



# A Review on Cloud Computing

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## Abstract

Cloud computing is Working over the internet is made possible by the cloud computing service. For security purposes, users who wish to access cloud-based data must first provide their user ID and password. In contrast to using a local server for data processing, storing, and management, cloud computing makes use of a network of remote servers that are hosted online. With the use of a global network, cloud computing services like Amazon Web Service and Microsoft Azure enable users to manage applications and services. Amazon introduced cloud services initially in 2006, marking the maturity of the cloud computing industry. Cloud computing is Due to the staggering volumes of data that are processed here every day across many industries, Hong Kong is a particularly good fit, and despite a modest start in the early years, there are indicators that local enterprises' use of cloud services may soon soar to unprecedented heights. Because of its extensive suggestion in many computing sectors, especially big data, which without cloud computing is at the great notion, cloud computing today easily tops any schedule of issues in computer science. Lenovo's recent establishment of a major cloud R&D facility in Hong Kong is evidence of this. The lifelong goal of computers as a utility is, cloud computing has the power to. Cloud computing is New hardware investments and labor costs for operating Internet services are no longer necessary for developers of innovative new invention concepts. They don't have to worry about over- or under-provisioning for a service whose demand turns out to be much higher or lower than expected, squandering expensive resources and maybe losing out on consumers and income. Additionally, since utilizing 1,000 servers for one hour costs the same as using one server for 1,000 hours, businesses with large batch-oriented operations can get results as quickly as their programs can scale. This elasticity of resources, which does not require paying a premium for an enormous scale, is unheard of in the history of IT.

**Keywords:** cloud computing, cloud providers, cloud storage, attacks, cloud security, benefits.

## Introduction

Processor Different people have different ideas about cloud computing. It may be used to describe accessing software data or referring to "cloud" storage of data. [1][2][3] using a network or internet representation and related services. The benefits of cloud computing are You can make service requests online thanks to a sizable amount of virtual storage. Computers in the past would have needed

as much space as a room filled with complex electronics, in contrast to computers today. To complete their processing, much more power will be needed.

Cloud computing is used to address many issues securely. Cloud computing is well-liked from a business standpoint. However, there are a few security issues with this feature that make it still difficult to use in a cloud environment. Cloud computing is

expanding as more businesses adopt the technology, but at the same time, several security concerns are emerging. Every organization chooses a secure infrastructure when moving data to a remote location. Through his work on ARPSNET in the 1960s, Joseph Carl Robnett Lickle developed cloud computing, which allows users to interact with people and data from anywhere at any time. CompuServe offered users a meager amount of disk space to store any files they wished to upload in 1983.[3][4].

A group of companies, including IBM, Intel, and Google, created the open cloud manifesto in 2009 to make recommendations for best practices to be used in the delivery of cloud computing services. The open cloud manifesto includes a list of qualities and benefits that it could compute. [3]

A model for providing convenient, on-demand network access to a shared pool of dependable and configurable computing resources, such as networks, servers, storage, applications, and services, etc., is known as cloud computing. Provisioned and released with little involvement from the service provider or consumer management.

The mobility that brings both commercial and leisure users is one of the other external uses of cloud computing. The number of users engaging with certain cloud computing services, such as Google Docs and email services. The most well-known cloud computing products are AWS Lambda, Google Cloud Engine, and AWS Elastic Compute.

**Accessibility:** Data can be accessed using cloud computing from any location in the world and from any device with an internet connection quite easily. Cost requirements for cloud computing are lower. Offers companies readily available computing resources, saving them money on their acquisition and maintenance costs.

Examples of cloud computing include Gmail, Facebook, and DropBox. Files can be stored in the cloud. Financial and banking services. Financial data that consumers have accumulated that cloud computing service providers. Healthcare, Education, Government, Business Process, and Big Data Analytics. Numerous Cloud Computing Options Three significant cloud environments, also referred to as cloud distribution models exist. Depending on their specific needs, businesses can choose to run applications on public, private, or mixed clouds. The term "cloud computing" describes both the hardware and system software in the data centers that provide the services as well as the applications that are delivered as services over the Internet. Software as a Service is a popular term for the services themselves (SaaS). We avoid terms like IaaS (Infrastructure as a Service) and PaaS (Platform as a Service), which some vendors use to rate their products. Definitions of them still have a wide range. [7]. There is no clear distinction between "low-level" infrastructure and a higher-level "platform." We examine the two together because we think they are more similar than they are different. It is the same with the related term "grid computing," which originates from the high-performance computing community and suggests protocols to provide shared computation and storage over long distances, but those protocols did not result in a software environment that expanded outside of its community.[8][9]

## 1. History and Status

The existing storage and computing facilities are under intense pressure as a result of the Internet's rapid expansion. The inexpensive commodity PCs become the primary hardware platform used by Internet service providers. The development of various software technologies that enable these PCs to function elastically has resulted in the development of three major

cloud computing architectures based on resource abstraction technologies: the Amazon style, the Google style, and the Microsoft style.[10] Server virtualization technology is the foundation of Amazon's cloud computing. Elastic Compute Cloud™ (EC2), object storage service, and structure data storage service were all made available by Amazon using Xen. AWS becomes the first provider of infrastructure as a service (IaaS) on demand and at a lower cost. Google's design is based on a sandbox for each technique. [12]

Between 2003 and 2006, Google published several research papers outlining a specific type of Platform as a Service (PaaS) cloud computing. In 2008, the platform—known as Google App Engine™ (GAE)—was made available to the general public as a service. [13] Microsoft Azure™, which uses.NET as the application container, and Windows Azure Hypervisor (WAH) as the underlying cloud infrastructure, was made available in October 2008. Additionally, Azure provides services like SQL service and BLOB object storage. It's difficult to say which one is superior, but server virtualization appears to be more adaptable and compatible with current software and applications, whereas sandboxes impose greater limitations on programming languages but less abstraction overhead. Server virtualization is the most common technology right now. Cloud computing resource abstraction technique. Numerous businesses have experimented with and/or implemented internal cloud computing systems in addition to these public cloud services. A key strategy for IT vendors, ISPs, and telecom service providers already involves cloud computing. Even further, the cloud has become a national strategy for the United States of America and Japan. Some of the early adopters for each style are listed in the following table. [10][11][12]

## 2. Definitions of cloud computing

Cloud computing is Similar to e-commerce, cloud computing is one of the most ambiguous technical concepts in history. One reason is that cloud computing can be employed across numerous different application scenarios. Another is that numerous companies actively advertise cloud computing to increase sales. Thanks to the Hyper Cycle study that the Gartner Corporation released in 2008, we can observe that the field of cloud computing is going through a period of tremendous expansion. [13]

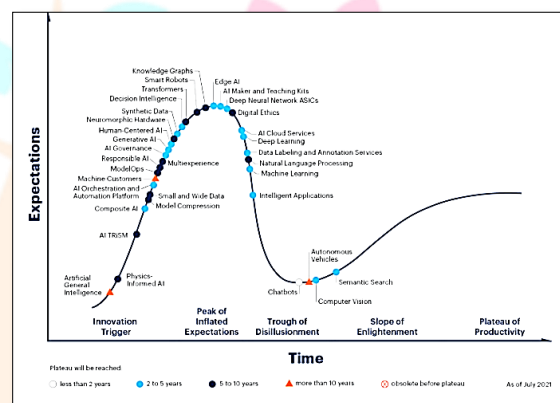


Figure 2: Pall computing is currently going through an era of fast expansion [13].

## 3. Types of pall computing

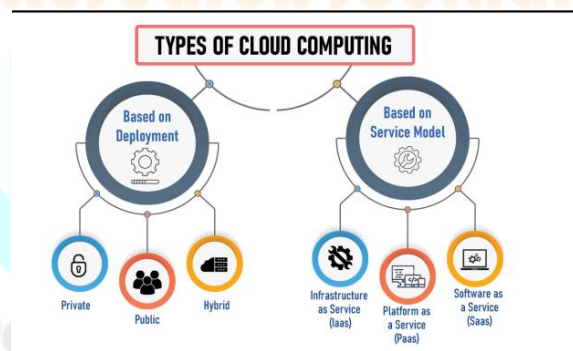


Figure 3: Types of pall Computing [18]

### 3.1 Cloud deployments

**Public cloud:** Cloud computing is the services that are off-site and accessed via the internet in the public code. The whole public can use it. What you do is use the cloud. A cloud service provider, like Amazon, owns and manages all of the



hardware, software, and other supportive infrastructure. [18][17]

- ii. **Private cloud:** Cloud computing is what you do. In a private cloud, only one organization uses the infrastructure. The company has the option of running its private cloud or hiring a hosting company to do so. A private network like AWS and VMware is used to maintain the infrastructure and service. [19]
- iii. **Hybrid cloud:** It consists of the functionalities of both public and private clouds. For example, its open source cloud registered project NEBULA uses a private cloud for research and development and in addition, a public cloud to share data sets with external partners and the public.[18][19]

### 3.2 Service model

i. **Infrastructure as a service (IaaS):** Here we rent IT infrastructure (server and network) from a cloud provider on a pay-as-you-go basis. Users of IaaS can outsource and build a "virtual data centre" in the cloud and have access to the resources as well for example AWS Elastic Compute Cloud (EC2).[13][19]

ii. **Platform as a service (PaaS):** The provider provides a platform on which software can be developed and deployed. The cloud provider allows the customer to deploy their applications using programming languages, tools, etc. for example AWS.[16][18]

iii. **Software as a service (SaaS):** In this model, cloud providers manage and host the software environment without maintaining any hardware, like Amazon Web Services. Use Intel to compete competitively and cost-effectively to advance important business priorities. Built to support HPC, networking, storage, analytics, and AI. SaaS customers subscribe to an application rather than buying and installing it once.

A SaaS application can be accessed and used online from any compatible device. In cloud servers that may be located far from a user's location, the actual application runs. [19][17]

### 4. Cloud Computing Architecture

The Secure Cloud Ecosystem Orchestration secures the Physical Resource Layer, Resource Abstraction, and Control Layer, as well as the Deployment and Service Layers. In contrast, the Architectural Components are based on the areas in which a cloud provider conducts its operations. It is a process that calls for different degrees of secure participation from each actor, such as the customer, provider, broker, and carrier, depending on the cloud service and deployment models. Clouds aim to provide computing, storage, network, software, or a combination of those in various flavors.

Operator of the application platform: Offers cloud application services. [20][21][22] The three most popular terms for the degrees of abstraction of cloud computing services, where the customer can use the application running on the cloud infrastructure, are infrastructure, platform, and software-as-a-service. [23]

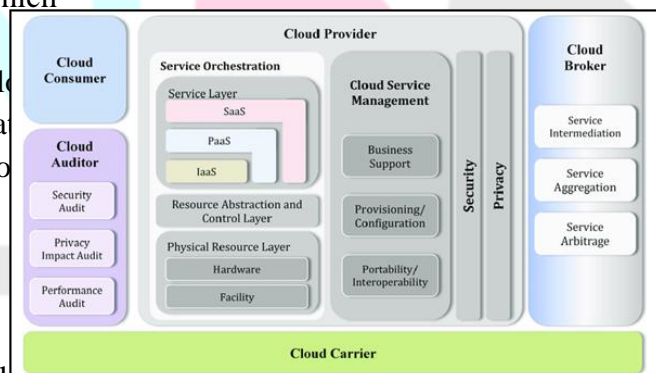
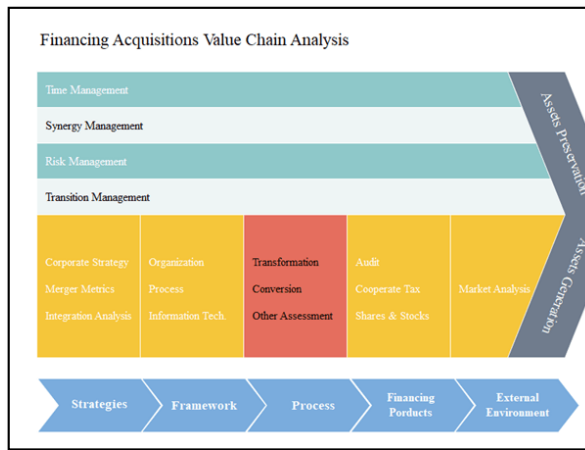


Figure 4: The Reference architecture [23]

### 5. Value Chain of Cloud Computing

The cloud computing value chain, along with relevant organizations and their roles, is shown in the following diagram.



**Figure 5: The core and ancillary components of the cloud computing value chain [26]**

The above diagram shows the cloud computing value chain, along with relevant organizations and their roles, is shown in the following diagram. [24][25].

1. The driving force behind cloud computing, cloud applications are distinct from traditional application modules.
2. Cloud application operator: provides goods for cloud computing. They are frequently identical to those offered by platform or application providers.
3. Platforms for cloud computing and development, including GAETM, Force.comTM, etc.
4. Operator of cloud infrastructure: Offer infrastructure services like AWSTM and Go Grid.
5. Provide network access services to the end users and operators of the aforementioned platforms.
6. Provide players in this chain with technical support, including software development, testing, provisioning, and operation.
7. Vendor of terminal equipment: Provide chain-wide participants with device maintenance services.

## 6. Cloud Security

No matter where it is stored, data is susceptible to attack; it could be attached while in motion or at rest. Different security measures like authentication and

authorization should be used. Monitoring and system auditing are techniques for preserving operational assurance. Accountability in a cloud environment refers to the capacity to examine the actions and behavior of a system, where an audit trail or logs provide support. A set of documents known as an audit trail or log provides information about who processed a transaction, the terminal it was processed on, the data it contained, and the time it was processed. Backup policies, including remote backup, can restore lost data. [28][27][30]

### 6.1 Conceptual Approach for Advanced Persistent Attack

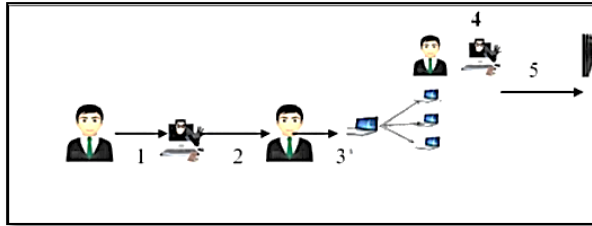
A long period is spent in an undetectable stage with an advanced persistent attack, which is unauthorized access to the cloud. This attack's main objective is to linger for a while and steal data rather than harm the cloud warehouse. In a simple attack, the intruder generally tries to enter and exit quickly to avoid being seen. It is a sophisticated attack because the malware components are created using easily obtainable DIY construction kits or exploit material. To accomplish the stated goals, this attack is carried out with constant observation and interaction. It is a piece of automated software that is coordinated by humans. [31][32]

It's challenging to find the enemy inside the cloud network; vulnerability exploits are the key tool of attackers, and The Steps involved in Advanced Persistent Attacks are

1. Identifying vulnerability
2. Phishing
3. Inside the attackers mapping the company resources
4. Attackers elevate privileges
5. Attackers create back-connect functionality

## 6. Installing malware to hijack the systems.

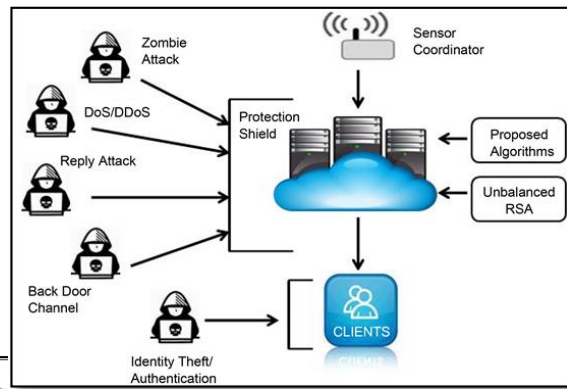
The first step in exploiting the vulnerability is to identify it. Next, using spear phishing and other social engineering techniques, attackers create a backdoor, and ghost infrastructure, elevate their privileges, and distribute malware. [32]



**Figure 6.1: Block Diagram of Advanced Persistent Attack [33]**

## 6.2 Conceptual Approach for Securing Cloud

Cloud Secured Architecture is made to guard against nefarious intrusions and attacks, and secure web gateways add another line of defense by filtering URLs, running antivirus scans, and even analyzing Security Socket Layer traffic. It is advised that you have a layered defense solution for both inbound protection and outbound data theft prevention in the event you are compromised to protect your organization holistically. A third party known as the Trusted Third Party (TTP) is a person or organization that enables safe communication between two parties. Whether or not a user has registered with the Third Party Auditor (TPA), it provides strong authentication and authorization. Cryptography for a secure data flow and transmission channel is ensured by cloud security files. Utilizing the Cloud Another step to confirm the existence and operation of cloud customers and cloud providers as security mechanisms is security auditing. For increased efficiency and security, the TPA can carry out multiple auditing tasks for one or more clouds in a branch-style manner.[34][35][36]



**Figure 6.2: Secured Model of Cloud from Attacks [35]**

## 7. Benefits of Cloud Computing

- I. Save and bring information back. Once the data has been uploaded to the cloud, using the cloud for backup and retrieval is easier.
- II. Increased cooperation through shared storage in the cloud, and cloud applications enable larger groups of people to more easily and quickly share information.
- III. Extraordinary comfort with an internet meeting, the cloud enables us to easily access and supply data anywhere, at any time, throughout the entire world. By ensuring that our information is always nearby, an internet cloud infrastructure increases group output and competence.
- IV. Minimal preservation fee Organizations can save money by using cloud computing to reduce their hardware and software maintenance costs.
- V. Mobility Cloud integration enables us to easily access all cloud data via mobile.
- VI. Endless storage space The cloud offers us a huge amount of storage space for centrally storing our important data, including pictures, pamphlets, audio, and video files.
- VII. Data protection One of the main advantages of cloud computing is the security of information. Cloud offers several modern security-related structures that confirm that data is securely stored and felt. [37][38]



## 8. Conclusion

For service providers, cloud providers, and cloud consumers, the cloud computing model is one of the most promising computing models. Because of this technology, programmers with innovative ideas for internet services won't have to shell out a lot of money to structure their tools and programs. Cloud computing is currently on the minds of IT companies all over the world. Companies that use cloud computing for the deployment and scaling of IT for business processes stand to gain significantly from it. Cloud computing services are being adopted by an increasing number of industries, from accounting firms to zoological societies. On desktop and mobile devices, millions of customers use online cloud services like Apple iCloud, Gmail, and DropBox every day.

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- [2] Asst. Prof.1, Department of C.S., I.C.S. College, Khed, Ratnagiri H.O.D.2, Department of I.T., I.C.S. College, Khed, Ratnagiri RESEARCH PAPER ON CLOUD COMPUTING Mrs Ashwini Sheth1, Mr Sachin Bhosale2, Mr Harshad Kadam3 Student3, M.Sc. I.T., I.C.S. College, Khed, Ratnagiri
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