, because both client and services are Independent Procedures.

2- DISTRIBUTED OBJECT MODEL: In this model, there is no difference between all connected devices, all of them can perform required tasks and all of them can request services from other devices.

**Architectures in Distributed Systems:**

1- Peer-to-peer architecture: The idea of ​​a peer-to-peer system is based on the principle of assembling a group of computers connected to each other by means of a network so that each of these computers acts as a provider for the rest of the computers and provides them with the data they need. At the same time, this computer acts as a client when requesting data from the rest of the computers.

2- Service Oriented Architecture.

**In computing, a cluster system:**

is defined as a collection of loosely or loosely connected servers and processors that work together so that, in many respects, they can be viewed as a single system. Unlike networked computers, in computing Cluster Every server dedicated to the same task is controlled and scheduled by software. 

Cluster components are usually interconnected via fast local networks, and each node (the computer that uses a server) manages its own state of the operating system. In most circumstances, all nodes use the same hardware and operating system, although in certain settings (such as using OSCAR sources), different operating systems can be used on each computer, or different hardware can be used.

Cluster systems are usually deployed to improve performance and availability compared to those from a single computer, while they are usually much more cos -effective than similar individual computers in terms of speed and availability.

Computer clusters emerged as a result of the uptake of computing trends, including the availability of low-cost microprocessors, high-speed networking, and software for high-performance distributed computing. Clusters have a wide range of applicability and deployment, ranging from small business clusters and their help nodes, to some of the fastest supercomputers in the world such as the IBM Sequoia. Before the invention of clusters, large computers were used that tolerate an error of one unit with a standard frequency. However, the decrease in the initial cost of clusters, and the increase in the speed of the network structure, caused a preference for adopting clusters. In contrast, larger, reliable, larger computer clusters are cheaper to scale up, but they also have more complexity in handling errors, as the error handling modes in clusters are not ambiguous to the programs running

**Features :**

Clusters provide many services to the electronic work environment, including:

**Large processor capacity**

By using the power of multiple processors together, clusters systems can secure large and complex network loads as one cluster cuts the time for engineering work from days to hours.

**Optimal use of resources**

The cluster signal can serve more than one load from the network and expand the processor power according to its need to download from the network. This makes clusters ideal in making the best use of resources and using them optimally.

**Economical in resources**

System splitting automatically handles the download signal from the network and it should be measured according to the urgent needs of the download from the network. This means that it will use a little bit of capacity, but not all of it even if the computer is perfect.

Participation in clustered systems allows to increase the processor's capacity to load across several networks, and it also increases the use of the advantages of sharing with processors by using unused capacity.

**Central Systems Management**

Advance scalability tools, distribute clusters from control point to signal.

Consolidation of servers in different geographical areas

In addition to the standardization of server work described previously, some customers share processor power across the world, for example by converting the processing of US transactions that take place in the daytime to systems in Japan that are relatively idle at night.

**Cloud computing :**

is a term that refers to the computer resources and systems available on demand across the network that can provide a number of integrated computing services without being restricted to local resources in order to facilitate the user, and these resources include space for data storage, backup and self-synchronization, as well as Includes programmatic processing capabilities, task scheduling, e-mail payment, and remote printing. When connected to the network, the user can control these resources through an easy programming interface that facilitates and ignores many details and internal processes.

**The method of work**

When a user accesses a cloud for a suitable website, many things can happen. For example, an IP can be used to establish the location of that user (geographic location). Where you can then take advantage of the Domain Name System (DNS) services to direct the user to a set of services close to him and related to him, and then he can access the website quickly by using his local language. Here, we note that the user does not log into the server, but instead logs into the service they are using by obtaining the session ID and / or tracking history (cookie) that is stored in their web browser.



What a user sees on their browser is often returned to it from a group of servers on the Internet. These web servers are characterized by running programs that engage the user with interactive interfaces that are used to collect commands or instructions from them (mouse clicks, writing and editing, file uploads, etc.). As these commands are then interpreted by the web servers or processed by the various application servers (servers). Then the information is stored or retrieved on / from database servers or even file servers, where in the end it happens that the user gets an updated page. And we should notice that data across different servers are synchronized around the world in order to allow all users in different parts of the world to access it and access the information available through it.

**Technical description (technical characteristics)**

Cloud computing, for example, can be compared to a source of electricity or gas, or it is text-based telephone, video, and postal services as well. All of these services are provided to users in a smooth and palatable format to be easily understood without the need for users to know how to provide those services. Where such a vision is called abstraction. Likewise, cloud computing provides and presents computer application developers and users at the same time an abstract destination that facilitates and ignores many details and internal processes. Here, we note that the process of providing the contractors with abstract electronic services via the Internet is called "the cloud".

The cloud computing process refers to computing, drivers and applications, access to data, in addition to storage services that do not require the last user of the service to know the geographical location and the configuration of the system that connects those services. Where it is possible to identify examples analogous to that idea, taken from the field of the electrical grid, where the last user consumes and benefits from energy resources without the necessary need to understand and know the devices that make up the network and are required to provide that service.

Cloud computing describes a new addition, consumption and a connected distributed model for IT services based on Internet protocols. It also typically includes interactive and often virtual scalable resource provisioning and provisioning. Hence, it is a by-product and by-product of the ease of accessing the remote computing sites provided by the Internet. It also often takes the form of tools for the Internet or applications that the user can access through a web browser as if they were programs that were locally added on their personal computers.

While the National Institute of Standards and Technology (NIST) provides a more objective and specific definition of the term (cloud computing):

Cloud computing is a model that allows network access when needed and appropriately to a bundle of configurable computing resources and resources (including, for example, networks, servers, storage, applications and services) that can be funded and launched quickly with minimal management effort or service provider interaction.

The funders of typical cloud computing services provide and deliver business management software over the Internet that can be accessed from any other web service or other software such as a browser, while computer software and various data are stored on specific servers for these purposes.

Most of the information computing infrastructure consists of services that are provided and connected through public centers and the servers (servers) built on them. Here the clouds appear as a cash.

**Assignment 1**

**INTRODUCTION :**

Computer development tends to make the computer faster, cheaper, and more able to store data, as well as perform larger and more complex tasks. Before the existence of computers, humans used to perform mathematical operations by themselves. The development of computers went through many stages and great developments until it became used in several fields such as education, communications and others.

In 1835 AD Babbage invented the **first calculator** and it was called the "Analytical Machine". Its parts were many and it was difficult to construct accurately and this machine never worked.

The era of the modern computer began in 1944, when the engineer "Aiken" invented the first modern computer named "Mark". This computer was electromechanically, not electronically, and it performed several functions such as storing data, printing information with an electrical machine whose size was as large as the size of a large hall. Computer Generations and Types:

**Computer generations:**

**First generation (1942-1954)**

In the 1950s, a UNIVAC computer was produced that was used to tabulate population statistics. This generation used vacuum tubes that are vacuum tubes that can stop or pass an electrical current without the need for a mechanical converter. It was large and heavy in weight, its speed was slow and needed to be heated before its work. It consumed a large amount of electrical energy. It used machine language where the instructions for the computer were in the form of a series of numbers. It was complicated.

The CPU consists of this generation of computers:

Data processing unit

Programmable controller

The main units that make up this generation:

Unit of arithmetic and logic.

Control unit .

main memory .

A group of public recorders (consisting of):

Accumulator (AC)

Multiplication and Division (MQ) recorder

Data Logger (DR)

Address recorder (AR)

Program counter (PC)

IBR

IR

5- Output unit.

Information form: The basic unit of information is the word (word) and it consists of 40 binary cells; It can be exchanged between the central processing unit (CPU) and the main memory (M.M) at a specific moment in time. Then the words are stored in the main memory under specific addresses, where the main memory can accommodate 4096 words (212), because the number of lines allocated to the address is (12).

The information stored in the main memory is divided into two parts:

Parameters: are numerical values ​​that are represented in the memory using a whole word, and the leftmost cell is reserved for reference

Instructions: Two lessons are stored in one site; each learning has 20 double digits.

See the figure for illustration

Second generation (1952-1964)

He based his design on the transistor

Calculators are smaller, less expensive, and faster.

The emergence of programming languages ​​such as Cobol, Fortran.

Magnetic disks were used as storage units.

Of this generation's computers: - The Tradic computer (made by Bell Labs).

In this generation, the vacuum tubes were replaced by transistors, which are smaller in size, have a longer lifespan, and consume much less energy and heat than vacuum tubes.

Transistor: It is a component that allows electrical energy to pass in one direction, while at the same time it works to stop the flow of electrical energy in the other direction.

Magnetic disk memory was also used as a means of storage and it is of high storage capacity. In this generation, high-level programming languages ​​were used instead of symbolic languages ​​and machine language in computer programming. Special processors have been allocated to supervise input and output operations called (I / O Processors). In addition, some registers have been added that perform arithmetic operations on the numbers represented by the decimal point.

Data form: As in the first generation, the word is the basic unit of information, as the information is organized into words with a length of 36 binary cells, where these words are stored in locations in memory (215). See the figure for clarity — computer use was restricted during this period to universities, government organizations, and businesses, and was not commonly used

The first major computer change occurred when the transistor (semiconductor) was replaced by a vacuum valve. The transistor, as it is known, is smaller, cheaper, and less heat-dissipating than a vacuum tube. It does not require wires, metal sheets and glass tubes, but rather a solid element made of silicon. By using the transistor, building computers entered its second generation. The classification of computers for generations depends on basic hardware technology. Each generation is distinguished from others by increasing the speed of its operations, its memory capacity and its small size. The computer industry has undergone other changes. The second generation witnessed the production of more complex arithmetic, logic and control units, the use of high-level programming languages, and the introduction of System Software software with the computer.

**Third generation (1964-1972)**

Computers have evolved in this generation, where integrated circuits made of silicon wafers were made, which are pure semiconductor materials, to which impurities are added in a very specific and accurate way, so that the result is capacitors, transistors, resistors, and the rest of the integrated circuit elements.

Ingredients for this generation:

main memory

Memory controller

CPU - The controller is connected: -

Express terminals via (I / O processor)

Slow terminals via (another channel that can be used to connect more than one input and output unit)

Data shapes:

Here, the byte was used as a data unit (8 binary cells) that could be stored in one of the memory locations and manipulated when needed, and the word could be represented by 4 bytes. The digital data is represented in 4 ways: 1) Packed method: two numbers can be stored in one byte] The number is composed of one digit (2) The non-packed method: One byte is allocated to store the number 3) Fixed comma 4) The decimal point

See the figure for illustration

Advantages: lightweight, small, inexpensive, disadvantages:

Its components cannot be separated from each other after manufacture.

It can't be repaired if it breaks.

And one of the most important programs that appeared in this generation is the operating system. -It has appeared in this generation of microcomputers

**Fourth generation (1972-1991)**

This generation used integrated circuits (LSI), chips, and microprocessors: a chip containing more than 1,000 transistors in a very small area of ​​silicon. RAM & ROM appeared in this generation - The personal computer (PC) also featured its features:

**Small size**

Speed ​​increase

The memory capacity is large

Low cost - this became the speed measured in millions of operations per second, based on flour design.

Live RAM and dead ROM

The advent of miniature hard disks and floppy disks

The input and output devices are becoming more sophisticated and easier to use.

Operating systems development.

One of the computers of this generation is IBM Pc.

**The Fifth Generation (1990)**

A next generation of smart computers.

Higher efficiency (phoneme - dealing with languages ​​and dialects to carry out orders and analyze them).

A computer is a device that processes information automatically and has a complex electronic structure. Due to the development in the field of electronics, computers can be divided chronologically into five categories, which we call generations (Générations).

**Sixth generation (post-1992)**

The generation of artificial intelligence and robots.

Huge increase in speeds and storage capacities.

**Network development.**

Features of the fifth generation, high-speed, high-resolution, high-capacity, large storage capacity. The fifth generation from 1989 to the present generation - and

**the future generation**

Due to the great and rapid development of computer technology, humans are now entering the field of artificial intelligence to produce smart computers that simulate human mental and motor capabilities. Scientists ’research in the field of communications, the Internet and artificial intelligence will not stop in order to produce smart computers that can reprogram themselves. Research in this field is based on designing computers based on a neural network known as the artificial neural network in addition to an attempt by genetic engineering scientists to produce a biological chip instead of a chip. Silicon is now used in calculators.

**types of computer equipment :**

**Personal computer**

A personal computer is a device that is used by a single person, meaning that it is intended for individuals, like all other types of computers that are used by a group of individuals.

**Desktop PC**

A standard personal computer can be placed on a desk, with its display screen positioned over the horizontal computer case.

**Tower PC**

The vertical case PC contains the same parts as the standard horizontal PC, except that the horizontal case is larger and therefore more devices can be installed inside it. The vertical tray can be placed on the floor to save space on the desk.

**Laptop**

It is small and lightweight, which makes it portable, unlike standard computers. Notebook computer can run on electricity or battery.

**Main computer or (Main Frame)**

Main computers are large, powerful, and expensive computers. Used as a reference in large organizations. These computers are used for central storage, central processing and management of a large amount of data. As for the price of the main computer, it may reach one hundred thousand dollars. Also, the power of the computer can be distributed among the number of users who access the main computer through their personal computers.

**Apple Mac**

This computer is different from the personal computer that we talked about earlier. Since it uses a different operating system and also requires special versions of the programs, even the internal parts must be designed to some extent that can be connected with this type of computer. In the past, the main thing that distinguishes a personal computer from a Mac computer was the so-called graphical application interface (GUI), or in other words, the method that enables you to control the computer through a mouse. To use old personal computers it required experience with these devices, but recently - with the presence of Microsoft Systems There is no longer any difference between traditional PC and Mac computers.

**Network PC**

The network allows you to connect two or more devices with each other, and this allows the data stored in one computer to be used by the other computer on the network, and it also allows the sharing of some resources, for example, instead of each computer needing a special printer connected directly to it, you can now Bring one printer to be shared.

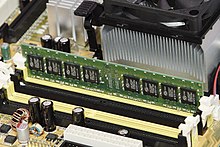
**Personal digital assistant (PDA)**

Personal digital assistant (PDA) is equipped with a special pen instead of the keyboard that can be used to store and recall information. Like many computers, it can be connected to the Internet.

**Computer data storage unit :**

often called a storage unit or memory, is a technology consisting of computer components and recording media used to hold digital data. It is an essential component of computers.

A computer's central processing unit is what processes data by performing mathematical or computational operations.In fact, almost all computers use a memory hierarchy, which puts fast and expensive storage media options close to the CPU, storage media. Slow down but bigger, cheaper options and move away from the CPU. Generally, technologies are ephemeral (which disappear as the electrical power goes away) which is called memory while slower technologies are referred to as volume, but fixed storage is sometimes called memory storage.

[[](https://ar.wikipedia.org/wiki/%D9%85%D9%84%D9%81:DDR2_ram_mounted.jpg)](https://ar.wikipedia.org/wiki/%D9%85%D9%84%D9%81:DDR2_ram_mounted.jpg)

1 GB of SDRAM installed on a PC.

1 GB of SD Ram vehicle on a personal computer.

An example of a master volume

[](https://ar.wikipedia.org/wiki/%D9%85%D9%84%D9%81:Seagate_Hard_Disk.jpg)

40 GB advanced parallel HDD technology socket; When connected to a computer it acts as a secondary storage unit

[](https://ar.wikipedia.org/wiki/%D9%85%D9%84%D9%81:Super_DLTtape_I.jpg)

160GB of SDLT tape cartridge, example of "external" storage. When used with a robotic tape library, it classifies as tertiary storage

Computer data storage, often called a storage unit or memory, is a technology consisting of computer components and recording media used to preserve digital data. [1] It is an essential component of computers.

