

## \* Cloud Computing :-

- It is the use of remote servers on the internet to store, manage and process data rather than local servers.
- Remote servers :- Servers provided by someone i.e (Rental servers.)
- Local servers :- Physical servers that are located at the same location.
- Define :-

It is the on demand availability of computer system resources and computing power without direct active management by the user.

## \* Properties of C.C :-

### 1) On-demand service :-

When any service is need to the user, they will request that services to the provider.

## 2) Broad network access availability :-

User can access many networks services available by the provider.

## 3) Resource Pooling :-

Resource pooling allows users to access and use a variety of resources on demand.

## \* Advantage of Cloud Computing :-

### ① Cost Reduction :-

- When data is managed by using cloud computing the maintenance of servers reduce the cost.  
*local*
- You only pay for the resources you use.

### ② Security :-

Cloud provider invest heavily in security measures to protect the data and resources of the users.

### ③ Scalability :-

Cloud computing resources can be easily scaled up and down as needed, allowing you to meet changing demand without over provisioning or under provisioning resources.

#### ④ Flexibility :-

Cloud computing allows you to access and use resources from anywhere, at any time, using any device with an internet connection. This makes it easier for organizations to support remote work and distributed teams. (Device Independence).

#### ⑤ Reliability :-

Cloud providers often have highly redundant systems in place to ensure high availability of services.

#### ⑥ Speed of deployment :-

Cloud computing allows you to set up and configure resources quickly, without the need to purchase and install hardware and software.

#### ⑦ Innovation :-

Cloud computing enables organizations to access the latest technologies and services, which can help them stay competitive and innovative.

## \* Understanding Cloud Vendors:

- ① AWS → Amazon
- ② Azure → Microsoft.
- ③ GCP → Google.
- ④ Heroku → Salesforce.

## \* Components

### ① Client Infrastructure :-

User interface for interaction.

### ② Application / Services :-

Process user want to access.

### ③ Management / security :-

Infrastructure to use the services.

### ④ Internet :-

Layer between client and services.

## \* Cloud Service Models :-

There are three main types of cloud computing models :

### ① IaaS : (Infrastructure as a service)

IaaS provides virtualized computing resources over the internet, including servers, storage and networking. With IaaS you can rent this resources on a pay - as - you - go. basis, rather than having to purchase and maintain physical hardware.

#### \* Pros of IaaS :

##### ① Cost Saving :

You only pay for the resources you use.

##### ② Scalability :

You can easily adjust to changes in demand.

##### ③ Flexibility :

Provide you a flexibility to choose the O.S, middleware, and software you want to use.

##### ④ Improve Efficiency :-

IaaS provider handle the maintenance and update of infrastructure, allowing you to focus on

your core business.

#### \* Cons of IaaS :

##### ① Security :

While IaaS providers offer security measures to protect their infrastructure, you are responsible for securing the data and applications you run on the infrastructure. This can be a concern for companies handling sensitive data.

##### ② Loss of Control :

As you are relying on the provider to maintain the underlying infrastructure. This can lead to a loss of control over certain aspects of your IT environment.

##### ③ Internet Connectivity :

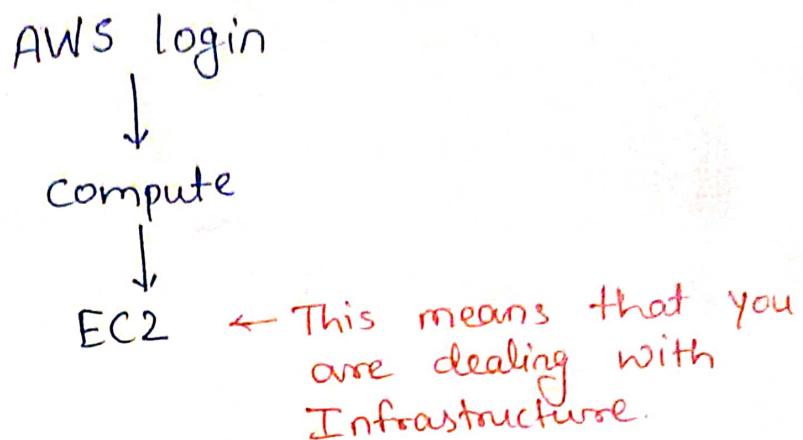
If your internet connection is unreliable or goes down, it can affect your ability to access your virtualized resources.

##### ④ Vendor lock-in :

It can be difficult to switch IaaS providers once you have set up your infrastructure with a specific provider. This can lead to vendor lock-in and a lack of flexibility in the long term.

**Note:-** Whenever a IaaS is provided to users by vendors an IP address is also provided related to that Infrastructure.

In AWS :



~~After EC2 you choose which OS & launch the instances & many other~~  
After Select EC2 you & launch the instances  
& after that you choose the O.S & other infrastructure.

**Note →** IaaS includes the feature like.

- choosing the O.S.
- Which server you would like to select such as web server, Database server, application server, etc.

Note :- Access of O.S. is not provided in PaaS.

Note :- Accessibility of PaaS is only for User Interface and Runtime environment of platform.

## ② PaaS : (Platform as a Service)

- PaaS provides a platform for developing, testing, and deploying applications.
- With PaaS, you can focus on building your applications without having to worry about the underlying infrastructure. The PaaS provider takes care of the hardware, software and other infrastructure needed to run the application.

### \* Pros of PaaS :

#### ① Reduce Maintenance :

The provider takes care about maintaining the underlying infrastructure.

#### ② Scalability :-

PaaS makes it easy to scale your application up or down according to demand.

#### ③ Cost savings :

Because you don't need to worry about maintaining the underlying infrastructure, PaaS can be more cost effective than running your own servers.

#### ④ Improved collaboration :

PaaS often includes tools for version control, bug tracking, and other forms of collaboration, which can make it easier for teams to work together.

### \* Cons of PaaS:

#### ① Limited Control:

Because you don't have direct control over the underlying infrastructure, you may be limited in terms of the configuration options available to you.

#### ② Dependence on the provider:

If the provider experiences an outage or goes out of business, your application may be affected.

#### ③ Security concerns:

Because your data is stored on the provider's servers, there is a risk that it could be hacked or accessed without your permission.

#### ④ Potential vendor lock-in:

If you build your application on a particular PaaS, it may be difficult or expensive to switch to a different provider later on.

### Note :- \* Access of cloud computing Models:-

IaaS > PaaS > SaaS

### Note :- \* users -

① IaaS → System Administrative.

② PaaS → Developers.

③ SaaS → End users.

### ③ SaaS : (software as a service)

- It is a model of software delivery in which a software application is hosted by a third-party provider and made available to customers over the internet.
- Customers can access the software using a web browser or a mobile app, and they pay a subscription fee to use the software.
- SaaS is a popular way for business to access software because it eliminates the need to install and maintain software on their own computers or servers.
- Instead, the provider handles these tasks and provides access to the software on a pay-as-you-go basis.

#### \* Pros of SaaS :

- ① No need to install and maintain software :  
The provider handles these tasks, which can be a time-saving and cost-effective solution for businesses.
- ② Access from anywhere :  
SaaS can be accessed from any device with an internet connection, which allows for flexibility and convenience.
- ③ Regular updates :  
SaaS providers often release updates and

new features on a regular basis, which can be helpful for businesses that want to stay current with the latest software.

#### \* Cons of SaaS:

##### ① Limited customization:

Since the software is hosted by the provider, businesses may have limited options for customizing the software to their specific needs.

##### ② Dependence on the provider:

Businesses using SaaS may be dependent on the provider for access to the software and may be at the mercy of the provider's uptime and security measures.

##### ③ Limited control :-

Since the software is hosted by the provider, businesses may have limited control over the data and may have to rely on the provider's policies for data backup and recovery.

##### ④ Ongoing cost:

SaaS typically requires a subscription fee, which can be an ongoing expense for businesses.

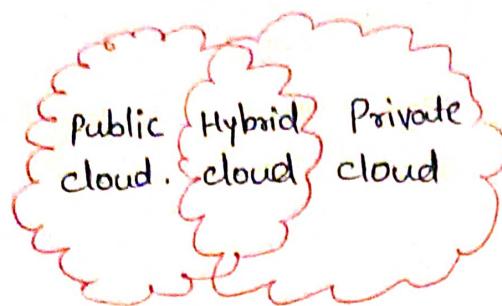
Note:- SaaS is used by End users.

Backend process is hidden from End users and managed by Vendors.

Note -

Public cloud deployed globally. whereas,  
Private cloud deployed locally.

## \* Cloud Deployment Models :



### ① Public Cloud :-

This is where the cloud infrastructure is owned and operated by a third-party provider and made available to the public over the internet (cost efficient).

### ② Private Cloud :-

This is where the cloud infrastructure is owned and operated by a single organization and made available ~~to~~ only to that organization.

### ③ Hybrid Cloud :

This is a combination of public and private clouds, where an organization uses a public cloud provider for some service and a private cloud for others. (cost efficient).

Note - ① The cost of private cloud is more as compare to public cloud

② Customization in public cloud is less & customization in private cloud is more.

Public
cost Efficient

+

Private
Critical Activities

=

Hybrid
cost Efficient + critical Activity

## \* Application of cloud computing:

### ① Hosting websites and web applications:

Many applications use cloud platforms, such as Amazon Web service (AWS), Microsoft Azure, or Google Cloud Platform (GCP), to host their websites and web applications. This can be more cost-effective and scalable than hosting the applications on-premises.

### ② Storing, and Analyzing Data:

Cloud platforms offer a range of tools and services for storing, processing and analyzing large amount of data. These tools and services can be used by organizations to gain insights from their data and make data-driven decisions.

### ③ Running applications and workloads:

Cloud platforms offers can be used to run a variety of applications and workloads, including batch processing, machine learning, and scientific simulations. This can be more cost-effective and scalable than running that applications on-premises.

### ④ Providing disaster recovery and business continuity

Cloud platforms can be used for backup and store data and applications, so that they can be quickly restored in the event of a disaster and outage. This can help organization to maintain business continuity and minimize downtime.

## ⑤ Delivering Software as a service (SaaS) :

Many organizations use cloud platforms to deliver their software as a service (SaaS) to customers. This can be more cost-effective and scalable than delivering the software on-premises.

## \* Virtualization in cloud computing :

- Virtualization is a key technology in cloud computing, as it enables the creation of virtualized computing resource that can be rapidly provisioned and released with minimal overhead.
- In a cloud computing environment, virtualization is typically used to create virtual servers, virtual storage, and virtual network, which can be accessed over the internet.
- These virtual resources can be easily created, configured, and destroyed as needed, which allows organizations to quickly scale up or down and to pay only for the resources they consume.

## \* Hypervisor :-

cloud providers typically use a hypervisor, which is a software layer that allows multiple VMs to run on a single physical device.

## \* Type of Hypervisors :-

### ① Type 1 hypervisors : (native)

These run directly on the host hardware and are responsible for managing the physical resources and providing access to the VMs.

Examples : VM ware,

Microsoft Hyper-V,

~~VirtualBox~~ (hosted).

### ② Type 2 hypervisors : (Hosted)

These run on the top of Host operating system and use the resource of the host to manage the VMs. Examples include VM ware Workstation and oracle Virtual Box