# Cloud Deployment Models

Importance of deployment models

- The deployment models are the different ways in which the cloud computing environment can be set up.
- Cloud computing is business oriented, and the popularity of the cloud is credited to its market-oriented nature.
- In the business perspective, making the correct decision regarding the deployment model is very important.
- A model should be selected based on the needs, requirements, budget, and security.
- A wrong decision in the deployment model may affect the organization heavily.
- There are many users of the cloud, and each user has different needs. One deployment model will not suite all the cloud users. Based on the cloud setup, the properties of the cloud change.
- There are four types of deployment models available in the cloud, namely, **private, public, community,** and **hybrid**.

- The classification of the cloud is based on several parameters such as the size of the cloud (number of resources), type of service provider, location, type of users, security, and other issues.

- The smallest in size is the private cloud
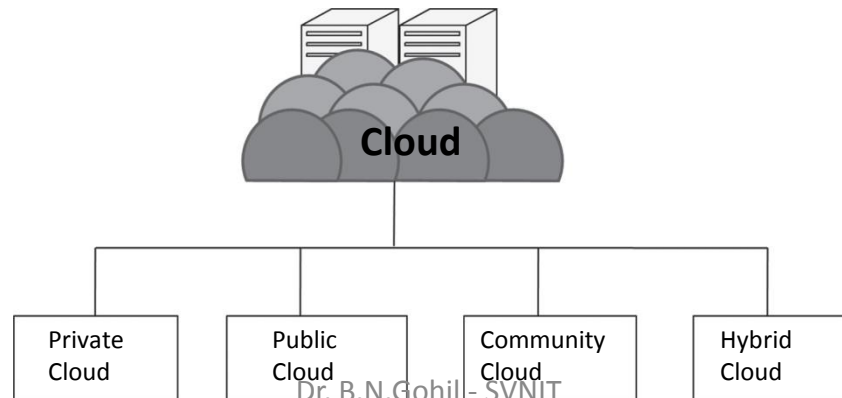
Private Cloud

- According to the National Institute of Standards and Technology (NIST), private cloud can be defined as the cloud infrastructure that is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units).

- It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

- Private cloud can be deployed using open source tools such as Openstack, Eucalyptus.

- The private cloud is small in size as compared to other cloud models. Here, the cloud is deployed and maintained by the organizations itself.

Private cloud - Characteristics

- <u>Secure</u>: This is because usually the private cloud is deployed and managed by the organization itself, and hence there is least chance of data being leaked out of the cloud. There is no other risk from anybody else as all the users belong to the same organization.

- <u>Central control</u>: When it is managed by the organization itself, there is no need for the organization to rely on anybody.

- <u>Weak SLAs</u>: Formal SLAs may or may not exist in a private cloud. But if they exist they are weak as it is between the organization and the users of the same organization.

Private cloud - Suitability

- Suitability refers to the instances where this cloud model can be used. It also signifies the most suitable conditions and environment where this cloud model can be used, such as the following:

➤ The organizations or enterprises that require a separate cloud for their personal or official use.
➤ The organizations or enterprises that have a sufficient amount of funds as managing and maintaining a cloud is a costly affair.
➤ The organizations or enterprises that consider data security to be important.
➤ The organizations that want autonomy and complete control over the cloud.
➤ The organizations that have a less number of users.
➤ The organizations that have prebuilt infrastructure for deploying the cloud and are ready for timely maintenance of the cloud for efficient functioning.
➤ Special care needs to be taken and resources should be available for troubleshooting.

- The private cloud platform is <u>not suitable</u> for the following:
- ➢ The organizations that have high user base
- ➢ The organizations that have financial constraints
- ➢ The organizations that do not have prebuilt infrastructure
- ➢ The organizations that do not have sufficient manpower to maintain and manage the cloud

- According to NIST, the private cloud can be classified into several types based on their location and management:
- On-premise private cloud
- Outsourced private cloud

- **On-Premise Private Cloud** - A typical private cloud that is managed by a single organization. Here, the cloud is deployed in organizational premises and is connected to the organizational network.

- Issues

- SLA

- Network

- Performance

- Security and data privacy

- Location

- Cloud management

- Multi-tenancy

- Maintenance

- <u>Outsourced Private Cloud</u> – It is a cloud outsourced to a third party. A third party manages the whole cloud. Everything is same as usual private cloud except that here the cloud is outsourced.
- There are several advantages and disadvantages of outsourcing the cloud.
- <u>Issues</u>
- SLA
- Network
- Security and Privacy
- Laws and conflicts
- Location
- Performance
- Maintenance

Private cloud

- <u>Advantages</u>
- The cloud is small in size and is easy to maintain.
- It provides a high level of security and privacy to the user.
- It is controlled by the organization.
- <u>Disadvantages</u>
- For the private cloud, budget is a constraint.
- The private clouds have loose SLAs.

Public cloud

- According to NIST, the public cloud is the cloud infrastructure that is provisioned for open use by the general public.
- It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.
- Public cloud consists of users from all over the world.
- A user can simply purchase resources on an hourly basis and work with the resources.
- There is no need of any prebuilt infrastructure for using the public cloud. These resources are available in the cloud provider's premises.
- Usually, cloud providers accept all the requests, and hence, the resources in the service providers' end are considered *infinite in one aspect. Some of the well-known examples of the public cloud are Amazon AWS, Microsoft Azure, etc.*

Public cloud - characteristics

- Highly scalable
- Affordable
- Less secure
- Highly available
- Stringent SLAs
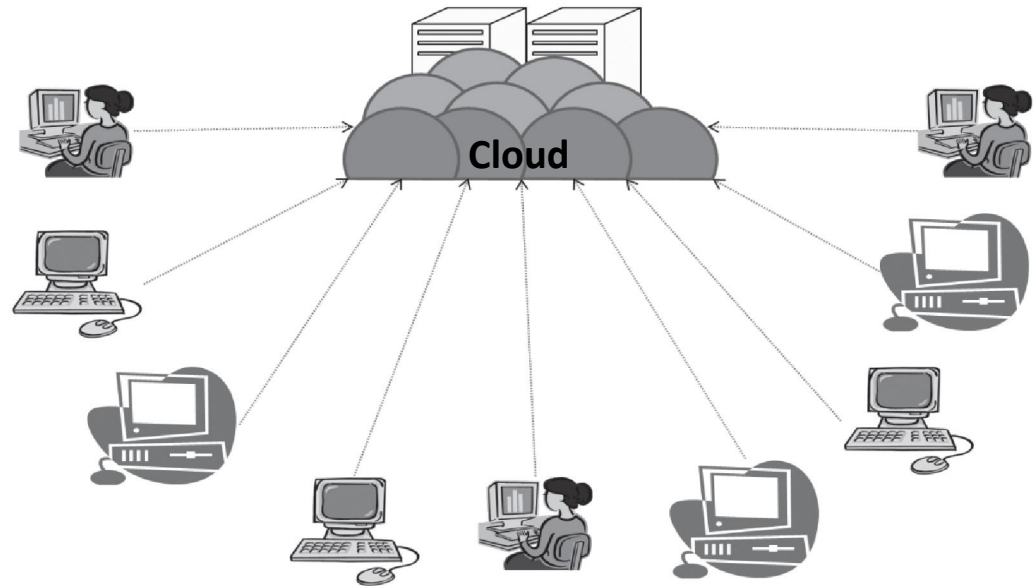
Public cloud - Suitability

- The requirement for resources is large, that is, there is large user base.
- The requirement for resources is varying.
- There is no physical infrastructure available.
- An organization has financial constraints.

The public cloud is not suitable for the following where:

- Security is very important.
- Organization expects autonomy.
- Third-party reliability is not preferred.

Public cloud - Issues

- SLA
- Network
- Performance
- Multi-tenancy
- Location
- Security and data privacy
- Laws and conflicts
- Cloud management
- Maintenance

Public cloud

- Advantages
- ➢ There is no need of establishing infrastructure for setting up a cloud.
- ➢ There is no need for maintaining the cloud.
- ➢ They are comparatively less costly than other cloud models.
- ➢ Strict SLAs are followed.
- ➢ There is no limit for the number of users.
- ➢ The public cloud is highly scalable.

- Disadvantages
- ➢ Security is an issue.
- ➢ Privacy and organizational autonomy are not possible.

Community cloud

- According to NIST, the community cloud is the cloud infrastructure that is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations).

- It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

- It is a further extension of the private cloud. Here, a private cloud is shared between several organizations.

- Either the organizations or a single organization may collectively maintain the cloud.

- The main advantage of the community cloud is that the organizations are able to share the resources among themselves based on specific concerns.

- Thus, here the organizations are able to extract the power of the cloud, which is much bigger than the private cloud, and at the same time, they are able to use it at a usually less cost.

- The community is formed based on any common cause, but eventually, all the members of the community are benefitted.

- This model is very suitable for organizations that cannot afford a private cloud and cannot rely on the public cloud either.

Community cloud - characteristics

- Collaborative and
distributive
maintenance
- Partially secure
- Cost effective
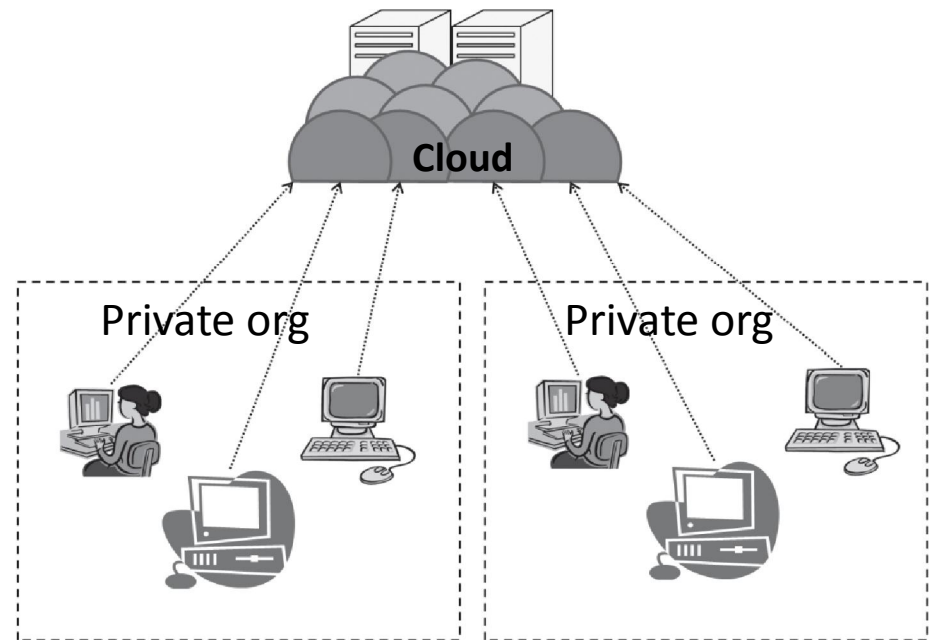
Community cloud - Suitability

- This kind of cloud is suitable for organizations that
- ➢ Want to establish a private cloud but have financial constraint
- ➢ Do not want to complete maintenance responsibility of the cloud
- ➢ Want to establish the cloud in order to collaborate with other clouds
- ➢ Want to have a collaborative cloud with more security features than the public cloud

- This cloud is not suitable for organizations that
- ➢ Prefer autonomy and control over the cloud
- ➢ Does not want to collaborate with other organizations

- There are two types of community cloud deployments:

1. On-premise community cloud

2. Outsourced community cloud

On- premise community cloud - issues

- SLA
- Network
- Performance
- Multi-tenancy
- Location
- Security and data privacy
- Laws and conflicts
- Cloud management
- Maintenance

Outsourced community cloud - issues

- SLA
- Network
- Performance
- Security and data privacy
- Laws and conflicts
- Cloud management
- Maintenance

Community cloud

- Advantages
- It allows establishing a low-cost private cloud.
- It allows collaborative work on the cloud.
- It allows sharing of responsibilities among the organization.
- It has better security than the public cloud.
- Disadvantages
- Autonomy of an organization is lost.
- Security features are not as good as the private cloud.
- It is not suitable if there is no collaboration.

Hybrid Cloud

- According to NIST, the hybrid cloud can be defined as the cloud infrastructure that is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

- The hybrid cloud usually is a combination of both public and private clouds. This is aimed at combining the advantages of private and public clouds.

- The usual method of using the hybrid cloud is to have a private cloud initially, and then for additional resources, the public cloud is used.

- There are several advantages of the hybrid cloud.
- The hybrid cloud can be regarded as a private cloud extended to the public cloud. This aims at utilizing the power of the public cloud by retaining the properties of the private cloud.
- One of the popular examples for the hybrid cloud is Eucalyptus.
- Eucalyptus was initially designed for the private cloud and is basically a private cloud, but now it also supports hybrid cloud.

Hybrid cloud - characteristics

- Scalable

- Partially secure

- Stringent SLAs

- Complex cloud management

Private cloud
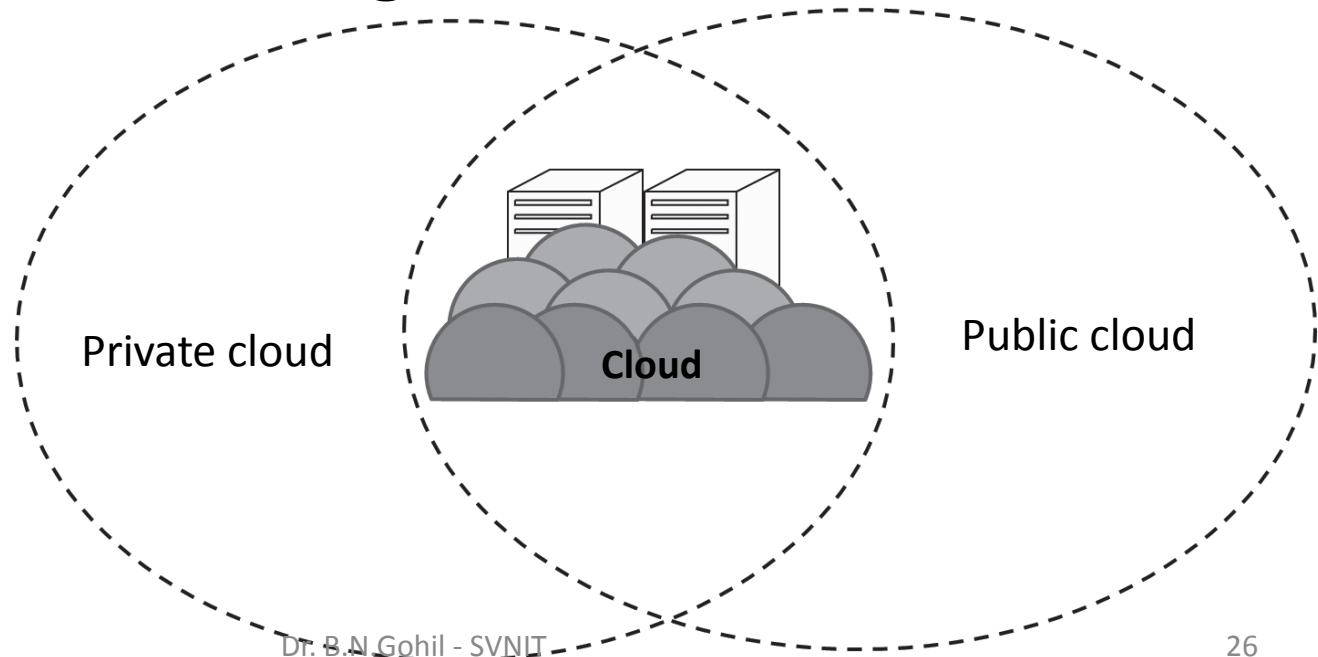
Cloud

Public cloud

Hybrid cloud - Suitability

- The hybrid cloud environment is suitable for

- Organizations that want the private cloud environment with the scalability of the public cloud

- Organizations that require more security than the public cloud

- The hybrid cloud is not suitable for

- Organizations that consider security as a prime objective

- Organizations that will not be able to handle hybrid cloud management

Hybrid cloud - issues

- SLA
- Network
- Performance
- Multi-tenancy
- Location
- Security and data privacy
- Laws and conflicts
- Cloud management
- Maintenance

Hybrid cloud

- **Advantages**
- It gives the power of both the private and public clouds.
- It is highly scalable.
- It provides better security than the public cloud.
- **Disadvantages**
- The security features are not as good as the public cloud.
- Managing a hybrid cloud is complex.
- It has stringent SLAs.