

## Unit - 2

### Cloud Computing Service Models

- The most popular services of the cloud are that of either infrastructure, platform, software, or storage.
- The most common cloud service is that one offering data storage disks and virtual servers, i.e. infrastructure. Examples of Infrastructure-as-a-Service (IaaS) companies are Amazon, Rackspace, Flexiscale.
- If the cloud offers a development platform, and this includes operating system, programming language execution environments, database and web server, the model is known as Platform-as-a-Service (PaaS). Examples of which are Google App Engine, Microsoft Azure, Salesforce. Operating system can be frequently upgraded and developed with PaaS, services can be obtained from diverse sources, and programming can be worked in teams (geographically distributed).
- Software-as-a-Service (SaaS), finally, means that users can access various software applications on a pay-per-use basis. As opposed to buying license programs, often very expensive. Examples of such services include widely used *GoodWee*.

GMail, or Google Docs.

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Managed by vendor

Stage:	Software as a service
Applications	Routine
Routine	Routine
Middleware	OS
Virtualization	Servers
Storage	Networking

Managed by vendor

Applications	Routine	Routine	Maintenance	OS	Virtualization	Converge	Storage	Networking
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Managed by vendor

Applications	
Routing	
Switching	
Middleware	
OS	
Virtualization	
Servers	
Storage	
Networking	

managed by you

## \* Infrastructure As A Service / IaaS :-

IaaS is one of the layers of cloud computing platform wherein the customer organization outsources via its IT infrastructure such as servers, networking, processing, storage, virtual machines and other resources. Customers access these resources over internet i.e. cloud computing platform, on a pay-per-use model.

IaaS, earlier called Hardware As a Service (Haas), is a cloud computing platform based model.

### → Major IaaS Vendors and Products :

There are many examples of IaaS vendors and products. AWS offers storage services such as Simple Storage Services (S3) and Glacier, as well as compute services, including its Elastic Compute Cloud (EC2). GCP offers storage and compute services through Google Compute Engine (GCE), as does Microsoft Azure.

⇒ Advantages of IaaS Cloud Computing Layer :

- 1) You can dynamically choose a CPU, memory and storage configuration as per your needs.
- 2) You easily access the vast computing power available on IaaS cloud platforms.
- 3) You can eliminate the need of investment in rarely used IT software/hardware.
- 4) IT infra will handled by the IaaS Cloud Computing platform vendors.

⇒ Disadvantages of IaaS Cloud Computing Layer :

- 1) There is a risk of IaaS cloud computing platform vendor by gaining the access to the organization data. But it can be avoided by opting for private cloud.
- 2) IaaS cloud computing platform model is dependent on internet availability.
- 3) It is also dependent on the availability of virtualization services.
- 4) IaaS cloud computing platform can limit the user privacy and customization options.

## \* Platform As A Service | PaaS :-

- PaaS cloud computing platform is a developer programming platform which is created for the programmers to develop, test & run and manage the applications.
- A developer is able to write the application as well as deploy it directly into this layer easily.
- PaaS extend and abstract the IaaS layer by removing the hassle of managing the individual virtual machine.
- In PaaS cloud computing platform, back end scalability is handled by the cloud service provider and the end user does not have to worry about to manage the infrastructure.
- All the infrastructure to run the applications will be over the internet.

### → Leading PaaS Vendors :

Google App Engine supports distributed web applications using Java, Python, PHP and Go. Red Hat OpenShift is a PaaS offering for creating open source applications using a wide variety of languages, databases and components.

⇒ Advantages of PaaS :-

- 1) Simplified Development
- 2) Lower risk
- 3) Prebuilt business functionality
- 4) Instant Community
- 5) Scalability

⇒ Disadvantages of PaaS :-

- 1) Vendor lock-in : One have to write the applications according to the platform provided by PaaS vendor. So migration of an application to another PaaS vendor would be a problem.
- 2) Data Privacy : Corporate data whether it can be critical or not, will be private so if it is not located within the walls of the company, there can be a risk in terms of privacy of data.
- 3) Integration with the rest of the systems / applications : It may happen that some applications are local and some are in local cloud. So there will be chances of increased complexity when we want to use data which is in the cloud with the local data.

## \* Software As A Service (SaaS) :-

SaaS is defined as the software distribution model that is deployed on internet in which applications are provided by cloud service provider. It is also known as "on-demand software" or "pay-as-you-go application".

In SaaS, the software & the applications associated with it are centrally located on the cloud server and users can access them via a thin client connecting application i.e. using a web browser.

SaaS is a way to deliver software over the internet. Instead of installing and maintaining applications, users access them via the Web. There's no hardware to buy, and users just need an Internet connection.

### → Advantages of SaaS Cloud Computing layer:

- 1) SaaS is easy to buy: SaaS pricing is based on a monthly fee or annual fee, SaaS allows organizations to access business functionality at a low cost which is less than licensed applications.
- 2) Less hardware required for SaaS: The software is hosted remotely, so organizations don't need to invest in additional hardware.

### 3) Low Maintenance required for SaaS:

Software as a Service removes the necessity of installation, set-up and often daily upkeep and maintenance for organizations.

### 4) No special software or hardware versions required : All users will have the same version of software and typically access it through the web browser.

#### ⇒ Disadvantages of SaaS Cloud Computing Layer :

- 1) Security : Actually data is stored in cloud, so security may be an issue for some users. However, cloud computing is not more secure than in-house deployment.
- 2) Latency issue : Because the data and application are stored in cloud at a variable distance from the end user, so there is a possibility that there may be more latency while interacting with the application than a local deployment.
- 3) Total dependency on Internet : Without internet connection, most SaaS applications are not usable.

4) Switching between SaaS vendors is difficult ; switching SaaS vendors involves the difficult and slow task of transferring the very large data files over the Internet and then converting and importing them into another SaaS also.

## \* CLOUD DEPLOYMENT MODELS

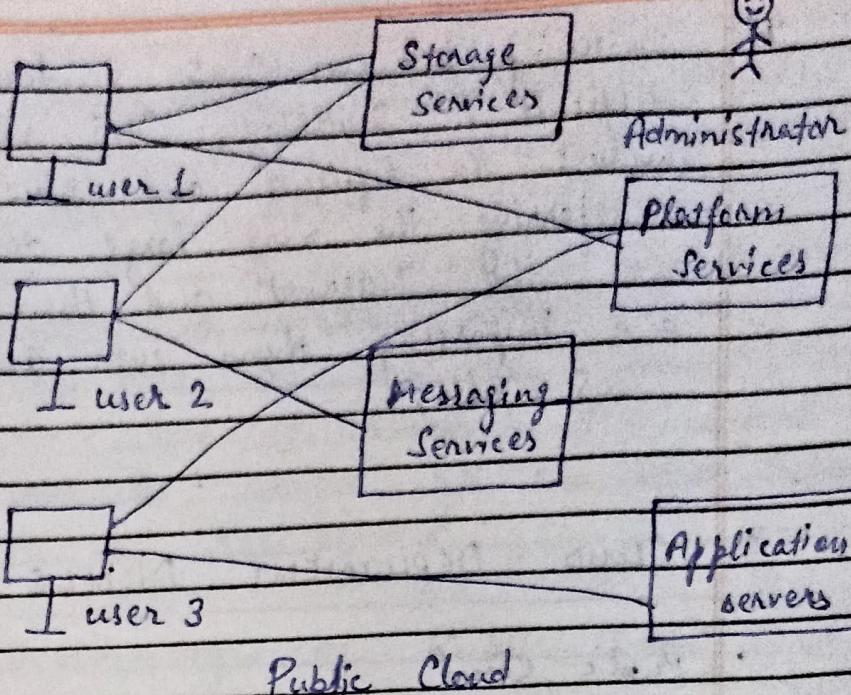
- Public Cloud
- Private Cloud
- Hybrid Cloud
- Community Cloud

### i) Public Cloud -

Public Cloud is a type of cloud hosting that allows the accessibility of systems & its services to its clients / users easily.

Some of the examples of those companies which provide public cloud facilities are : IBM , Google , Amazon , Microsoft etc.

This cloud service is open for use. This type of cloud computing is one true specimen of cloud hosting where the service providers render services to various clients.



⇒ Advantages of Public Cloud Model :

- 1) Low cost : Public cloud is having low cost as compared to private or hybrid cloud, because it shares same resources with large number of consumers.
- 2) Reliable : Public cloud provides large number of resources from different locations, if any of the resource fail, public cloud can employ another one.
- 3) Flexible : It is very easy to integrate public cloud with private cloud and hence it gives flexible approach to consumers.
- 4) Location Independent : It ensures the

independency of location, because public cloud services are delivered through Internet.

5) High Scalability: Cloud resources are available as per the demand from the pool of resources that means they can be scaled up or down according to the requirement.

#### ⇒ Disadvantages of Public Cloud Model:

- 1) Low Security: In public cloud model, data is present off-site and resources are shared publicly. Hence it does not ensure the high level security.
- 2) Less customizable: It is less customizable than private cloud.

#### 2) \* PRIVATE CLOUD -

Private Cloud is also termed as 'Internet Cloud', which allows the accessibility of systems and services within a specific boundary or organization. The Cloud platform is implemented on a cloud-based secure environment that is guarded by advanced firewalls under the

surveillance of IT department that belongs to a particular organization.

Your Application

Your Information

Enterprise IT resources (Virtualized infrastructure)

Cloud OS and Cloud Internetwork

Enterprise Infrastructure	Provided Infrastructure
Network - server -	Network - server -
storage	storage

Private      Closed

⇒ Advantages of Private Cloud Model -

- 1) Highly private and secured.
- 2) Control Oriented.

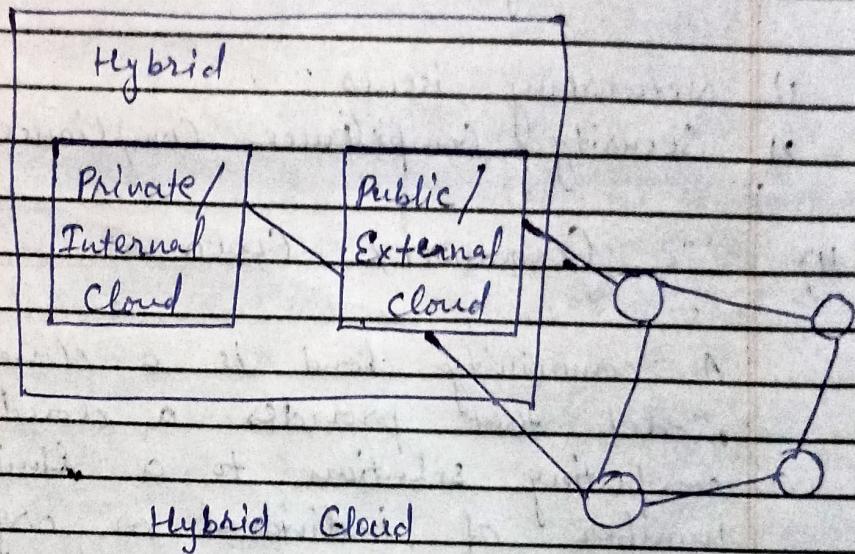
⇒ Disadvantages -

- 1) Restriction
- 2) More Cost
- 3) Inflexible price.
- 4) Less scalability.

3)

## HYBRID CLOUDS

Hybrid Cloud is often another + Cloud computing type, which is integrated, i.e. it can be a combination of two or more cloud servers, i.e. private, public or community combined as one architecture, but remain individual entities.



⇒ Hybrid Cloud models can be implemented in a number of ways:

- Separate cloud providers team up to provide both private and public services as integrated service.
- Individual cloud providers offer a complete hybrid package.
- Organizations who manage their private clouds themselves sign up to a public cloud service, which they then

integrate into their infrastructure.

⇒ Advantages -

- 1) Scalable
- 2) flexible and secure
- 3) Cost effective.

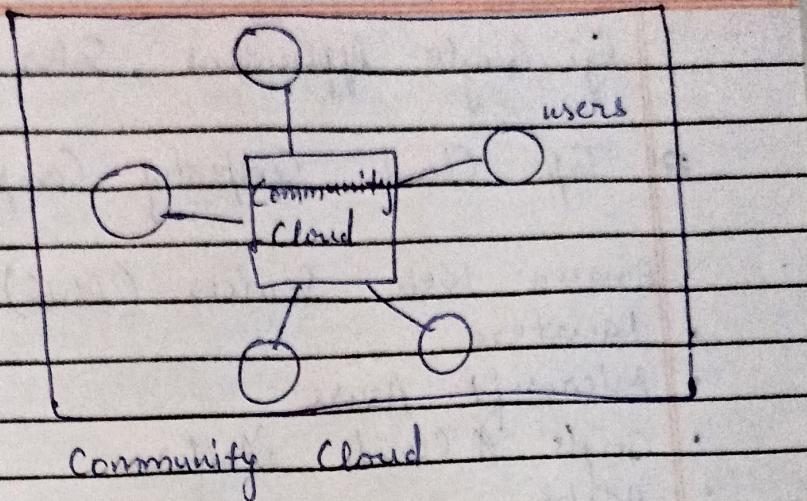
⇒ Disadvantages -

- 1) Networking issues
- 2) Security! Compliance Compliance

4) Community Cloud -

A community cloud is a cloud service model that provides a cloud computing solution to a limited number of individual or organizations that is governed, managed and secured commonly by all the participating organizations ~~or~~ or a third party managed service provider.

Community clouds are a recent variation on the private model that provide a complete cloud solution for specific business communities. Businesses share infrastructure provided by the CSP for software and development tools that are designed to meet community needs.



### \* Major Cloud Service providers :

- 1) Infrastructure as a Service (IaaS) -  
This service provides the infrastructure like Server, Operating Systems, Virtual Machines, Networks, and Storage etc on rent basis.  
Eg: Amazon Web Service (AWS), Microsoft Azure.
- 2) Platform as a Service (PaaS) -  
This service is used in developing, testing and maintaining of software. PaaS is same as IaaS but also provides the additional tools like DBMS, BI services etc.  
Eg: Apprenda, Red Hat Open Shift.
- 3) Software as a Service (SaaS) -  
This service makes the users connect to the applications through the Internet on a subscription basis.

Eg: Google Applications, Sales force.

⇒ Top Cloud Computing Companies =

- Amazon Web Services (AWS)
- Rackspace
- Microsoft Azure
- Google & Cloud Platform
- Adobe
- VMware
- IBM Cloud
- Rack Space
- Red Hat
- Sales force
- Oracle Cloud
- SAP
- Verizon Cloud
- Navisite
- Dropbox
- Egnyte