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Cloud Computing and Its Application in Different Sectors

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Abstract

Cloud computing refers to the development and application of internet-based processing technology. Cloud computing, as a new business model, significantly impacts the information technology (IT) industry, and its integration into various business applications highlights its value at a deeper level. The purpose of this study is cloud computing. Its use is to control processes. With the rapid development of cloud computing, organizations can achieve greater efficiency in delivering IT services, while reducing costs. This technology benefits both large enterprises and improves the operational efficiency of small and medium-sized businesses in the IT sector. Optimizing the process based on cloud computing can increase overall standards and competition in the field of IT. Cloud computing has facilitated doing things in addition to solving previous problems. In addition, for organizations, cloud computing will be worth paying attention to, through which they can advance their professional goals by building cloud-based business-related systems, and in this way, obtain benefits such as reducing costs and increasing interest. Benefit from many choices and large industries can also benefit from the reduction of infrastructure costs after the global economic recession. Developers will be able to improve their abilities when facing cloud computing through the platform-as-a-service model. Therefore, we can see that this will have a significant impact on various roles in cloud computing.

Keywords: Cloud computing, process control, information technology, IT industry, infrastructure costs, network processing

INTRODUCTION

Cloud computing is the latest buzzword in the information technology (IT) industry [1], where information technology and the internet have become an integral part of people's lives, and with the change in the lifestyle of people in society, there are needs such as information security, fast processing, instant access to information, and most importantly, savings. The costs also changed. Naturally, with the expansion of these needs, organizations and individuals have completely different needs in the field of electronic services compared to the past. For example, in companies and organizations where a large volume of information is processed daily, there is a need for a large storage space with high processing speed. Suppose that in a document registration organization, where a large volume of information circulates daily, we need computers with high processing power and special software in the form of a single license, which requires a lot of money and time to prepare. As another example, the New York Times newspaper decided in 2007 to convert its entire archive from 1851 (which was about four terabytes in TIFF format) to PDF and put

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it on the web, which took years using conventional processing methods. It took a long time. Therefore, it is natural that these organizations seek solutions to reduce costs and improve response times. However, in the 21st century, with the possibility of easy access to the internet and light-portable devices, users will not desire to use devices with high processing power, and the desire to use service-oriented services has increased daily. A cloud is a parallel and distributed system comprising a collection of virtualized interconnected computers that are dynamically allocated and presented as one or more unified computing resources. These resources are managed based on service-level agreements established through negotiations between service providers and customers [2]. The solution that has been proposed to solve emerging problems in the last decade is a technology called cloud computing, which seems to have been implemented in recent years with new methods of processing according to McCarthy's dream that processing will be used as useful general software is used, we are getting close, and cloud computing can be considered the largest step toward achieving this goal. This technology has become very important from the point of view of computer science researchers; cloud computing has been included in the list of the top ten technologies in the world and is expected to change the lives of people in societies like the internet, which introduced a new way of life to people, and even to it will go on to control the kitchen sink. Taghipour et al. [3] examined the impact of information and communication technology (ICT) on knowledge-sharing obstacles within the knowledge-management process, including a case study. Mohammadi et al. [4] investigated the role and impact of ICT tools in evaluating the performance of service organizations.

DEFINITION OF CLOUD COMPUTING

Cloud computing refers to the development and application of internet-based processing technology. This term is a method of computer calculation in a space where capabilities related to IT are offered as a service to the user and allow them to access technology-based services on the internet; Without having specialized information about these technologies or wanting to take control of the technology infrastructure that supports them. This phrase is a general concept used to integrate new technologies, such as software as a service, Web 2, and other new tricks that have been released recently, so that all the needs of users can be met with common and everyday topics. He answered on the internet. For example, Google Apps offers general commercial tools online so that users can access them through an internet browser when their information and software are available on the server. Cloud computing enables convenient networked access to a shared pool of configurable computing resources that can be rapidly provisioned, utilized, and released, with minimal effort and cost [5]. The following are some definitions of cloud computing:

The National Institute of Technology and Standards defines cloud computing as follows (Figure 1):

- Cloud computing is a model that provides on-demand network access to a pool of flexible and configurable computing resources such as networks, servers, storage, applications, and services. This access requires minimal resource management effort or direct intervention from the service provider and allows resources to be quickly provisioned or released.
- Cloud computing is a model that relies on large computer networks such as the internet to provide, consume, and deliver IT services, including hardware, software, data, and other shared computing resources.
- Cloud computing offers solutions for providing IT services in ways similar to public industries (water, electricity, telephone, etc.). This means that access to IT resources is delivered to the user through the internet in a flexible and scalable manner at the time of demand and based on the user's demand.

Cloud computing not only addresses previous issues but also simplifies various tasks. The term 'cloud' is metaphorical, representing the internet in network diagrams, where a cloud shape symbolizes the network. The comparison of the internet with a cloud arises from the fact that, like a cloud, the internet obscures its technical complexities for users, providing a layer of abstraction between these details and users [6]. To make this issue clearer about electrical technology, think that you press the light switch in your room several times a day and use electricity without having control or knowledge

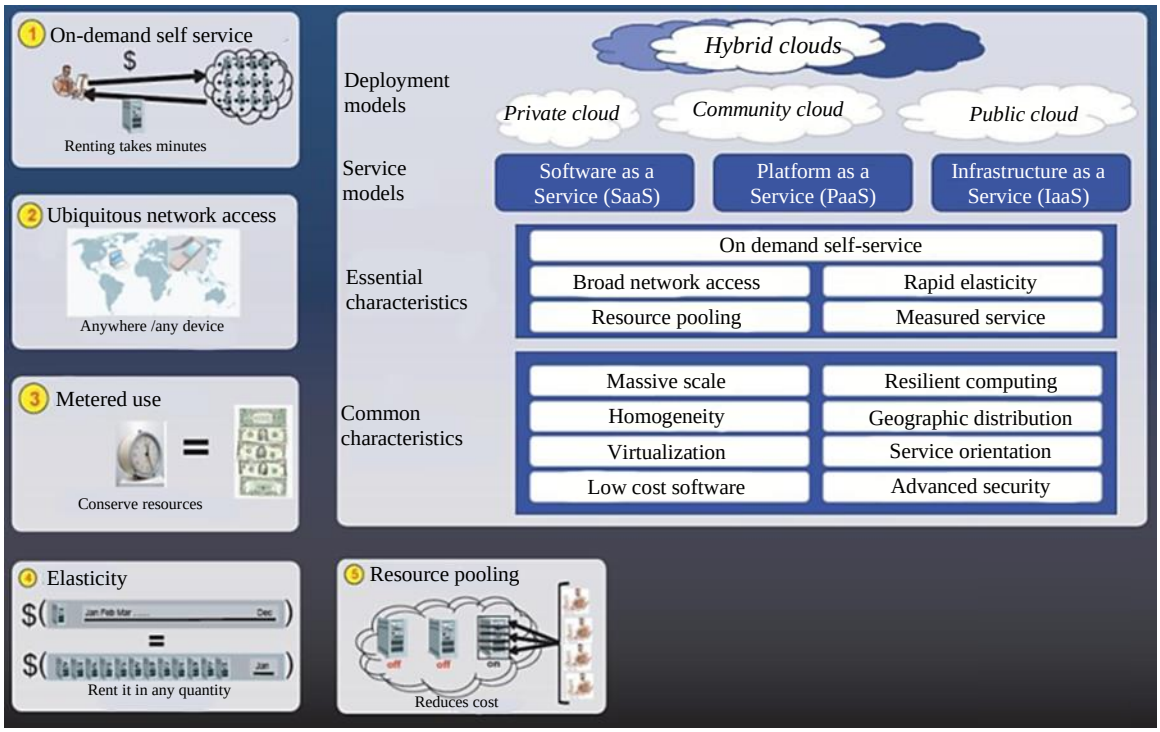

Figure 1. The National Institute of Standards and Technology (NIST) definition of cloud computing /1/.

of the complex processes that take place in the power plant to produce electricity [7]. Even if you press the switch and you do not pay the electricity company until you have used the electricity branch of your house, the electricity provided to you has its standards defined by the electricity company, and you do not even know it. From which power plant is your electricity consumed (in the discussion of security, we will discuss the point that this feature of cloud computing (the consumer's lack of information about the location and method of supplying resources) is one of the reasons for the increased security of this processing method).

BASIC ELEMENTS OF CLOUD COMPUTING

Virtualization, network computing, and the web.

VIRTUALIZATION

One of the biggest problems faced by IT managers is the excessive amount of single-purpose server hardware required. The most important reason for increasing the number of such hardware applications is the incompatibility of applications that run on different servers. As a result, system administrators prefer to run applications on separate servers. On the surface, an increase in the number of servers is not considered a significant problem. Over time, it has become clear that heavy hidden costs must be paid for the excessive increase in server hardware costs, electricity consumption of servers, cooling equipment of the data center, the place where the servers should be kept, and most importantly, expert experts who are responsible for managing the systems, both in terms of hardware and software. Compel managers accept service integration as their principle.

The most reliable way to integrate servers is to use virtualization technology. Virtualization provides the possibility of running multiple virtual machines on any physical hardware. Each virtual machine can run its operating system independently. Using virtualization, it is possible to run several operating systems (even incompatible) on one server simultaneously, with each operating system running an application. Virtualization features are listed below.

- Optimal use of hardware resources.
- Easier management and as a result reducing the number of technical experts required.

- Non-dependence of virtual machines on hardware resources.
- Separation of virtual machines.

The main difference between clouds and virtualization is that,

- The purpose of the cloud is to automate the acquisition of resources.
- Virtualization aims to optimize the use of resources.

Major Differences Between Cloud Computing and Network Processing

- In network processing, a large project is divided into several computers to use its resources. However, in cloud computing, several small computer programs can run simultaneously on several computers.
- Network processing can be used only for applications that can be executed in parallel. However, there are no limits to this field of cloud computing.
- In network processing, resource allocation is always based on a contract set between the virtual organization and the domain manager. Therefore, they had limited resources. However, in cloud computing, the allocation of resources is based on supply upon request, and the domain manager allocates the requested resources based on the needs of users. Users are compensated based on their usage.
- Network processing is required for a small number of users with large requests, whereas cloud computing is required for a large number of users with small requests.
- In network processing, all network systems must use the same operating systems and software. However, there are no restrictions on cloud computing.
- Network processing is a technology used by people with specific needs and often experts, whereas cloud computing is a processing method used by anyone and anywhere. It can be said that even though cloud computing is a newer technology, it has gained more acceptance because the limitations in network processing are not seen in cloud computing. In addition, large companies, such as Google and Yahoo, provide many of their widely used services on cloud platforms.

In summary, we can state the following:

- The purpose of cloud computing is to provide the highest end service to end users.
- The purpose of network processing is to perform complex calculations.

SECURITY

The relative security of cloud computing remains a contentious issue hindering its widespread adoption. Some argue that data security is better when managed internally, while others believe that service providers are highly motivated to uphold trust and implement stronger security measures, as noted in reference [8]. Cloud computing applications include online games, social networks, and scientific applications. One of the key consequences of public clouds is their security and privacy [9].

Contemporary software is mostly sold as a service, in which case users only need a web browser to use the software instead of installing it on their system, because of this software. They are stored on a server and the user uses the software as a client. This feature has caused software updates and security as well as data to be provided by the service provider, and the customer or user is not related to these issues.

Cloud computing provides resources for users through the internet and as mentioned before, has three main features. The types of resources provided to users are software (SaaS), platform (PaaS), and infrastructure (IaaS). Security Problems in Cloud Services. All experts in this industry interpret the concept of cloud computing from their perspectives. Consequently, after reviewing a large number of studies and projects conducted in this regard, there are likely no standards in the field of cloud computing. Therefore, we analyze the problem of cloud computing security using small components.

A higher level indicates logical action. Finally, each of the security aspects of cloud services is classified into one of the following groups:

- Security problems related to cloud services and Web 2, as a principle, state that these problems are more related to the privacy and protection of users' personal information than to the security of cloud services. Similar problems can be observed in the services provided by most of the main internet service providers. For example, we can refer to several complaints from Google and Microsoft regarding tracking of user information.
- Organizational security problems arise from the popularity of cloud services. Usually, company employees chatting about confidential organizational issues on separate social networks becomes problematic for their respective organizations.
- Cloud computing security problems are related to the organizational use of these services, especially SaaS.
- Problems related to the use of cloud computing concepts in information security solutions.

To avoid confusion and contradictions, we will examine only the third group of the above problems in detail because this group of problems is, in fact, the most serious security problem that organizations face. Cloud services have attracted internet users and no security threat can change this trend. A controversial issue is how cloud computing can become an organizational platform for small, medium-sized, and large multinational organizations.

Analyzing Enterprise Cloud Services One of the Internet Database Analysts (Institute) who gave a speech at the Internet Database Cloud Computing Association in February 2013, says: The most important concern of organizations that tend to use cloud services, is information security. According to the internet database, approximately 75% of IT managers are concerned about the security of cloud computing services (Figure 2).

To understand this, the security problems must be broken down into smaller categories. In organizations that use cloud computing services, all security problems fall into three main groups.

1. The security of the platform is located in the residence of the cloud service provider.
2. Security of workstations (endpoints) located at customer locations.
3. Security of data sent from endpoints to the platform.

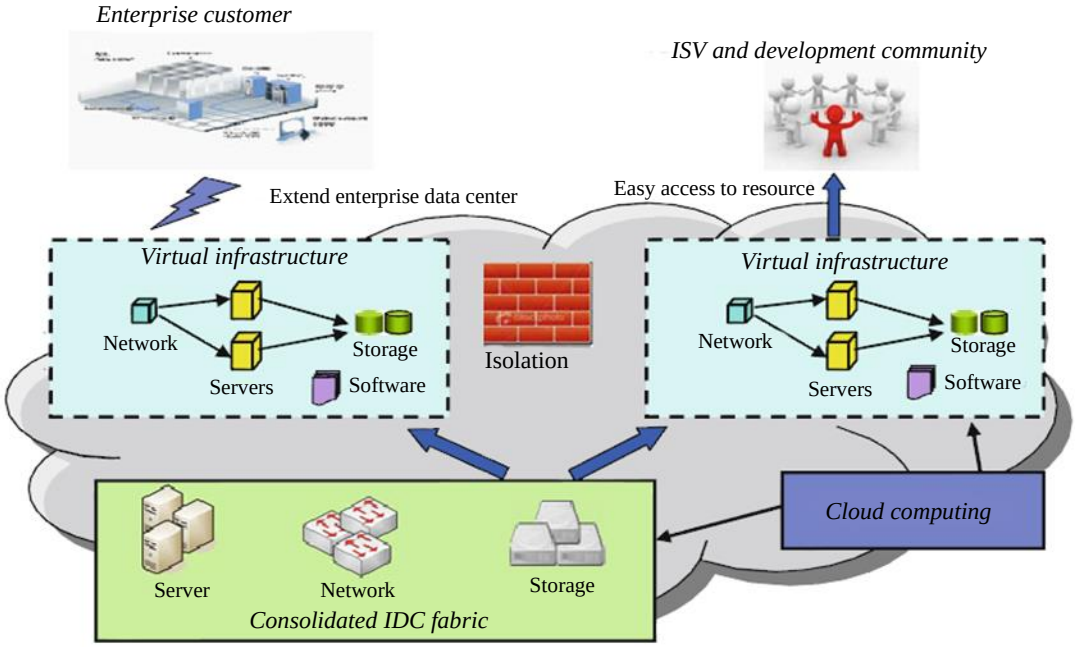

Figure 2. Structure of Internet Database Cloud /2/ (IDC).

The last-mentioned security concern, which is the security of data in transit, is practically solved using encryption techniques, secure connections, and VPN. All new cloud services support these mechanisms, and currently, the transfer of information from endpoints to platforms is performed in a completely safe process.

Security problems related to system validation and operation. Today, the biggest nightmare for IT managers is the existence of security problems related to service platform performance. Finding a suitable way to secure a system that cannot be directly controlled is difficult for most people. The cloud service platform is in the form of a centralized system in the residence of a diverse organization; however, it is often located in an unknown data center in an unknown country. In other words, the main security problem in cloud computing comes from problems in the validity (and validation) of service providers. It is the sequence of the same problems that occur in the process of delegating part of the affairs of organizations to external suppliers. Professionals and managers of organizations are unfamiliar with outsourcing critical tasks such as securing their working information to external suppliers. However, we can be sure that this problem, like the previous problems related to delegating the internal affairs of organizations to different suppliers, will be solved, and all existing concerns about the security of resources will disappear.

What is the basis for these statements? First, it is much easier for service providers to secure data centers that contain processing resources. This is because of the distribution characteristics (scale) inherent in cloud computing. Because service providers offer services to a large number of users, they can secure the security of all users simultaneously. Consequently, they can benefit from more effective and complex security approaches. Of course, Google and Microsoft have more resources and facilities to ensure information security than small companies and large institutions that use dedicated data centers.

Second, the use of cloud services between client and service provider organizations is always based on the quality agreed upon by the parties in contracts that foresee all the responsibilities of the service provider in relation to security problems. Third, the continuation of service providers' work is directly related to their work record. Therefore, they always try to ensure the security of information at the highest possible level.

In addition to credit problems and credit evaluation, cloud platform customers are also concerned about security problems related to the way cloud systems work. Although many home systems have this feature (because of their long-term evolution), the situation becomes much more complicated when using cloud services. The security Risks of Cloud Computing explore seven key security issues associated with cloud services, many of which stem from the inherent operations of cloud systems. The Gartner Institute recommends examining cloud systems based on the distribution of information access rights, information retrieval capabilities, research support, and periodic reviews.

In summary, the existing concerns regarding information security as far as the platform part of the cloud computing environment is concerned lead us to the conclusion that all the problems identified by today's users of cloud systems will be resolved successfully. There are no abstract limitations of cloud computing. The endpoints of continuing problems and worsening the situation in an ideal “cloud world” because information is not stored in the equipment, the security of cloud computing is provided at the platform level and through communication with the peripheral equipment. However, this model is still unsuitable for practical use, and the information that reaches the platform is created, processed, and stored at the endpoints of the system.

IMPLEMENTATION METHOD OF PROCESS RESEARCH

Cloud Architecture

The architecture of open cloud computing consists of two general parts: (1) front section, (2) back section.

The *front part* is related to the user–user interface through which the user accesses the cloud services. This section includes the user's network, hardware, and software that he uses to benefit from the services. The *back part* is related to the cloud itself, which is a set of information stored in servers and the clients who want to access it. These two parts of the architecture are connected through a network platform, the internet.

The architecture of software systems involved in cloud computing includes components that communicate with each other through software programming interfaces and web services. It should be noted that the term cloud computing architecture refers to the architecture of the back part, which the cloud itself is directly facing.

Cloud Computing in Industrial Engineering

In this regard, first, the debate is raised: How far has the field of industrial engineering been able to enter the cloud category according to the information at hand, it can be realized that this field and this category have not yet been able to digest each other. They can then extract the information from this field. Therefore, we first discuss some common features between cloud computing and the industry, but first, to better clarify the issue, we focus on an example in this regard. An industry that is reminiscent of group work, the United Nations has been paying attention to this for years and encouraging the world to move in this direction, Iran is also using this method, for example, two The big industrial cluster in Iran can be considered as Saipa and Iran Khodro, where the manufacturing companies of different parts are gathered in a small space, but each of them has its management and plan. The most important feature of these clusters is the reduction in communication and planning costs, and they can jointly benefit from resources, storage, hardware, etc., which can be shared.

Scheduling and Cloud Computing

Cloud computing refers to the use of infrastructure, platforms, and software as services. A form of computing is useful when the customer does not need to own the necessary infrastructure, and only pays for what he uses. Computing resources are presented as virtual machines, in which scheduling algorithms play an important role because the goal of efficient scheduling of tasks is to reduce time and resource utilization to improve.

Algorithm

1. Sorting cloud pieces by length.
2. PEs are sorted among all hosts based on processing power.
3. Create virtual machines in a sorted list of PEs by compressing as many virtual machines as possible into the fastest possible PE.
4. Mapping the sorted cloud chunks from the sorted list to create virtual machines.

IMPLEMENTATION

Simulation Environment

The cloud simulation environment is an organized extensible simulation framework that can model, simulate, and test the cloud computing infrastructure and application services. The data center component is an important hardware infrastructure that provides services to satisfy requests. A data center is composed of a collection of hosts responsible for managing virtual machines throughout their lifecycles. A host is a component that represents a physical computing node in a cloud equipped with preconfigured processing capabilities (measured in millions of instructions per second), allocated memory, and storage. The virtual machine provider component allocates application-specific virtual machines to the hosts in the peer-based data center. The default policy implemented by the virtual machine vendor is a direct policy that assigns a virtual machine to a host on a first-in, first-served basis. In cloud simulations, user tasks are cloud pieces. Each cloud chunk is assigned an ID, and it is assumed that longer chunk sizes are more complex. Fragments can be limited to a virtual machine, explicitly specified by the user, or dynamically specified at runtime. Chunk Scheduling is the component

responsible for mapping chunks to virtual machines, and the default policy used in Chunk Scheduling (FCFS); that is, each chunk in the queue is assigned to a list of virtual machines created on the FCFS. The need to process a task is not considered when making scheduling decisions. The FCFS does not consider the need to process user tasks. It suffers from starvation of long-queued primitive tasks and delays of shorter tasks with high response times, which results in negligible resource efficiency.

Experiments

The simulation algorithms were implemented on an Intel Dual Core processor with a 320 GB HDD and 2 GB RAM on a Cent OS 5.5. The experiments were performed in a cloud environment provided by cloud simulation. The speed of each element is expressed in millions of instructions per second and the length of each cloud slice is expressed as the number of instructions to be executed. The simulation environment included a data center with two hosts that had three and two processing elements, respectively. Each processing element was assigned a different computing power (different Million instructions per second (MIPS)). The algorithms were tested using different numbers of pieces, ranging from 10 to 50, as well as different lengths of super-random pieces. Therefore, the number of virtual machines used to run the cloud pieces is also different. The completion time of the last task for processing cloud chunks was used as a benchmark to evaluate the performance of the proposed algorithm. The results show that, for a smaller number of tasks, all three algorithms (FCFS, SCFP, and LCFP) perform similarly. However, as shown in Figure 3 shows that the performance diverges with an increase in the number of tasks, indicating that the behavior of the algorithms changes as the number of queued cloud chunks increases. LCFP provides better performance than FCFS and SCFP because longer tasks are completed faster, thereby reducing the time required to complete the last task.

Cloud computing is a growing research area that simultaneously improves the scheduling of resource utilization tasks at the same time. We investigate the quality of service of tasks, which is an important issue in private cloud environments because private clouds have limited resources. In this section, the use of two scheduling algorithms for scheduling tasks is presented, along with the need to process a task and the computational capacity of a resource when making scheduling decisions.

CLOUD COMPUTING, SUPPLY CHAIN, CLOUD SUPPLY CHAIN COMPONENTS

The concept of a supply chain in cloud computing is an innovation that opens a new field of research in this field. A supply chain consists of two or more interconnected branches involved in the movement of goods, information, and capital.

The supply chain of cloud services must be identified and controlled from the business and technical management perspectives. A cloud supply chain is an interconnected business network within a cloud area. Therefore, the implementation of the cloud chain requires management and coordination and to some extent, the two-way movement of services, information, and capital throughout the cloud chain,

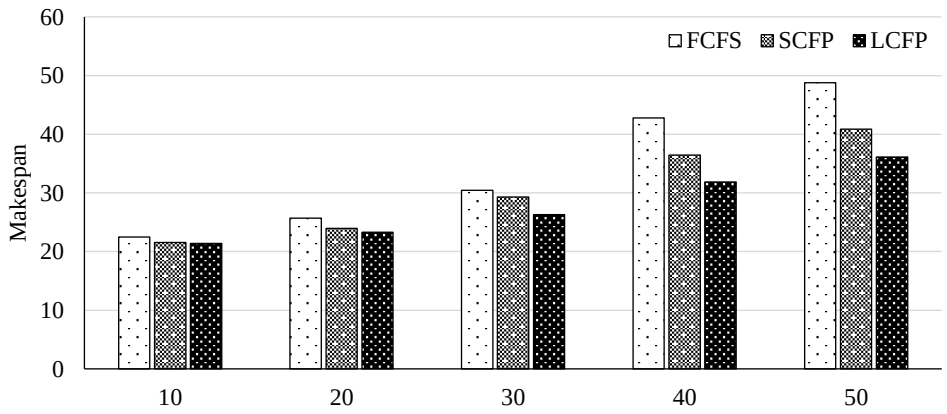

Figure 3. Comparison of scheduling algorithms.

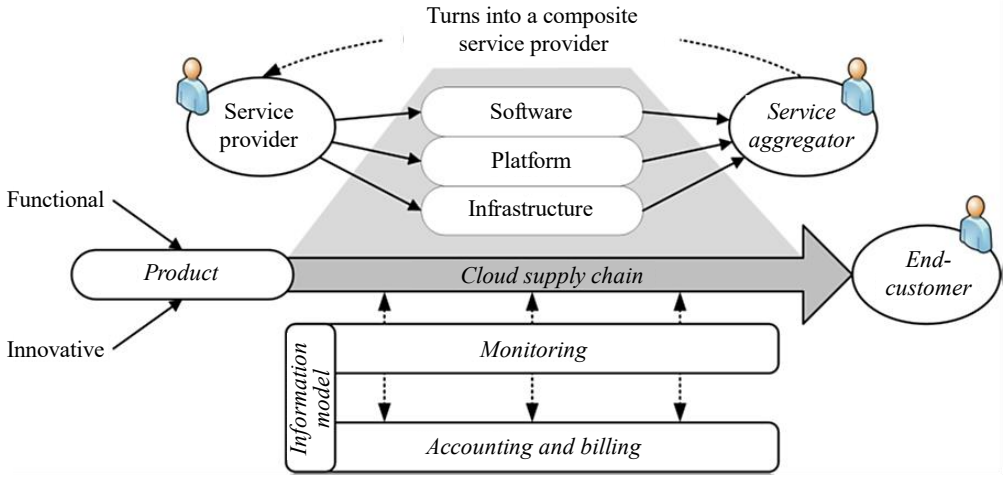

Figure 4. The supply chain cloud is /3/.

which includes the actual provision of infrastructure services, monitoring services such as the provision of virtual machines and information processes supporting Accounting and invoicing processes are but not limited to that. To identify this chain, it is necessary to define components such as products and services exchanged along the cloud supply chain, and the flow of information and budgets.

The main products were identified throughout the supply chain. Service providers can play multiple roles in the cloud supply chain. They may act as infrastructure, platform, or software, and be in direct contact with the end customer. However, they may also be brokers (service providers) or business partners in collecting services.

Thus, a hybrid service is created. For example, a hybrid service may be a piece of software that is used as a service on a flexible platform. Thus, the end customer's product is software as a flexible service. Customers are usually the consumers of a product provided by a service provider in a cloud supply chain, as shown in Figure 4.

Products are primarily classified into two categories based on their demand patterns: (A) primarily functional, and (B) primarily new [10]. Taghipour et al. [11] reviewed the application of sustainability indicators to vehicle routing problems.

Cloud Computing and Business Risk Management

Cloud computing is a model that reveals innovative and promising perspectives related to ICT. However, the use of cloud resources, which are usually considered external assets by consumers, shows that there is always a certain amount of risk that must be considered.

Currently, cloud computing organizes a risk management approach in the form of business-level goals. Experts have suggested that the SEBCRA concept is the main process in the risk management category [12].

In addition, the cloud is currently a service provider that enables us to achieve business-level goals. This provider maximizes profits by transferring the risks of private cloud provisioning to a third-party cloud infrastructure provider. Taghipour et al. [13] examined the risk analysis in the management of urban construction projects from the perspectives of both employers and contractors. Mahboobi et al. [14] discussed the assessment of ergonomic risk factors using a combination of data envelopment analysis and conventional methods for auto parts manufacturers, noting that occupational injuries are a significant global contributor to job loss. Sharifzadeh and Taghipour [15] evaluated the efficiency of dam construction management and explored methods to improve it.

Cloud Computing and Human Resource Planning

The enterprise resource planning system is based on a broad system by which software applications designed in different business fields can be integrated [16]. These systems often serve internal and external functions. Internal functions typically concentrate on essential activities such as financial management, operations management, and human resource management. External functions include integrating organizational systems by business partners and suppliers, which allows information to flow from one company to another, where the supply chain and value of each company are related to its supplier. This relationship allows the client to be seen as a value system because this value can flow at any point, and this amount can help the company achieve a competitive advantage [17].

Cloud Computing and Web-based Simulation

The rapid growth of the internet has led many fields to consider evaluating their strategies and techniques and checking them in terms of the services provided by the internet [18]. Simulation is also one of the fields that has not been affected by this category and has entered this technology more than any other field [19]. This is considered a fruitful field in computer research [20], and the emergence of web-based simulations is clear.

Web-based simulation refers to the integration of web technologies into the simulation field, a trend that has expanded in recent years [21]. Currently, such a field does not specifically exist, but it is an idea that simulation experts are interested in using this technology on the Web [14]. This problem can be defined as the use of resources and technologies provided by the wide world of the web to interact with the client and server of modeling and simulation tools. Consequently, a common feature is defined for all web-based simulation applications that interact with the simulation using a browser as a backend to connect the graphical user interface, which allows the user to download. The simulation package is from a server, and its execution as software is completely independent of the browser and website.

Web-based simulations are a popular method for performing online simulations. This idea uses a web server and implements the network architecture using specific architecture, such as client-oriented servers, high-level architecture, demand interface architecture, and procedure calls from long distances [22].

The distribution of calculations between the simulation results and their visualization on a remote server and their effect on the client can be used as a hybrid approach [23]. However, running a web-based simulation such as a handheld device requires time and expertise. The most common method for using a remote simulator is to design a web-based tool.

Currently, the websites of simulation systems provide their results to users online. It is also suggested that the X3D standard be used to virtually display the results. Other studies highlight the following: an investigation of the effect of integrated marketing communication on brand value, focusing on the role of agency reputation (including a case study). A case study at Imam Sajjad (As) Hospital in Ramsar [19] examined the modeling of nurses' shift work schedules based on ergonomics in a case study at Imam Sajjad (As) Hospital in Ramsar [19]. Taghipour et al. [20] analyzed the impact of working capital management on the performance of firms listed on the Tehran Stock Exchange (TSE). Taghipour et al. [20] explored the application of cloud computing in system management for controlling processes. Taghipour et al. [20] examined the effects of physical workplace conditions on employee productivity through a case study.

DISCUSS

Although cloud computing has answered many questions, it has posed new questions in front of us. Thus, by choosing or not choosing cloud computing, we can achieve a balance between old and new questions. The desire of large companies in the IT industry to use and provide cloud computing services is an undeniable fact that brings good news. The main driving forces behind cloud computing are the proliferation of wireless and broadband networks, reduction in storage costs, and exponential

improvement in internet-processing software. Cloud service customers can inject more capacity into their systems during peak demand, reduce costs, experience new services, and eliminate unused capacity from the organization. Cloud computing will be worth paying attention to, through which they can advance their professional goals by building cloud-based business-related systems and, in this way, benefit from reducing costs and increasing profits. Benefits of many choices. Big industries can also benefit from the reduction in infrastructure costs after the global economic recession. For developers, they will be able to improve their abilities when faced with cloud computing through the platform-as-a-service model. Therefore, it has a significant impact on various roles in cloud computing, as shown in Figure 5.

The idea that, in 2019, we will be doing all our processing through laptops for less than $100, while having no issues with service and security levels, is certainly beyond the pale. This is true; however, clouds will certainly be widely used in the future. Cloud computing represents a new paradigm in which computing resources, such as processing power, memory, and storage, are not physically located on the user's site. Instead, these resources are owned and managed by the service provider, and users access them via the internet [24]. For example, Amazon's website services allow users to store personal information through a simple storage service, and it is possible to perform calculations on the stored data using flexible cloud computing. The use of platform-type computing systems benefits businesses. Some of the advantages of this method include less investment, less time needed to start new services, lower maintenance and operation costs, effective use through virtualization, and most importantly, easier recovery. These aspects are significant in cloud computing [25]. Reports show that a large amount of computing is moving from the desktop to taking advantage of the cloud. Cloud computing has significant limitations, owing to its limited energy and low bandwidth. Cloud computing can be effectively used to save energy on mobile phones, which is a unique challenge for the cloud. Smartphones and other mobile systems have become the primary computing platforms for many users.

Cloud computing, as a transformative business model, has significantly affected the IT industry. Its integration across various business applications further highlights its value at a more profound level. Cost-effective opportunities in human resource planning organizational systems include reviews of the capabilities of organizational systems and potential benefits of using resource-based and open-source clouds.

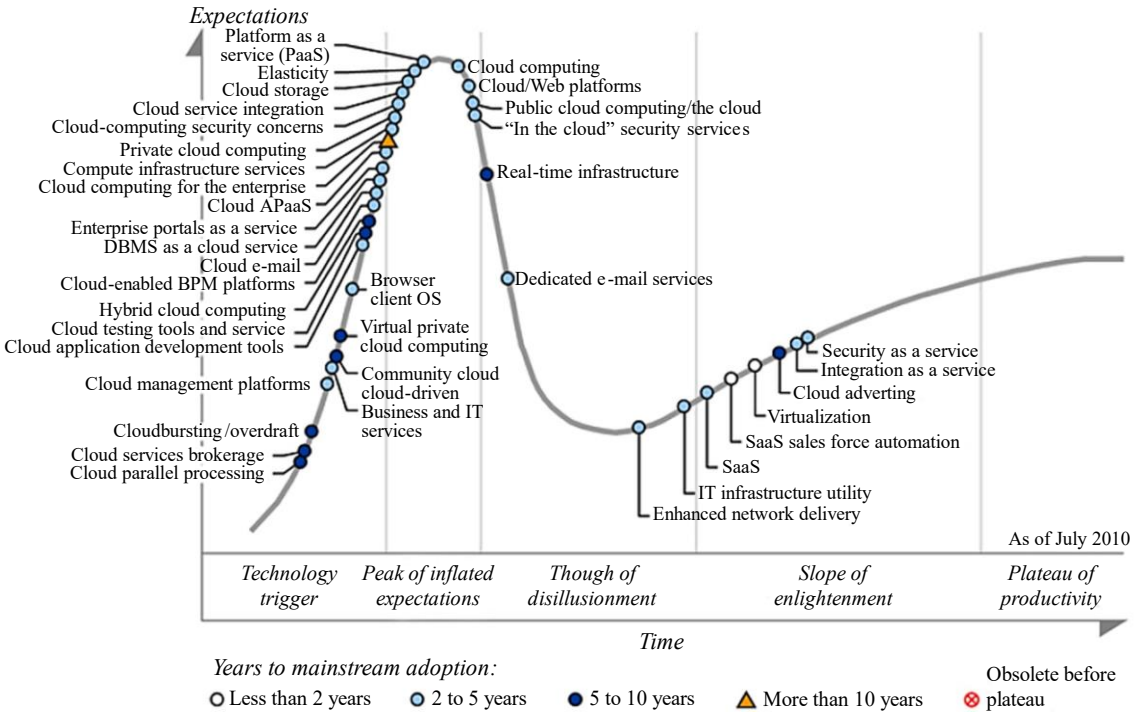

Figure 5. Progress in cloud computing /4/.

Future Work

In this section, we present the work that can be done in this field, which has been identified during the research process and is based on the weaknesses and shortcomings of the existing methods and models. Provide a new method for managing composite services based on cloud computing. Service composition consists of two completely different scenarios: service composition development and service composition management. The development scenario begins when the architect or composite service designer enters their request to create a new composite service based on the system requirements. This request is processed by the service composition development framework, and this requirement is transformed into an executable composite service through processes that can be executed automatically or manually. This executable service can be created in different formats that are generally used in the business process implementation standards in this field. After a combined service is created, users can call it directly or through other combined services. This stage begins with the user's request to execute the combined services.

Therefore, in continuation of the work done in relation to the development of a framework for the development of mixed services consisting of heterogeneous services, the development of a new framework for the management of the combination of services will have characteristics that can be distinguished from those of previous works. This can be proposed as a topic for this thesis. This framework contains innovations that distinguish it from the other frameworks presented in this field.

DEPLOYMENT ON THE CLOUD COMPUTING PLATFORM

As can be understood from the title of the proposed topic, the desired framework for managing a combination of services should be presented on a cloud computing platform. In addition to the implicit benefits of cloud computing, this study is important from two perspectives. One is the discussion of supporting services in the form of demand and the other is the possibility of increasing the efficiency of the standard business process execution engine for the implementation of combined services. On-demand provisioning refers to creating services when needed, for example, in situations in which the load on a particular service increases. If required, create, and use equivalent services from a specific service. This capability has been discussed in many articles, and our framework will have this capability as one of its main characteristics because creating and destroying very easily and quickly is one of the main goals of cloud computing. Therefore, the solution presented in this platform will benefit from this feature more than those of other platforms. Likewise, in the discussion on increasing the efficiency of the standard executive engine for the implementation of business processes, solutions such as load distribution on several versions of engines have been presented. Examples of standard engines include the implementation of business processes and the formation of a more powerful and extensible engine for the implementation of hybrid services.

CONCLUSION

The purpose of this research was to study cloud computing and its applications in different sectors. Cloud computing represents a new paradigm in which computing resources, such as processing power, memory, and storage, are not physically located on the user's site. Instead, these resources are owned and managed by the service provider, with users accessing them via the internet. As a new business model, cloud computing significantly affects the IT industry and its integration into various business applications further highlights its value. The rapid development of cloud computing can help organizations achieve high efficiency in providing IT services and reducing costs, and it also leads to small- and medium-sized enterprises, such as big companies, achieving high efficiency in information technology. Additionally, alleviating the burden of information technology can allow organizations to concentrate on their core business activities. Cost-effective opportunities in human resource planning organizational systems include reviews of the capabilities of organizational systems and the potential benefits of using resource-based clouds and open-source clouds.

Author Contributions

All authors contributed to this work.

Conceptualization, MT and HA; methodology, MT and HA; software, HA and MT; validation, MT and HA; formal analysis, MT and HA; investigation, MT and HA; resources, HA and MT; data curation, HA and MT; writing—original draft preparation, HA and MT; writing—review and editing, HA and MT; visualization, MT and HA; supervision, HA and MT; project administration, HA and MT. All the authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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