

Study on Cloud Computing's Deployment Models

Kartikeyan Balla^{1,*}, Kalyani Alisetty²

Abstract

Cloud computing represents a significant technological advancement in the information technology industry. It is one of the fastest-growing technologies, where computing resources are managed and allocated across the globe via the internet. Today, cloud computing is a key topic in many computer science curricula due to its extensive impact on various computing domains, particularly big data, which would be impossible without cloud computing. Cloud computing is an internet-based technology that is rapidly developing, bringing notable changes to the field of information technology. It provides information technology resources such as infrastructure, applications, and platforms in the form of services connected to the internet. In technical terms, cloud computing allows users to access information technology resources via the internet without the need to install any software on their personal computers. This technology consists of different service models that organizations can choose from, depending on their business needs. These models have a significant impact on business efficiency, cost reduction, and fast accessibility over the internet. Many companies have already adopted cloud computing services and relocated their processing and storage to the cloud. Cloud computing offers a variety of features that enhance its strength and versatility, such as resource pooling, security, and scalability. These features help the technology function smoothly and efficiently. The benefits of cloud computing are highly flexible, supporting various industries and organizations, and empowering businesses to focus on their core objectives. Therefore, all the important information related to cloud computing is thoroughly covered in this article.

Keywords: Cloud computing, technology, organizations, infrastructure, databases, storage, services, benefits, service models

INTRODUCTION

In this advanced era, many technologies have been adopted worldwide, one of which is cloud computing. This simply means that resources over the internet can be accessed by any user [1]. These resources can include data stored on physical servers, such as databases, data storage, servers, networking capabilities, application development tools, software, AI-powered analytics tools, and more, all accessible over the internet. In simple terms, cloud service providers deliver information technology infrastructure and services. The purpose of cloud computing is to store and access data and programs via the internet, rather than on a computer's local hard drive.

*Author for Correspondence

Kartikeyan Balla
E-mail: kartikeyan.balla@gmail.com

¹Student, Department of Management, Sinhgad Institute of Business Administration and Research, Pune, Maharashtra, India

²Assistant Professor, MCA, Sinhgad Institute of Business Administration and Research, Pune, Maharashtra, India

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Information technology resources included or provided by cloud service providers maintain and manage the allocation of resources to their clients. These clients must pay for services that they wish to choose according to their business objectives.

The utilization area of cloud computing is drastically increasing very rapidly, as many businesses have already adopted technology through which they benefit in terms of efficiency, high computing power and security, high performance, increased productivity, and cost savings.

There is always a straightforward way to reach this point and an efficient solution to handle this complexity using cloud computing. The most remarkable ones that integrate cloud computing services are email and Google Docs. A relational database is required for most cloud computing applications for their backend operations, which includes some code written in the SQL query language [2]. Conversely, client-side programs run in JavaScript are embedded in HTML documents.

Furthermore, we can assume that the lightning speed of this technology can grow drastically around the globe. This technology brings an enormous number of benefits to this generation because everything you use in your daily life is over the cloud, such as Gmail, I-cloud, Netflix, and Amazon Prime.

WHAT IS CLOUD COMPUTING?

Cloud computing is an innovative technology that is growing rapidly in the modern era of technology. The emergence of cloud computing can be traced back to the early 2000s, although its roots can be found in earlier concepts such as grid and utility computing [3]. Cloud computing makes information technology easier as it provides infrastructure for anyone who is allowed to access a particular resource, but the user should have an internet connection to access the resource, as shown in Figure 1.

In other words, cloud computing is a mechanism for accessing computing resources over the internet. These resources include data storage, servers, databases, analytics, artificial intelligence, software, and networking capabilities. By using cloud services, businesses can benefit from faster and more secure innovation, cost savings, flexible resources, and economies of scales.

Cloud computing also provides the option of using only specific services with the concept of pay-as-you-go pricing.

This enables effective management of infrastructure, reduced operational expenses and the capability to adjust scales according to business requirements. Moreover, servers hosted across the internet are maintained and managed by cloud service providers, where data are stored on physical servers [4]. Without the need for direct management, any user can gain access to computer resources such as databases, data storage, and computing power.

TYPES OF CLOUD COMPUTING DEPLOYMENT MODELS

Cloud computing deployment models define how cloud services are delivered, hosted, and managed by organizations or users.

Further, there are three types of cloud computing deployment models:

1. Public cloud,
2. Private cloud, and
3. Hybrid cloud.

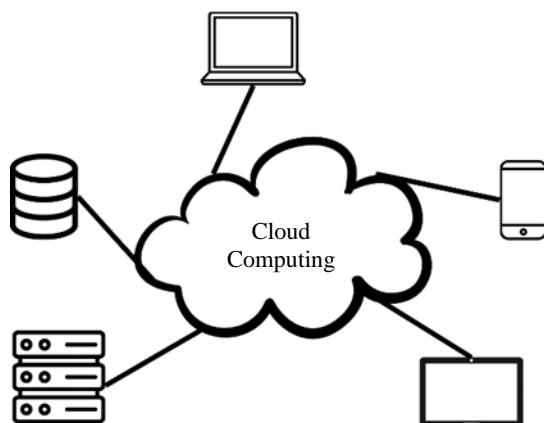


Figure 1. Cloud computing.

Public Cloud

The public cloud is one of the most widely used deployment models compared to the other types of deployment models. Public clouds are operated and controlled by external cloud service providers who offer computing resources, including servers and data storage, via the internet, as shown in Figure 2. The instances of a public cloud are Microsoft Azure, Amazon Web Services, IBM, and Digital Ocean. In the public cloud, the cloud provider plays a main role in delivering infrastructure to the users as they own and manage all software, hardware, and other devices related to cloud computing. To manage and access their account, a web browser is used [5].

In a public cloud deployment model, third-party service providers use common infrastructure to offer cloud services through the internet. These services are usually offered under a pay-as-you-go model and are accessible to both the public and large industrial organizations. Scalability, flexibility, and affordability are the advantages that the user enjoys without having to handle or maintain the underlying infrastructure.

Private Cloud

In this digital era, many organizations face challenges in streamlining their resources or infrastructure to survive current competition and remain secure. A private cloud is owned by the company itself for its use or can be hosted by a third-party but is used by different industries and subgroups. A private cloud typically incurs higher costs than a public cloud [6].

Private clouds exist in two forms: on-premises private clouds, and privately hosted external clouds. Both clouds are used by a single organization, but externally hosted private clouds are hosted by other organizations with sufficient experience in the cloud infrastructure. On the premises, private clouds are more expensive than externally hosted private clouds. A private cloud is owned by the company itself or can be hosted by a third-party but is used by different industries and subgroups [7].

A private cloud was developed and maintained specifically for one company; however, the administrator also allowed outside companies to use the cloud. A private cloud enables on-premises or off-premises operation. Private clouds offer good cost control, cost control privacy, and energy efficiency. Private clouds have a limited capacity and are limited to specific regions (Figure 3).

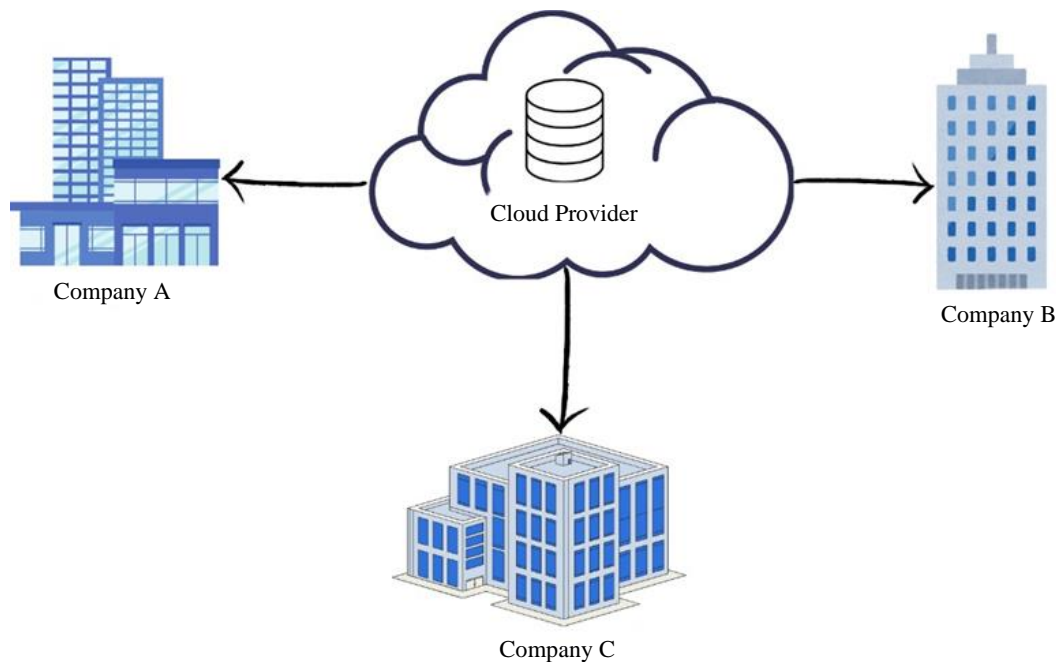


Figure 2. Cloud provider.

Hybrid Cloud

A hybrid cloud is a versatile deployment model that is used by many companies. It is comprised of two or more separate clouds. Hybrid clouds integrate two or more separate clouds (private and public) that retain their identities but are interconnected to offer the advantages of multiple deployment models [8]. In a hybrid cloud, third-party cloud providers can be managed either in whole or in part by increasing the flexibility of data processing. For example, during peak hours, individual applications or parts of the applications can be moved to the public cloud.

A company may choose to use a public cloud service for its day-to-day operations while storing sensitive data in its data center. The use of hybrid clouds has several advantages. Large and well-known organizations are more likely to make significant investments in the infrastructure needed to secure internal resources, as safety is an additional factor.

Hybrid cloud computing blends the on-premises infrastructure with both public and private cloud services, providing flexibility, scalability, and cost efficiency. It is used in disaster recovery, dynamic workloads, data backups, and development/testing environments.

Enterprises use hybrid clouds to optimize performance, ensure data compatibility, and balance control with innovation (Figure 4).

METHODOLOGY

Systematic analysis was conducted to obtain valid and informational data [9]. The methodology used in this study was divided into the following steps.

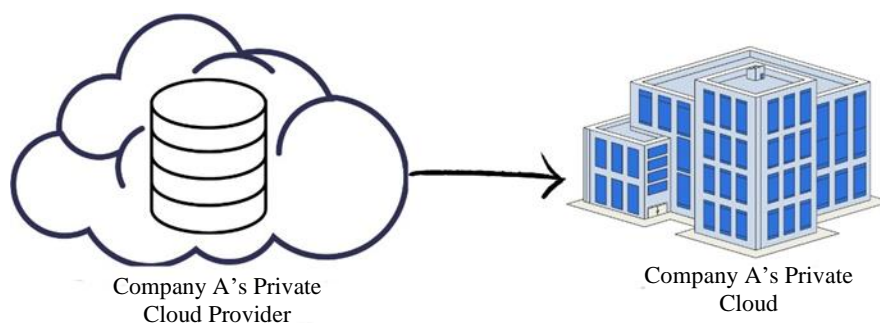


Figure 3. Private cloud.

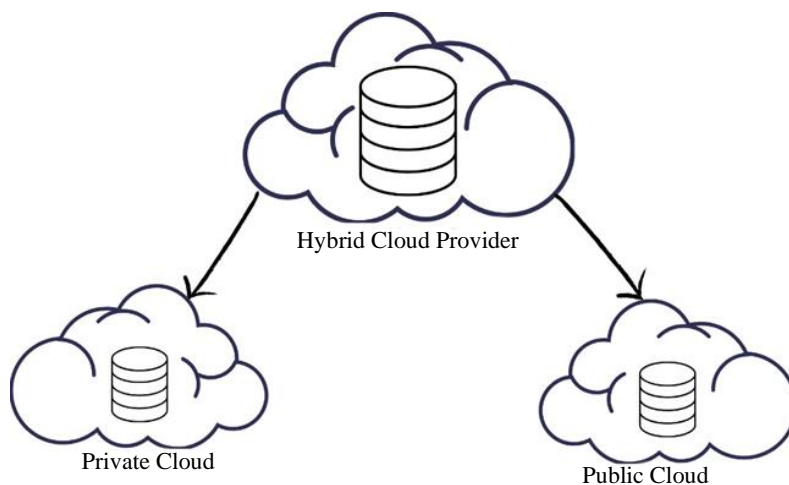


Figure 4. Hybrid cloud.

Type of Research

- Qualitative research has been conducted to write the research paper.

Data Collection Sources and Process

- The data collected for this research was obtained from the web, other research papers, and articles.
- The data is collected and stored in Microsoft Word known as secondary data.

Evaluation and Data Analyzation

- The secondary data collected were analyzed and evaluated with a keen reading and in-depth understanding of the topic.

Inclusion Criteria

- Latest data is used to read and write down the research paper.
- Topics related to cloud computing and its deployment model are included.
- Open-access articles and web content are used to read the data.

Results

- What is cloud computing?
- Deployment models of cloud computing

ARCHITECTURE OF CLOUD COMPUTING

Cloud computing architecture is a fusion of two architectures: service-oriented architecture (SOA) and event-driven architecture (EDA). The components of cloud computing architecture are client infrastructure, application, service, runtime cloud, storage, infrastructure, management, and security, which are important parts of cloud computing architecture that are involved in the cloud computing architecture accessing resources using the internet and architecture components [10].

The architecture of cloud computing is divided into two main parts: (1) front-end, and (2) backend.

Front End

The user interface in cloud architecture pertains to the client-facing aspect of the cloud computing system. This encompasses all the interfaces and applications that customers use to access cloud services and resources. For example, access a cloud platform through a web browser.

Back End

The backend in cloud computing architecture refers to the cloud infrastructure used by the service provider. It includes resource management and security measures, such as robust storage, virtual applications, virtual machines, traffic control mechanisms, deployment models, and other components. Figure 5 depicting the architecture of cloud computing.

Client Infrastructure

In cloud computing infrastructure, the client infrastructure is a segment of the user interface module. It comprises applications and user interfaces that are essential for utilizing a cloud platform. Essentially, the client infrastructure offers a graphical user interface (GUI) to engage with the cloud.

Application

An application is part of a backend component related to the software or platform that the customer is using. This implies that it provides services to the backend system based on customer requirements.

Service

Backend services encompass three primary types of cloud-based services: SaaS, PaaS, and IaaS. It also checks the services used by the user.

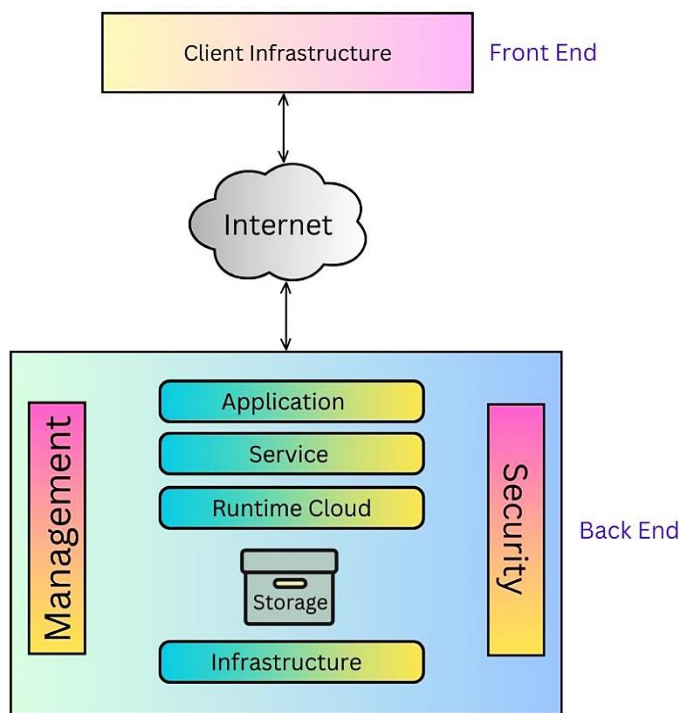


Figure 5. Client infrastructure.

Runtime Cloud

In cloud computing architecture, runtime refers to a cloud service that offers a virtual machine or environment for executing and running applications.

Storage

Background storage offers a flexible and scalable service for storing and managing data.

Infrastructure

The backend cloud infrastructure includes hardware and software components of the cloud. This includes servers, storage devices, network equipment, virtualization software, and other necessary elements.

Management

Managing backend systems involves supervising elements, such as applications, services, runtime environments, storage, infrastructure, and diverse security measures.

Security

Backend security involves deploying various security mechanisms within a backend system to safeguard cloud resources, systems, data, and infrastructure for end users.

Internet

The Internet connection serves as a tool or bridge between the user interface and the backend system, facilitating interaction and communication between them.

Database

Backend database services provide databases for storing structured data encompassing both the SQL and NoSQL databases. Examples of these services include Amazon Relational Database Service, Microsoft Azure SQL Database, and Google Cloud SQL.

OBJECTIVE OF THE STUDY

In today's competitive world organizations and other businesses face challenges in upholding market demand and remaining agile in their respective fields. Cloud Computing is an adaptable and skyrocketing technology that is adopted by many companies to scale their businesses and maintain their sensitive data.

In this study, cloud computing was defined and presented in a simple format to make this study interesting and readable. The exact definition of cloud computing and its importance in today's generation are clearly stated to understand the value of cloud computing and the changes that cloud computing has brought about in information technology.

Different companies have different needs. Cloud computing offers three different types of models that can be chosen by a company according to their needs and the services required. These types of deployment models were also defined and briefly explained to acknowledge the types of deployment models related to cloud computing.

This article consists of the following objectives:

1. To understand what cloud computing is
2. Importance of cloud computing
3. Types of deployment models in cloud computing

CONCLUSION

Cloud Computing is a technology that is skyrocketing because of its versatile features in the field of information technology. Shortly, this technology will be far better than current technology.

This article focuses on defining cloud computing and understanding its importance. This topic was chosen because of its rapid growth in the IT infrastructure used by organizations or companies. Cloud Computing extends the versatility of different deployment models. These deployment models were also explained in this study.

The utilization of cloud computing comes in path with every aspect such as, we use Gmail, which is stored in the cloud; hence, we can access Gmail from any device. Netflix is another good example for this generation as it has all kinds of video formats stored on its cloud so we can gain access from any device. This shows how this technology can build future information technology by bringing up new features and that a rising trend can bring about major changes in the future, which makes human life easier. Thus, we can predict the future by looking at current modernized technology we have an impact that we will have in various fields.

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