What is Cloud Computing? Explain its models.

It is a model for enabling ubiquitous, convenient, on-demand network access to ashared 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.

Benefits of Cloud Computing

- **Pay-per-use Model:** You only have to pay for the services you use, and nothingmore!
- **24/7 Availability:** It is always online! There is no such time that you cannot useyour cloud service; you can use it whenever you want.
- **Easily Scalable:** It is very easy to scale up and down or turn it off as per customers' needs. For instance, if your website's traffic increases only on Friday nights, you can opt for scaling up your servers that particular day of the week andthen scaling down for the rest of the week.
- **Security:** Cloud computing offers amazing data security. Especially if the data is mission-critical, then that data can be wiped off from local drives and kept on thecloud only for your access to stop it ending up in wrong hands.
- **Easily Manageable:** You only have to pay subscription fees; all maintenance, up-gradation and delivery of services are completely maintained by the Cloud Provider. This is backed by the Service-level Agreement (SLA).

Cloud Computing Deployment Models

There are three basic cloud deployment models:

- **Public Cloud**
- **Private Cloud**
- **Hybrid Cloud**

Public Cloud

In a public cloud, your applications would reside on a shared infrastructure. Although Cloud Providers provide complete isolation from other users who co-exist on the same hardware, it is advisable not to store any sensitive documents or information on it whenusing a public cloud.

Private Cloud

A private cloud is not very different from a public cloud, only that the security featuresvary. In a private cloud, your infrastructure or server will just have your applications. It will be completely isolated from public cloud servers. These servers are commonly usedby companies which have sensitive information to store. A private cloud can either be provided to you by your Cloud Provider or you can create your own private cloud by buying your own stack.

Hybrid Cloud

A hybrid cloud is a combination of a public cloud and a private cloud. It providesfunctionalities of both public and private clouds.

Basically, cloud services are divided into three categories:

Infrastructure-as-a-Service (IaaS): A Cloud Provider provides a user with a virtual machine or any other resources without letting the user worry about the physical aspects of the machine. More importantly, the user gets access to the operating systemin IaaS. Therefore, you can install/uninstall any software on these servers.

IaaS Advantages:

Maintaining on-premise IT infrastructure is costly and labor-intensive.It often requires asignificant initial investment in physical hardware, and then you will probably need to engage external IT contractors to maintain the hardware and keep everything working and up-to-date.

IaaS solutions are highly flexible and highly scalable, and you can replace it wheneveryou need without losing money on your initial investment.

IaaS Characteristics:

IaaS platforms are:

- Highly flexible and highly scalable.
- Accessible by multiple users.
- Cost-effective.

When to Use IaaS:

IaaS is beneficial to businesses of all shapes and sizes, as it allows complete control over your infrastructure, and operates on a pay-as-you-use model, so it fits into mostbudgets.

Platform-as-a-Service (PaaS): In this service, one does not get access to the operating system. If you need a web server with PHP installed on it, they will give you this web server, without giving you access to the OS. What you get is a dashboard through which you can upload and deploy your files; the rest is managed by the Cloud Provider, i.e., software installation, security patch on OS, etc.

PaaS Advantages:

PaaS is primarily used by developers who are building software or applications.

This means developers don't need to start from scratch when creating applications,saving them a lot of time (and money) on writing extensive code.

PaaS is a popular choice for businesses who want to create unique applications withoutspending a fortune or taking on all the responsibility.

PaaS Characteristics:

PaaS platforms are:

- Accessible by multiple users.
- Scalable – you can choose from various tiers of resources to suit the size of yourbusiness.
- Built on virtualization technology.
- Easy to run without extensive system administration knowledge.
- PaaS is often the most cost-effective and time-effective way for a developer tocreate a unique application.
- PaaS allows the developer to focus on the creative side of app development, asopposed to menial tasks such as managing software updates or security patches. All of their time and brainpower will go into creating, testing, and deploying the app.

Software-as-a-Service (SaaS): In SaaS, one just gets the access to the software whichis installed on the server. No dashboard is provided, and no access to the operating system is given, for example, Netflix. You can use Netflix, but you do not have any access to its server or dashboard. You can just use the software.

SaaS platforms are:

- Available over the internet.
- Hosted on a remote server by a third-party provider.
- Scalable, with different tiers for small, medium, and enterprise-level businesses.
- Inclusive, offering security, compliance, and maintenance as part of the cost.

What are the differences between IaaS, PaaS, and SaaS?

- IaaS is there to provide you with maximum flexibility when it comes to hosting custom-built apps, as well as a providing a general data center for data storage.
- PaaS is most often built on top of an IaaS platform to reduce the need for systemadministration. It allows you to focus on app development instead of infrastructure management.
- SaaS offers ready-to-use, out-of-the-box solutions that meet a particular business need (such as website or email). Most modern SaaS platforms are builton IaaS or PaaS platforms.