Public Cloud

The public cloud services are runs over the internet. Therefore, the users who want cloud services have to have internet connection in their local device like thin client, thick client, mobile, laptop or desktop etc. The public cloud services are managed and maintained by the Cloud Service Providers (CSPs) or the Cloud Service Brokers (CSBs). The public cloud services are often offered on utility base pricing like subscription or pay- per-use model. The public cloud services are provided through internet and APIs. This model allows users to easily access the services without purchasing any specialize hardware or software. Any device which has web browser and internet connectivity can be a public cloud client. The popular public cloud service providers are Amazon web services, Microsoft azure and Google app engine, Salesforce etc.

Advantages of public cloud

1. It saves capital cost behind purchasing the server hardware's, operating systems and application software licenses.
2. There is no need of server administrators to take care of servers as they are kept at CSPs data center and managed by them.
3. No training is required to use or access the cloud services.
4. There is no upfront or setup cost is required.
5. A user gets easy access to multiple services under a single self - service portal.
6. Users have a choice to compare and select between the providers.
7. It is cheaper than in house cloud implementation because user have to pay for that they have used.
8. The resources are easily scalable.

Disadvantages of public cloud

1. There is lack of data security as data is stored on public data center and managed by third party data center vendors therefore there may be compromise of user's confidential data.
2. Expensive recovery of backup data.

3. User never comes to know where (at which location) their data gets stored, how that can be recovered and how many replicas of data have been created.

Private Cloud

The private cloud services are used by the organizations internally. Most of the times it run over the intranet connection. They are designed for a single organization therefore anyone within the organization can get access to data, services and web applications easily through local servers and local network but users outside the organizations cannot access them. This type of cloud services are hosted on intranet therefore users who are connected to that intranet get access to the services. The infrastructure for private cloud is fully managed and maintained by the organization itself.

It is much more secure than public cloud as it gives freedom to local administrators to write their own security policies for user's access. It also provides good level trust and privacy to the users. Private clouds are more expensive than public clouds due to the capital expenditure involved in acquiring and maintaining them. The well-known private cloud platforms are Openstack, Open nebula, Eucalyptus, VMware private cloud etc.

Advantages of private cloud

1. Speed of access is very high as services are provided through local servers over local network.
2. It is more secure than public cloud as security of cloud services are handled by local administrator.
3. It can be customized as per organizations need.
4. It does not require internet connection for access.
5. It is easy to manage than public cloud.

Disadvantages of private cloud

1. Implementation cost is very high as setup involves purchasing and installing servers, Hypervisors, Operating systems.
2. It requires administrators for managing and maintaining servers.
3. The scope of scalability is very limited.

Hybrid Cloud

The hybrid cloud services are composed of two or more clouds that offers the benefits of

multiple deployment models. It mostly comprises on premise private cloud and off-premise public cloud to leverage benefits of both and allow users inside and outside to have access to it. The Hybrid cloud provides flexibility such that users can migrate their applications and services from private cloud to public cloud and vice versa. It becomes most favored in IT industry because of its eminent features like mobility, customized security, high throughput, scalability, disaster recovery, easy backup and replication across clouds, high availability and cost efficient etc. The popular hybrid clouds are AWS with eucalyptus, AWS with VMware cloud, Google cloud with Nutanix etc.

The limitations of hybrid cloud are compatibility of deployment models, vendor-lock in solutions, requires a common cloud management software and management of separate cloud platforms etc.

Community Cloud

The community cloud is basically the combination of one or more public, private or hybrid clouds, which are shared by many organizations for a single cause. The community cloud is setup between multiple organizations whose objective is same. The Infrastructure for community cloud is to be shared by several organizations within specific community with common security, compliance objectives which is managed by third party organizations or managed internally. The well-known community clouds are Salesforce, Google community cloud etc.

Comparison between various Cloud Deployment Models

S.No	Feature	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
1	**Scalability**	Very High	Limited	Very High	Limited
2	**Security**	Less Secure	Most Secure	Very Secure	Less Secure
3	**Performance**	Low to Medium	Good	Good	Medium
4	**Reliability**	Medium	High	Medium to High	Medium

5	**Upfront Cost**	Low	Very High	Medium	Medium
6	**Quality of Service**	Low	High	Medium	Medium
7	**Network**	Internet	Intranet	Intranet and Internet	Internet
8	**Availability**	For general public	Organizations internal staff	For general public and organizations internal Staff	For Community members
9	**Example**	Windows Azure, AWS etc.	Openstack, VMware cloud, CloudStack, Eucalyptus etc.	Combination of Openstack and AWS	salesforce community

Comparison between various Cloud Deployment Models

Cloud Service Models

A Cloud computing is meant to provide variety of services and applications for users over the internet or intranet.

The most widespread services of cloud computing are categorised into three service classes which are called cloud service models or cloud reference models or working models of cloud computing.

They are based on the abstraction level of the offered capabilities and the service model of the CSPs. The various service models are :

- **Infrastructure as a Service (IaaS)**
- **Platform as a Service (PaaS)**
- **Software as a Service (SaaS)**

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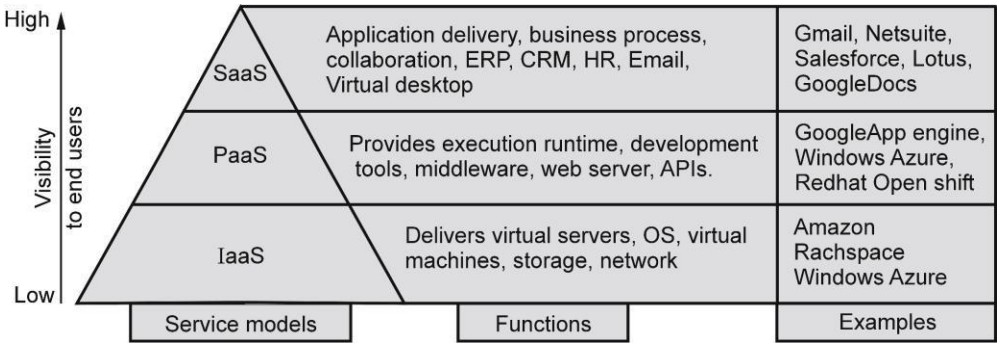


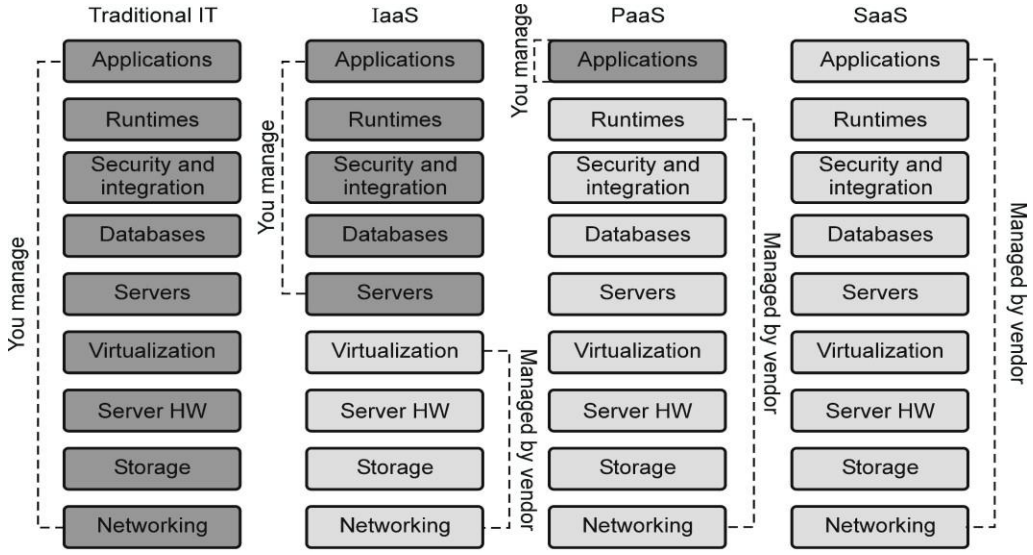
Cloud service models

From Fig. 1.10, we can see that the Infrastructure as a Service (IaaS) is the bottommost layer in the model and Software as a Service (SaaS) lies at the top.

The IaaS has lower level of abstraction and visibility, while SaaS has highest level of visibility.

The Fig. 1.11 represents the cloud stack organization from physical infrastructure to applications.

In this layered architecture, the abstraction levels are seen where higher layer services include the services of the underlying layer.



The cloud computing stack

The three services, IaaS, PaaS and SaaS, can exist independent of one another or may combine with one another at some layers. Different layers in every cloud