

Comparative Study: Cloud Computing

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Abstract: *The concept of cloud computing was invented by the Internet service providers to support a large number of users and elastic services with the least number of resources. This expanding field of cloud computing has become the need of the future and is at the cutting edge. The hosting process of cloud computing has been transformed from internal IT systems to public services, from cost-effective tools to revenue generator tools, and from ISP to telecom services. This paper describes the concept, overview, services of cloud computing, issues and challenges of cloud computing as the value chain and standardization effort. Working of Cloud is the distribution of Computing services which include servers, database, networking devices, storage devices, software, analytics and intelligence-over the Internet (“the Cloud”) to offer faster revolution, cost-saving and flexible resources, and economies of scale. The purpose of cloud computing is to deliver computing services which include servers, storage, database, networking, software, analytics, intelligence, and more, over the Cloud (Internet). Overviewing at the characteristics of cloud computing there are majorly 5 characteristics : (1) large scale computing resources (2) high scalability & elasticity (3) shared resource pool (virtualized and physical resource) (4) dynamic resource scheduling (5) general purpose*

Keywords: Cloud computing, Cloud Storage, Deployment Models, SaaS, PaaS, IaaS

I. INTRODUCTION

Cloud computing, the life time futuristic dream of computing as a utility, has the power to transform a large part of the IT industry, converting software and resources even more attractive and high-tech as a service and shaping the way IT hardware is designed, framed and purchased. Developers with new invention ideas and concepts for latest Internet services no longer need the enormous capital expenses in hardware to deploy their service or the human charges to utilize it.

Definition :Cloud computing is a model for enabling convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [1].

Cloud computing has recently evolved as a popular word in the whole distributed computing community. Many of us believe that Cloud is going to reframe the IT industry as a rebellion. So, what is the definition Cloud Computing? What are some general challenges and issues for both cloud providers and consumers? While looking for answers to these questions, we focus on defining fundamental research issues and future research challenges and administration of cloud computing.

Cloud computing is attracting to business owners as it abolishes the need for users to plan for provisioning, and permits enterprises to start from the scratch and increase resources only when there is an increase in service demands. Cloud computing can be referred to both the applications delivered as services over the Internet and the hardware and systems software in the data centres that provides those services. The services themselves are huge and are referred to as Software as a Service (SaaS)

Like SaaS there are terms such as IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) in cloud computing.

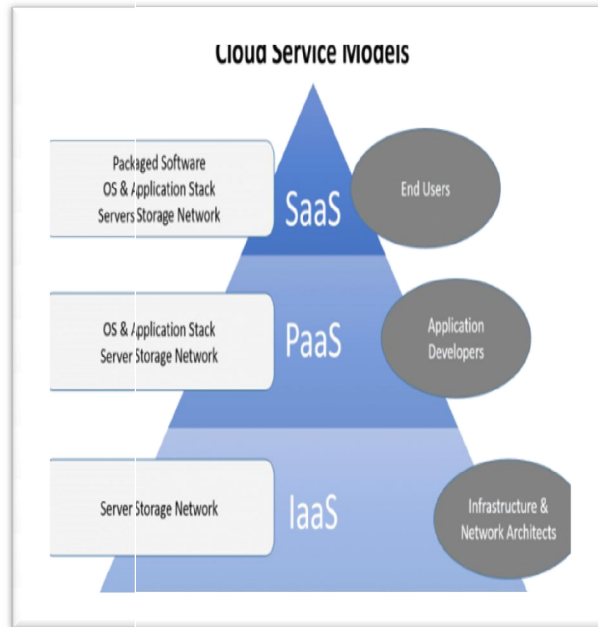


Fig.: Cloud Service Models

The most famous and user friendly cloud computing services include Amazon Web Services, Google Cloud platform and Microsoft Azure. Cloud Computing provides flexibility. Cloud-based services act as a model for businesses with rapidly increasing or variable bandwidth demands. If your requirements rise, it's easy to scale up your cloud capacity. One of the other largest external uses of cloud computing is the mobility and scalability that it brings, both to the end-user, as well as to the enterprise. Many of us are already familiar with some Cloud Computing services, like Google Docs, or even email services. The greatest possible famous Cloud Computing products or services include AWS Elastic Compute, Google Cloud Engine and AWS Lambda.

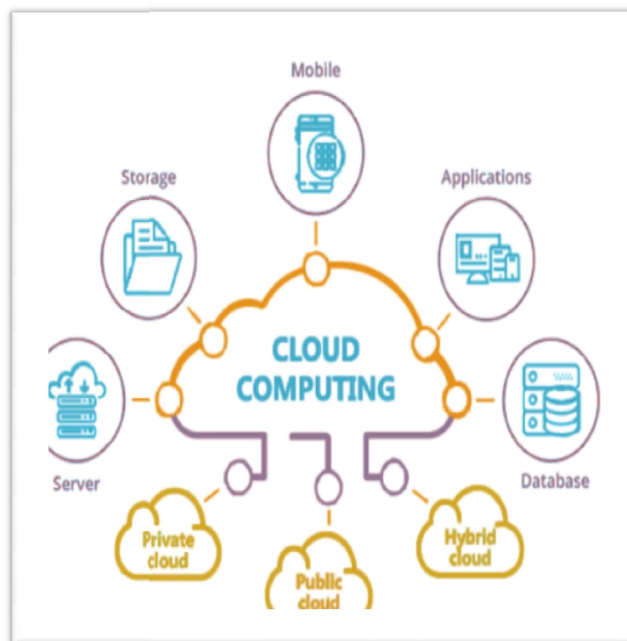


Fig.: Cloud Computing

II. LITERATURE REVIEW

The cloud computing is referred to as a technology that provides its users with IT resources by using the Internet as a medium. The users can use IT resources such as application software or storage space from the cloud without needing to own them. The users only need to pay per usage charges for the resources they used. The concept of cloud computing is not new. It is the combination of distributed computing, grid computing, utility computing, *etc.* [3–5].

When a user requests services from some cloud server, the server immediately provides the requested services to the user based on their request details. It means that the cloud computing has the ability to customize its service to each user. Since servers charge fees based on usage, it can automatically guide its users of their service request based on previous usages. These features allow that users to use the service only the amount they need at their desired time. Also, there are numerous cloud based applications that are freely available and the trend for that continues to grow [6,7].

2.1 Types of Cloud Computing Deployment Models:

Private, public, and hybrid clouds are three main deployment models of cloud computing. Each offers well defined features and advantages. Here's an overview of the main differences between private, public, and hybrid clouds:

A. Private Cloud:

Ownership and Access

- Ownership: Private clouds are dedicated, single-tenant environments owned and operated by a single organization.
- Access: Access to the private cloud is restricted to the organization and its authorized users.

Infrastructure Location:

- Private clouds can be hosted on-premises within the organization's data centers or can be deployed off-site with a third-party provider.

Customization and Control:

- Organizations have greater control over the infrastructure, allowing for customization to meet specific security, compliance, and performance requirements.

Security and Compliance:

- Private clouds are considered more suitable for handling sensitive data and complying with industry-specific regulations due to the increased control over security measures.
- Scalability:
- While private clouds offer scalability, the organization needs to invest in and manage the necessary infrastructure to accommodate growth.

B. Public Cloud:

Ownership and Access:

- Ownership: Public clouds are shared environments owned and operated by third-party cloud service providers.
- Access: Access is open to the public, and resources are shared among multiple users or organizations.

Infrastructure Location:

- Public cloud infrastructure is located off-site, typically in data centers operated by the cloud service provider.

Cost Model:

- Public clouds operate on a pay-as-you-go or subscription-based model, providing cost efficiency as users pay only for the resources they consume.

Scalability:

- Public clouds offer high scalability, allowing users to quickly scale resources up or down based on demand.

Global Reach:

- Public cloud providers have a global presence, enabling users to deploy resources in various geographic regions.

C. Hybrid Cloud:

Integration of Environments:

- Hybrid clouds combine elements of both private and public clouds, allowing data and applications to be shared between them.

Ownership and Access:

- Organizations maintain a level of control over certain components, deciding which workloads run in the private or public cloud.

Flexibility:

- Hybrid clouds offer flexibility, allowing organizations to leverage the benefits of both private and public clouds based on specific use cases and requirements.

Data and Application Portability:

- Data and applications can be moved seamlessly between the private and public cloud environments, providing greater agility.

Cost Considerations:

- Organizations can optimize costs by utilizing the public cloud for scalable workloads and the private cloud for more sensitive or mission-critical applications.

Scalability:

- Hybrid clouds provide scalability by allowing organizations to use the public cloud for burstable workloads and the private cloud for steady-state workloads.

Summarising above points, we can say that main difference lie in ownership, access, infrastructure location, control, security, and scalability. Organizations often choose a deployment model based on following factors - data sensitivity, regulatory compliance, cost considerations, and flexibility in managing workloads. Hybrid clouds provide a middle way, allowing enterprises to balance the pros and cons of both private and public clouds.

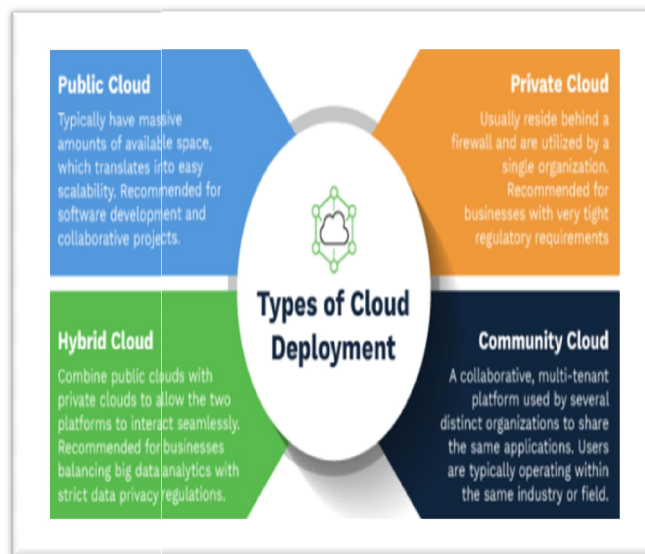


Fig.: Types of Cloud Computing Deployment Models

2.2 Advantages of Cloud computing:

Cloud computing offers numerous advantages that have contributed to its widespread adoption across various industries. Here are some key advantages of cloud computing:

1. Cost Efficiency:

Pay-as-You-Go Model: Cloud services operate on a pay-as-you-go model, allowing organizations to pay only for the computing resources they consume. This eliminates the need for large upfront capital expenditures.

Resource Optimization: Cloud platforms provide scalable resources, enabling organizations to adjust their computing capacity based on demand. This flexibility helps avoid over-provisioning and reduces costs.

2. Scalability and Flexibility:

On-Demand Scalability: Cloud computing allows organizations to scale resources up or down rapidly in response to changing workloads. This flexibility is particularly beneficial for businesses with fluctuating computing needs.

Global Reach: Cloud services are accessible from anywhere with an internet connection, providing global accessibility and allowing organizations to expand their reach without significant infrastructure investments.

3. Agility and Speed:

Rapid Deployment: Cloud services enable rapid deployment of applications and services. This agility is crucial for businesses aiming to respond quickly to market changes or launch new products and services.

Development and Testing: Cloud environments facilitate faster development and testing cycles by providing readily available infrastructure, reducing time-to-market for software products.

4. Reliability and Redundancy:

High Availability: Cloud providers typically offer high levels of availability through redundant infrastructure and data centers. This helps ensure that applications and services remain accessible even in the face of hardware failures.

Data Backups: Cloud services often include automatic data backup and recovery features, reducing the risk of data loss due to hardware failures or other disruptions.

5. Security:

Professional Security Expertise: Cloud providers invest heavily in security measures, employing dedicated security experts and implementing robust security protocols to protect data and infrastructure.

Compliance Certifications: Many cloud providers adhere to industry-specific compliance standards and obtain certifications, offering assurance to organizations with specific regulatory requirements.

2.3 Disadvantages of Cloud Computing:

While cloud computing offers numerous advantages, it also comes with certain disadvantages and challenges. It's important for organizations to consider these aspects when deciding whether to adopt cloud services. Here are some common disadvantages of cloud computing:

1. Security and Privacy Concerns:

- **Data Security:** Storing data in the cloud raises concerns about its security. Organizations may worry about the potential for data breaches, unauthorized access, or insider threats.
- **Regulatory Compliance:** Some industries have strict regulatory requirements regarding data handling and storage. Ensuring compliance with these regulations in a cloud environment can be challenging.

2. Downtime and Service Reliability:

- **Dependency on Service Providers:** Organizations depend on cloud service providers for their infrastructure and services. Downtime or service disruptions on the provider's end can impact the availability of applications and data.
- **Limited Control:** Organizations have limited control over the physical infrastructure in a cloud environment. Any issues with the cloud provider's infrastructure, such as hardware failures, can affect service reliability.

3. Data Transfer and Bandwidth Costs:

- **Data Transfer Fees:** Cloud providers may charge for data transfer between the cloud and on-premises environments or between different regions. Large data transfers can lead to unexpected costs.

- Bandwidth Limitations: Organizations may encounter limitations on bandwidth, especially with public cloud providers. This can affect the speed of data transfer and access to cloud resources.

4. Limited Customization and Flexibility:

- Vendor Lock-In: Adopting certain cloud services may lead to vendor lock-in, making it challenging to switch to a different provider due to dependencies on proprietary technologies and formats.
- Limited Customization: Some cloud services may have limitations on customization, particularly in multi-tenant environments. Organizations with unique requirements may find it challenging to implement highly customized solutions.

5. Loss of Control Over Infrastructure:

- Dependency on Providers: Organizations relinquish control over the underlying infrastructure when using cloud services. This loss of control may impact the ability to manage and fine-tune hardware and software components.
- Outages and Maintenance: Cloud providers often perform maintenance and updates on their infrastructure. During these periods, users have limited control over their environment, leading to potential disruptions.

III. CONCLUSION

This paper discussed overview of Cloud Computing along with types of Cloud and cloud deployment models. Further we discussed advantages and disadvantages of Cloud Computing. Cloud computing marks the beginning of a new era in the arena of data and communication technology as it carries along with an development paradigm which has the potential to change the way in which computing was done. Users are still getting informed through this expertise and a change from conformist subtracting to cloud computing will result but progressively. Due to this technology, developers with modernistic ideas about internet services will no longer need to spend huge amounts of currency in structuring their programs and tools substructure abilities.

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