

# Challenges and Benefits of Cloud Computing: Comparison Study

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## ABSTRACT

Cloud computing technology is the most widely used current application. Due to the strength of the infrastructure, the ease of providing services, and its speed, it is scalable and expandable, and it has many characteristics. Despite all that has been mentioned about cloud computing, it faces many problems. Like flexibility and security which is it makes an individual distrust computing when using it, and increases the concerns of individuals or companies over their data. In addition to cloud problems. However, there are significant challenges to solving cloud problems, the most important which is the challenge of flexibility, security, cost...etc. All the problems and challenges faced by cloud computing, have many benefits. Such as scalability, collaboration, speed, automatic update...etc. This paper discusses the most important problems and challenges that you face when using cloud computing. This paper also reviews the most important advantages of cloud computing.

**Keywords:** Cloud Computing, Security, Data Analysis.

## 1. Introduction

Cloud computing is a group of computers called servers connected to the main computer, which is called the central computer. This computing, in turn, provides the best services for individuals and companies. [1] Cloud computing is very important and useful for companies, organizations, and even individuals. Because of its speed and low cost, and also you can access data at any time easily, and it is also very economical. There are a lot of CSPs so it is useful in both the public and private sectors. [2] The main goal of cloud computing is to facilitate services to the user through a simple interface without entering into the minute internal details, or internal technical details, which will require maintenance and large costs. But, only they pay the subscription fee and the CSP gives them access to the infrastructure, the cloud, and the cloud resources at no high cost. [3] Among the applications or services provided by cloud computing that the user needs are, for example, e-mail services, and storage services such as Google or Dropbox. The most important applications in cloud computing, the most important cloud applications are Google Docs, and Photoshop express. And all of these applications are very important and are used for many purposes such as Photoshop, editing images and data, and many other things that do not need to be stored in their programs to work on them [4,14].

In the 1990s, the term cloud computing was used. That was when they represented the Internet in maps and graphs in the form of a cloud, hence the term computing inspiration. [5] Multiplicity, flexibility, scalability, and self-resource provision are among the most important characteristics of cloud computing. [6] Resources within the cloud are available when they are requested by the user, such as data storage, as well as

computing power, without the need to directly manage them by the user. [39] Figure1 shows the architecture of cloud computing. [39]

## 2. Problems

There are many problems faced by the cloud. for example, the security problem that threatens the security of stored data and thus threatens data credibility and trust. Companies pay for the use of cloud computing resources. Therefore, the cloud service provider (CSP) must provide good services to the customer, and take care of good infrastructure. Because, computing solves the problems of companies, especially if it is flexible, scalable, and secured in a good and diverse way. These qualities and other advantages within the cloud are what make companies and individuals gravitate toward cloud computing. Despite all these advantages, it is not without flaws and problems. Below have been mentioned some of the problems that we may encounter when using cloud computing. [40]

### 2.1. Service Outage

The service interruption is a big problem, especially for large, vital companies that cannot bear this interruption, but the CSP keeps all the resources and data. because there is no way to prevent or avoid this interruption, even if the devices that provide the service are of high quality. [7]

### 2.2. Limited Flexibility and Control

Because clients cannot control information technology, only CSP manages and controls computing resources. For this reason, the flexibility of the IT infrastructure is not high. [8]

### 2.3. Vendor Lock-in

The process of switching between different CSPs is difficult or nearly impossible, so clients cannot switch to a better CSP. [9]

### 2.4. Security Issues

Among the most serious problems with cloud, resources are security and privacy because these resources are available to everyone. No matter how good and modern the technologies used by cloud service providers are, there is no public service that has 100% high security because it is provided to everyone, so violations and insecurity should be expected at any moment. [10,11]

### 2.5. Security Breaches

After several studies, it was found that most companies trust cloud technology more than traditional technology, and consider it more secure. The breach is a big problem because it reduces confidence. The breach is by an individual, it may be a name, a card, or anything else. Its causes are either malicious purposes, a malfunction, or a mistake by the individual. [12,13]

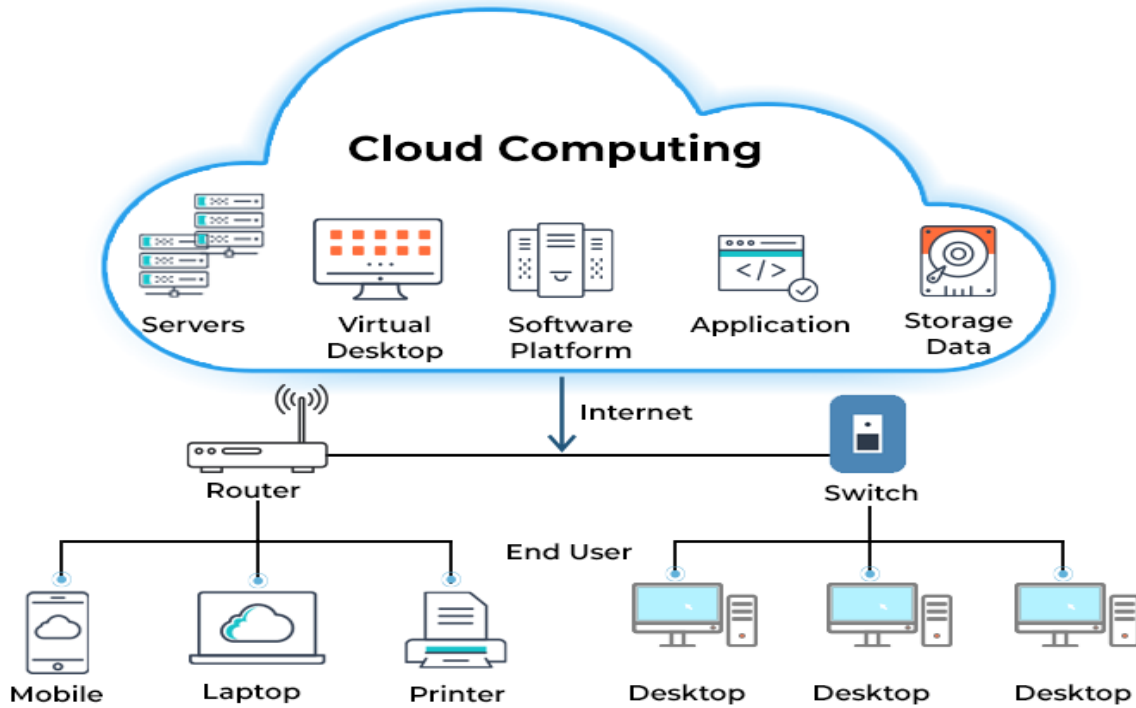


Figure 1: Cloud computing architecture [1]

### 3. Challenges

One of the biggest challenges faced by the cloud is security problems or concerns. Although cloud service providers take this problem into consideration and are very interested in providing the best security standards, there are still risks to the data stored within the cloud. [38] When a company or

organization decides to deal with cloud computing, it will transfer all its sensitive data and applications and everything related to the company from the local site to the CSP. Therefore, one of the most important challenges that any company or organization may face when migrating its data is shown in Figure 2. [41]

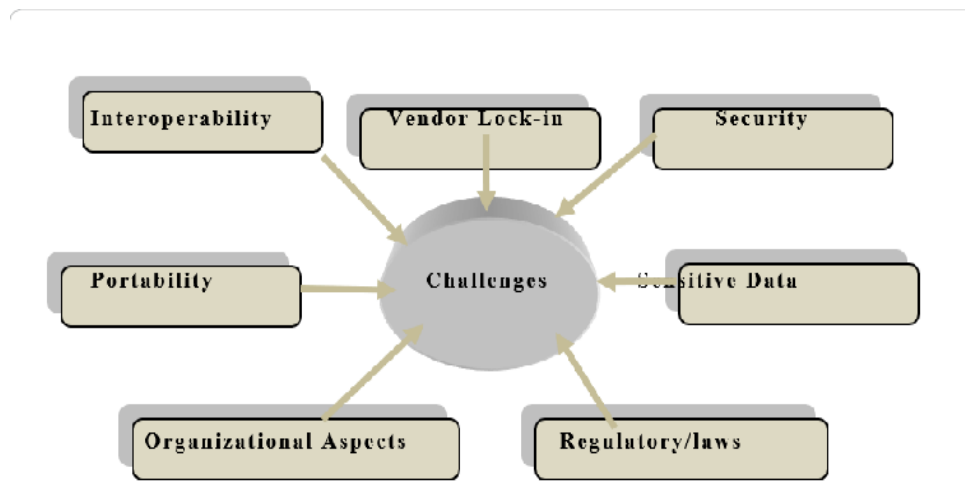


Figure 2 cloud computing challenge [2]

### 3.1. Data Security and Privacy

Due to the privacy of data in the cloud, providing security for this data is very important. Even if the cloud service provider is within the integrity of the data, we must authenticate the user, and encrypt and manage the data. Security issues and data breaches reduce trust among application users. Therefore, data leakage will lead to huge losses, financially and in addition to reputation. Because the data that is transferred through cloud computing is data in very large quantities. [15,16]

### 3.2. Cost Management

The SCP has a pay-as-you-go model, which in turn, reduces the total cost of the used resources collected when using cloud computing. The main reason behind the accumulation of costs, which leads to their increase. Is the failure to use the server in an integrated and correct manner, and the deteriorating performance of the application and its misuse. For example, when we work on the cloud, we will turn it on. So when it is finished, it must be turned off, otherwise, the cost of the cloud will increase. [17]

### 3.3. Multi-Cloud Environments

Most companies use more than one cloud or depend on their work on more than one cloud service provider. This is due to the multiplicity of cloud options. Therefore, this matter leads to problems and obstacles in the work as it becomes more complex, especially for the infrastructure team, which is difficult for them to manage easily. [18]

### 3.4. Performance

Strength and compatibility in the cloud mean strong performance, which is very important for the cloud to be strong and have a good performance because this will affect the users. If the performance is not good, the effect on the cloud users will certainly have a negative impact on individuals, companies, and organizations. [19]

### 3.5. Interoperability and Flexibility of cloud

The process of switching from one cloud to another has

complications and inflexibility. Because applications written for a particular cloud are required to be written for another cloud in case the switching process occurs. In addition to the existing problems, the processing of data traffic, security, and privacy settings also increase the problems when switching to another cloud, thus reducing flexibility. [20,26]

### 3.6. High Dependence on Network

Because cloud computing deals with large amounts of data, and provides services in the required time. Therefore, cloud computing needs a highly efficient and very fast Internet. Therefore, problems may occur in the event of a sudden interruption or weakness on the Internet, because the data and resources are transmitted over the network, so you need high Internet efficiency. Companies must always ensure the efficiency of the Internet and the absence of any interruption. Because this leads to a great loss of work. So this point is a big challenge, especially for small companies that need an efficient network, which costs a lot. [21]

### 3.7. Lack of Knowledge and Expertise

Due to the problems and complexities faced by cloud users. Therefore, they need experienced professionals in this field and are constantly updating themselves. This is in order to understand the applications more and manage them in the best way, to reduce problems and increase reliability. [21]

## 4. Benefits

The benefits of cloud computing are many and benefit individuals in all businesses, whether in the government sector or the private sector. The flexibility of working on the cloud gives you convenience when using the cloud. Because you can communicate with your business anywhere and at any time. The large number of devices that support the web, whether it is smartphones or other devices, makes accessing your data very easy. There are many benefits of the cloud, the most important of which are mentioned below. [37] figure 3 shows cloud computing benefits. [41]

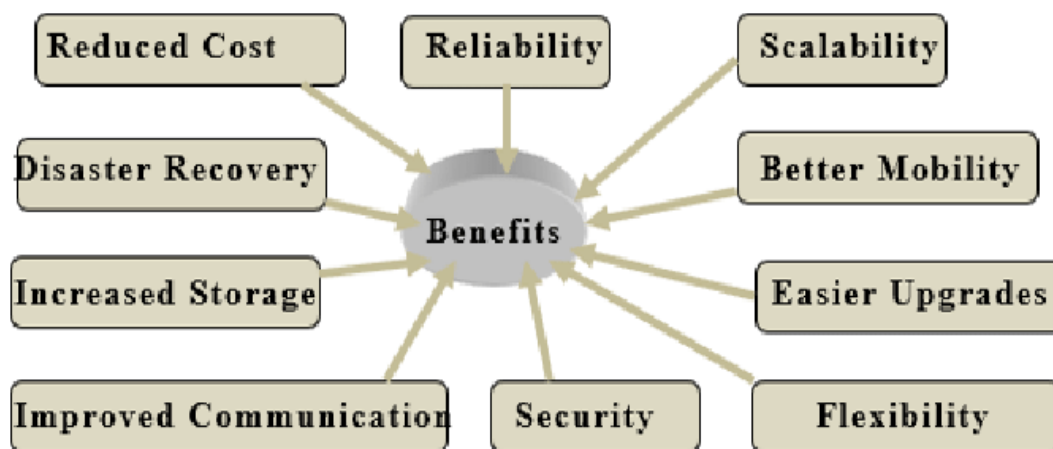


Figure 3: the benefits of cloud computing [2]

### 4.1.High Speed – Quick Deployment

The speed of cloud computing work and the speed and agility

of new software development has great benefits in testing new ideas, programs, and applications by software developers and designing applications architecture easily. [22]

#### **4.2. Automatic Software Updates and Integration**

Usually, in traditional methods, the user makes efforts to integrate applications according to preferences, but in the cloud, the user does not need to do so, it happens automatically. [23,27]

#### **4.3. Efficiency and Cost Reduction**

The use of cloud infrastructure reduces capital expenditures and the overall cost. Therefore, you do not need huge amounts of money to purchase and maintain equipment. Also, you do not need a large team to manage the cloud data center. You can rely on the expertise of CSP. Also, one of the most important benefits of the cloud, which reduces costs and does not need to spend money and time, is the lack of disruption of cloud systems. So you do not need a lot of money to maintain it. [24,26]

#### **4.4. Data Security**

Security concerns exist. Data preservation is important, so how do you prevent hackers by not stealing your data and accessing it? In the cloud, there is a security officer, and he monitors the system efficiently and monitors all vulnerabilities. Storage inside the cloud is 91% safer than traditional methods. Therefore, the cloud is more secure than the traditional internal system. What makes the cloud more secure is the process of encrypting the data that takes place inside the cloud. [36]

#### **4.5. Scalability**

The requirements and needs of companies in the field of technology differ from one to another. Large companies have different needs than small companies. Therefore, such large companies consider the use of the cloud as the best solution to cover all their technological need and their ability to expand according to work.

The cloud gives good and ideal solutions, especially for growing companies, because it has the ability to expand and does not need to invest in physical infrastructure. Therefore, scalability reduces problems or risks related to internal maintenance. [25]

#### **4.6. Collaboration**

Collaboration is important in cloud computing to maintain a competitive advantage. For example, the infrastructure of small companies is very limited, so when cooperating with other small companies will give them strength and status and make them different from other companies and enhance their position and competitiveness. [28]

#### **4.7. Unlimited Storage Capacity**

The cloud is characterized by the storage of different data with an unlimited capacity, depending on the available data and its frequency. The level of data availability and frequency of access affects the cost of data storage. Maintaining the storage of corporate data in the cloud relies on optimizing the cloud structure policy, which reduces the cost of cloud storage. [29,35]

#### **4.8. Back up and Restore Data**

The cloud capacity has no limitations in data storage and backup and restore. It is important to store older software versions because of the constant change of user data, which may need old data retrieved later. [27]

#### **4.9. Disaster Recovery**

The multiplicity of versions within the cloud gives it the possibility of rapid recovery in the event of any disaster. For example: When your application is distributed over multiple sites and one of these sites or areas is down, the traffic will automatically move to another

area without causing any interruption or damage.

#### **4.10. Mobility**

One of the most important advantages of cloud computing is the ability to access company data via phones, which is a good and convenient way for company employees, who have a busy schedule or live in places far from the company, as it gives them the ability to see what is going on at work by phone. [30,31]

#### **4.11. Data Loss Prevention**

Data security and loss are very important for users. But one of the most important advantages of the cloud is that the data remains present and can be recovered even in the event of hardware damage, disaster, or power outage, the user has confidence that his data is not lost and can be recovered. Infrastructure has a great impact on data retention or loss. Therefore, the cloud is distinguished in preserving data and not losing it because it has a strong infrastructure. If your data is uploaded to the cloud, you can access it through any device connected to the Internet in the event of a malfunction in one of the devices. But in traditional storage methods, you lose your data as soon as your device malfunctions. [32,33]

#### **4.12. Control**

Among the advantages and benefits of the cloud, is the control of its data. all data is stored in one place and in a consistent manner. Control is very important, because there is sensitive data, and if time is in inept hands, a big problem will occur. [34,36]

#### **4.13. Competitive Edge**

There are companies that do not use the cloud, although, others that use it benefit a lot from it and the cloud affects them positively. [36]

### **5. Previous study**

In [42] cloud computing technology and big data analytics are integrated, to improve the decision-making process. The paper focused on the most important challenges and benefits of cloud computing. Also, focused on how to address risks when using "ClaaS".

[43] Focused on the work of the cloud and its impact on business. It discussed the advantages and disadvantages of computing in business. It also focused on finding solutions to these defects and how to deal with them in business. The problem of security and data theft was discussed, and how these problems affect the business of organizations or companies. Also, solutions to these problems are mentioned. This paper aims to develop plans for the future regarding the benefits of the cloud and the security problem. It is to develop a theoretical framework, and how organizations can use this framework. Also, the security problem is settled for the service provider(CSP) in order to raise the cyber-attack.

In [44] Focuses on the challenges and benefits of using the cloud in banks. It emphasized the problem of security because it is the reason for the loss of confidence in the future. Therefore, it stressed the importance of bank data. Therefore, by specialists, a special cloud for the system and banking matters was created to avoid security problems.

In [45] analyzes the challenges of cloud computing, as well as the benefits of cloud adoption.

Software companies are constantly contributing to the development of cloud computing applications. The objective of this paper is to develop and design new technologies in order to eliminate the challenges of cloud computing.

This paper discussed the challenges, problems, and benefits in general of cloud computing. Compared with previous studies, all previous studies discussed either only challenges and problems or

benefits and harms of computing. Some studies discussed problems, solutions, and, benefits of computing, but in a specific field, either business or banking.

Table 1: Comparison of Cloud Computing Issues

Security Topics	Security Issues	Security Solutions
Data Storage	Remote data storage Loss of control Data pooling, data locality Multi-locations Complex model for integrity checking	better security scheme for resident data File Assured Deletion (FADE) scheme for data security SecCloud protocol for secure storage
Un-trusted computing	Top-down SLAB Malicious users, downtimes, slowdowns Dishonest computing, root level error in backups, migration and restoring problem Weak security solutions for computing models	A non-interactive solution A lightweight and low-cost solution for e-banking
Data and service availability	Counterfeit resource usage Cloud interruption Hardware availability issue (hardware fault)	A solution for data availability Pray re-encryption scheme based on time-based
Cryptography	Insecure cryptography mechanism, poor key management faulty cryptography algorithms Brute force and Dictionary attack	Order-preserving encryption Cryptography in cloud computing
Cloud data recycling	Deficient implementation of data devastation poll- cites Un-used hard discard Hard disk multi-tenant usage Resource recycling	Secure data deletion
Malware	Failure of signature based anti-viruses Cloud malware syncing	Detecting malware

**6. Conclusion**

Cloud computing technology has become an important part of our lives. The use of the cloud has also become very important that companies cannot dispense with. Expectations about this cloud may change the landscape or vision of the information technology industry. Low cost, service provision, and speed, are all of these advantages that have given great strength to the cloud in The labor market, as well as confidentiality, scalability, flexibility, and other important advantages for individuals. The aim of this research paper is to give a comprehensive explanation of the cloud and its problems to avoid these problems during work and take them into consideration. It also sheds light on the most important challenges faced by the cloud. Also, the paper aimed at clarifying the benefits of using the cloud, that it has great benefits and preserves data as much as possible, and that the data is secured inside the cloud more than traditional storage methods. All of these tasks and benefits that were mentioned previously made me explain the problems, challenges, and benefits together in this literature review.

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