

ADVANTAGES AND OBSTACLES OF CLOUD COMPUTING IN FUTURE: AN ANALYSIS

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Abstract –

This paper aims to enhance the understanding of cloud computing while proposing pertinent avenues for future research. Additionally, it will examine the prospective advantages of cloud computing alongside the potential challenges that may arise. The field of cloud computing encompasses various architectural configurations, which include diverse options for processors, memory, and nodes. The transformation brought about by cloud computing in data storage, processing, and access has already been profound, and it is anticipated that its influence on the future landscape of information technology will remain substantial.

Cloud computing offers a flexible infrastructure for artificial intelligence and machine learning applications, facilitating the development and implementation of these technologies in a more accessible and economical manner for organizations. This service allows users to retrieve files and applications hosted in the cloud from any location, thereby eliminating the necessity for constant physical proximity to specific hardware. More precisely, the cloud has transformed various aspects of daily life. In summary, cloud computing is expected to maintain a crucial position in the future of information technology, empowering organizations to enhance their agility, efficiency, and innovation in response to swift technological advancements.

Keywords:

Cloud Computing, Computing Service, Private Clouds, Public Clouds, Hybrid Clouds, Multi-Clouds.

1. Introduction

The Internet stands as one of the most valuable technologies utilized by individuals today. It offers a range of technologies that have been embraced by many over the years. Notable examples include the World Wide Web (WWW), Cloud Computing, and Internet Relay Chat (IRC). Among these, cloud computing has emerged as the most prevalent and innovative technology in the contemporary computing landscape. It serves as a model that facilitates ubiquitous, convenient, and on-demand network access to a shared pool of configurable computing resources, such as networks, servers, storage, applications, and services, which can be swiftly provisioned and released with minimal management effort or interaction with service providers [5][6][7].

Cloud computing refers to the delivery of computing resources via the internet. Organizations offer these resources on a rental basis, resulting in reduced costs. This innovative approach to computing is continuously evolving. Cloud computing encompasses both computational and storage services, operating on a pay-as-you-go model [1]. The term "cloud computing" is derived from the common representation of the internet or network as a cloud in diagrams, highlighting its role in providing diverse computing resources to individuals with varying needs across different locations.

The primary objective of cloud computing is to allocate tasks among various groups of individuals, facilitating collaborative efforts and leveraging the resources of different organizations to execute large-scale computations. Cloud computing encompasses several domains, including virtualization, load balancing, interoperability, and quality of service. As a network administrator, you are tasked with meeting the technological needs of employees, which may include computers, software, or hardware necessary for their work. Purchasing these resources entails addressing multiple considerations, such as setting up infrastructure, installing software on individual machines, and ensuring adequate storage space in accordance with the requirements and certification details of the various resources. This approach can lead to increased costs and challenges in maintenance. A more

effective solution to mitigate expenses is to utilize cloud services instead of acquiring physical resources or infrastructure. This strategy not only reduces costs but also simplifies maintenance. By adopting cloud solutions, there is no need to install software on each computer or purchase separate storage for every device; instead, services can be accessed conveniently via the internet. This paper is organized as follows: This paper is organized with following sections - Section II Literature Review, Section III Design of Cloud Computing, Section IV Benefits and Advantages, Section V Obstacles and Problems, Section VI Conclusion.

2. Literature Review

Numerous studies have been conducted that concentrate on the cloud environment. This section examines various papers pertaining to cloud computing and the associated challenges. David C. Wyld articulates that cloud computing includes a broad spectrum of services that are hosted in diverse manners, emphasizing that security requirements must be tailored to the specific nature of these services [9]. Ahmed E. Youseff and Manal Alageel characterize cloud computing as a model that facilitates convenient, on-demand network access to a shared pool of configurable computing resources, which can be provisioned with minimal effort or interaction with the service provider [10].

3. Design of Cloud Computing

Cloud computing services encompass a range of offerings provided by cloud service providers. These services can be categorized in three distinct ways.

3.1 IaaS(*Infrastructure as a Service*)

Infrastructure as a Service (IaaS) pertains to the infrastructure services offered by cloud service providers. In this context, the cloud service provider supplies virtual servers, load balancers, and storage solutions to clients, who are then required to install their own software or operating systems on these servers. While the management of the servers falls under the purview of the cloud service provider, the responsibility for managing the software and its certification rests entirely with the client.

3.2 PaaS (*Platform as a Service*)

Platform as a Service (PaaS) pertains to the suite of development services offered by cloud service providers to their clients. In this context, these providers supply a development environment that includes essential components such as databases and storage capacity, enabling clients to meet their development requirements effectively. Clients are not required to install database software or any other necessary applications for the development process; rather, they can access the development resources provided by the cloud service providers via the internet. It is important to note that the development resources may require more storage space compared to other types of resources. By utilizing these cloud resources, clients can circumvent the expenses associated with acquiring substantial storage space needed for application installation. PaaS encompasses the provision of platform-level resources, which include operating system support and software development frameworks [3]. Notable examples of PaaS offerings include Google App Engine (GAE) and Microsoft Azure [4].

3.3 SaaS (*Software as a Service*)

SaaS, or Software as a Service, denotes the software solutions offered by cloud service providers to multiple clients. In this context, the cloud service provider supplies applications, such as email services, to the client. Consequently, the client is not required to install or manage the software on their own hardware; rather, they pay a fee, akin to rent, to access these services. SaaS represents a software deployment model in which applications are hosted and delivered to users via the Internet [2].

3.4 Cloud Computing Architecture

The architecture of cloud computing is structured as a layered model. Typically, the layers of cloud computing architecture are categorized into four components: the hardware layer, the infrastructure layer, the platform layer, and the application or software layer.

3.4.1 Hardware Layer

The function of this layer is to oversee the diverse hardware components essential for cloud computing. These components encompass storage systems, processors, routers, switches, and more. In

practical terms, the hardware layer is realized within data centers. Typically, a data center houses thousands of servers, which are arranged in racks and linked via switches, routers, or other networking fabrics [3].

3.4.2 Infrastructure Layer

The infrastructure layer is tasked with overseeing the management of virtual servers and storage media, as well as balancing the various nodes to optimize resource utilization and improve the response times of these nodes. This optimization can be achieved through the use of load balancers.

3.4.3 Platform Layer

The platform layer is tasked with overseeing development resources, including databases, operating systems, and various development applications such as Java and Oracle. This management alleviates the client's responsibility of handling the substantial storage requirements necessary for software maintenance.

3.4.4 Software Layer

The software layer is tasked with delivering a range of software services to clients, including email services and document applications. This approach alleviates the client's obligation to purchase software, upgrade licenses, and install applications on individual machines or manage them on a centralized server. Additionally, this layer facilitates the provision of services such as email, accounting software, and editing tools.

3.5. Types of Cloud

The cloud can be categorized into three types

3.5.1 Public Cloud

A public cloud is a platform where cloud services offer various resources to the general public. This model alleviates the need for clients to make significant initial capital investments in infrastructure and the management of necessary resources for establishing such infrastructure. However, the security associated with public cloud usage is generally lower than that of other cloud types, as access to these services is available to anyone in the general public.

3.5.2 Private Cloud

Private clouds are defined as cloud environments that are established and overseen by organizations, delivering cloud services to clients situated in various locations. Commonly known as internal clouds, these private clouds provide enhanced reliability and security in comparison to other cloud types.

3.5.3 Hybrid Clouds

Hybrid clouds integrate the functionalities of both public and private clouds, aiming to address the limitations inherent in each. In this model, a portion of the service infrastructure operates within private clouds, while the remainder is hosted on public clouds.

4. Benefits and Advantages

Cloud computing presents numerous advantages compared to other network services. This section outlines several of the benefits associated with cloud computing.

4.1 Compact Price

Cloud computing minimizes the financial burden on clients by lowering the initial capital investment and streamlining resource management. This is achieved as cloud service providers are responsible for owning and maintaining all computing resources, including software, storage, and associated concerns.

4.2 Enhanced Reliability

In cloud computing, applications are generally executed on cloud servers. Users are not required to install resource-intensive software on their less powerful personal computers. This arrangement enhances the performance of the client-side computer.

4.3 Reduced IT Infrastructure Charge

Cloud services offer infrastructure as a service to users, which results in a reduction of installation costs for the infrastructure that the client incurs during the establishment of physical servers.

4.4 Boundless Storage Volume with accessibility of Data across global

Through the utilization of cloud services, clients can take advantage of the virtually limitless storage capacity offered by cloud service providers. As the client's storage needs grow, they will incur a modest additional fee to access the expanded storage available on the cloud server, as the cost of installing large storage solutions is higher than leasing storage space. By leveraging cloud computing services, individuals can access their data from any location and at any time. Clients merely need to log into their cloud account to retrieve their stored data.

4.5 Needs minimal Coaching and Newest Software

The individual experiences a reduced learning curve when familiarizing themselves with hardware and software challenges. By utilizing cloud services, one can access the most up-to-date software via the internet. Clients are not obligated to manage the software on their devices, nor are they required to purchase certifications for the software.

4.6 Amplified Group Association

Cloud services enhance collaborative efforts among groups. Individuals located in various places can work together on the same project or subject matter. The sharing of documents across different teams is facilitated by the use of cloud services.

5. Obstacles and Problems

While cloud computing offers numerous benefits, it also presents several drawbacks. Among these disadvantages are:

5.1 Need of steady Internet Connection

Utilizing the diverse services offered by the cloud necessitates a constant internet connection. In the absence of an internet connection, users are unable to access cloud services offline.

5.2 Lesser Speed Internet Connection

The sluggish nature of internet services, such as 3G connections / other type of connection, renders the utilization of cloud services challenging or even unfeasible. Consequently, accessing documents stored on cloud servers can become a highly time-consuming endeavor.

5.3 Minimum Safety

The utilization of public cloud services frequently results in diminished security, as these platforms are accessible to the general public. This accessibility may attract malicious actors who could potentially compromise data integrity or exploit sensitive information.

6. Conclusion

The study aims to elucidate that cloud computing represents the most recent advancement in internet technology. It details the various service models associated with cloud computing, facilitating an assessment of the different categories of services offered within this domain. Additionally, the study provides a summary of the layered architecture of the cloud and examines the methods by which cloud services are accessed. Clouds are classified into private, public, and hybrid categories, based on the organizational requirements and security needs of different users.

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