ENTERPRISE CLOUD CONCEPTS

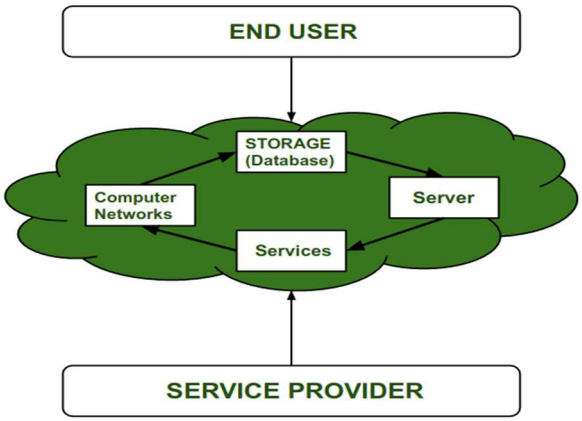
Unit-1

Important Q & A

1) Explain about Origins & Influence of Enterprise Cloud Concepts? What are its advantages & disadvantages?

Ans) In this, we will cover the basic overview of cloud computing. And you will see mainly our focus on history of cloud computing and will cover the history of client server computing, distributed computing, and cloud computing. Let's discuss it one by one.

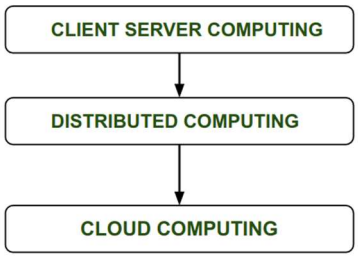
Cloud Computing:
Cloud Computing referred as the accessing and storing of data and provide services related to computing over the internet. It simply referred as it remote services on the internet manage and access data online rather than any local drives. The data can be anything like images, videos, audios, documents, files etc.



Cloud Computing Service Provider's:
Cloud computing is in huge demand so, big organization providing the service like Amazon AWS, Microsoft Azure, Google Cloud, Alibaba cloud etc. are some Cloud Computing service Provider.

History of Cloud Computing:
In this, we will discuss the history of Cloud computing. And also cover the history of client server computing, distributed computing, and cloud computing.

- Before Computing was come into existence, client Server Architecture was used where all the data and control of client resides in Server side. If a single user want to access some data, firstly user need to connect to the server and after that user will get appropriate access. But it has many disadvantages. So, After Client Server computing, Distributed Computing was come into existence, in this type of computing all computers are networked together with the help of this, user can share their resources when needed. It also has certain limitations. So in order to remove limitations faced in distributed system, cloud computing was emerged.



- During 1961, John MacCharty delivered his speech at MIT that "Computing Can be sold as a Utility, like Water and Electricity." According to John MacCharty it was a brilliant idea. But people at that time don't want to adopt this technology. They thought the technology they are using efficient enough for them. So, this concept of computing was not appreciated much so and very less will research on it. But as the time fleet the technology caught the idea after few years this idea is implemented. So, this is implemented by Salesforce.com in 1999.

- This company started delivering an enterprise application over the internet and this way the boom of Cloud Computing was started.

- In 2002, Amazon started Amazon Web Services (AWS), Amazon will provide storage, computation over the internet. In 2006 Amazon will launch Elastic Compute Cloud Commercial Service which is open for Everybody to use.

- After that in 2009, Google Play also started providing Cloud Computing Enterprise Application as other companies will see the emergence of cloud Computing they also started providing their cloud services. Thus, in 2009, Microsoft launch Microsoft Azure and after that other companies like Alibaba, IBM, Oracle, HP also introduces their Cloud Services. In today the Cloud Computing become very popular and important skill.

Advantages :

- It is easier to get backup in cloud.
- It allows us easy and quick access stored information anywhere and anytime.
- It allows us to access data via mobile.
- It reduces both hardware ad Software cost, and it is easily maintainable.
- One of the biggest advantage of Cloud Computing is Database Security.

1. Cost Efficiency
2. Scalability
3. Flexibility and Mobility
4. Enhanced Security
5. Improved Collaboration

Disadvantages :

- It requires good internet connection.

- User have limited control on the data
- Risk of Vendor Lock-In
- Less Control Over Underlying Cloud Infrastructure
- Concerns About Security Risks
- Integration Complexity
- Unforeseen Costs

2) what are the goals and benefits of Enterprise Cloud Concepts?

Ans) Goals:

1. **Cost Efficiency:** Reduce the capital expenditure on physical hardware and infrastructure by moving to a more scalable and pay-as-you-go model.
2. **Scalability:** Quickly and easily scale resources up or down based on demand without the need for significant upfront investment.
3. **Flexibility:** Enable businesses to rapidly deploy new services and applications, responding swiftly to market changes and opportunities.
4. **Innovation:** Foster a culture of innovation by providing access to advanced technologies and tools that might be too costly or complex to maintain on-premises.
5. **Security:** Enhance security by leveraging cloud providers' robust security measures, including compliance certifications and advanced threat protection.

Benefits:

1. **Improved Collaboration:** Facilitate better collaboration among employees, regardless of their location, through cloud-based tools and platforms.
2. **Disaster Recovery:** Improve disaster recovery capabilities with cloud backup and recovery solutions, ensuring business continuity in case of disruptions.
3. **Operational Efficiency:** Streamline IT operations and reduce the time spent on maintenance, allowing IT teams to focus on strategic initiatives.
4. **Access to Advanced Analytics:** Leverage cloud-based analytics tools to gain insights from large datasets, driving data-informed decision-making.
5. **Enhanced Customer Experience:** Deliver superior customer experiences through faster and more reliable service delivery.

3) What are the Risks and Challenges of Enterprise Cloud Concepts?

Ans) Security and Privacy Risks:

- **Data Breaches:** Storing sensitive data in the cloud can expose organizations to risks of data breaches and unauthorized access.
- **Compliance:** Ensuring compliance with industry regulations and standards (e.g., GDPR, HIPAA) can be complex when data is stored and processed by third-party cloud providers.

Downtime and Reliability:

- **Service Outages:** Cloud service providers may experience outages or downtime, impacting business operations.
- **Dependency on Providers:** Relying on a single cloud provider can be risky if they face technical issues or disruptions.

Cost Management:

- **Unexpected Costs:** Without proper management, cloud costs can escalate due to unexpected usage or inefficient resource allocation.
- **Pricing Models:** Understanding and optimizing the various pricing models offered by cloud providers can be challenging.

Data Management:

- **Data Loss:** Inadequate data backup and recovery processes can lead to data loss.
- **Migration Challenges:** Moving data and applications to the cloud can be complex, time-consuming, and costly.

Performance Issues:

- **Latency:** Cloud-based applications may experience latency issues, especially if the data center is located far from the users.
- **Bandwidth Limitations:** Limited network bandwidth can affect the performance of cloud services.

Vendor Lock-In:

- **Limited Flexibility:** Organizations may face difficulties if they want to switch to a different cloud provider or bring services back on-premises due to compatibility issues and proprietary technologies.
- **Contract Terms:** Long-term contracts with cloud providers can limit flexibility and negotiation power.

Skill Gaps:

- **Lack of Expertise:** Organizations may face challenges in finding and retaining skilled IT professionals with cloud expertise.
- **Training Needs:** Continuous training and upskilling are required to keep pace with evolving cloud technologies.

Integration with Existing Systems:

- **Compatibility Issues:** Integrating cloud services with existing on-premises systems and applications can be complex.
- **Hybrid Environments:** Managing a hybrid cloud environment (combining on-premises and cloud services) can add complexity to IT operations.

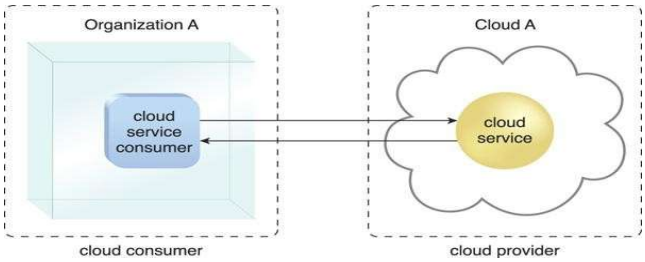
4) What are the roles and boundaries of Enterprise Cloud?

Ans) Cloud Provider

The organization that provides cloud-based IT resources is the cloud provider. When assuming the role of cloud provider, an organization is responsible for making cloud services available to cloud consumers, as per agreed upon SLA guarantees. The cloud provider is further tasked with any required management and administrative duties to ensure the on-going operation of the overall cloud infrastructure. Cloud providers normally own the IT resources that are made available for lease by cloud consumers; however, some cloud providers also "resell" IT resources leased from other cloud providers.

Cloud Consumer

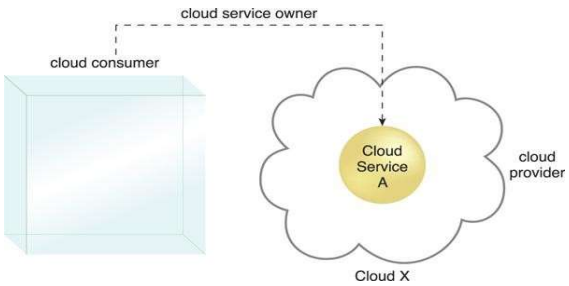
A *cloud consumer* is an organization (or a human) that has a formal contract or arrangement with a cloud provider to use IT resources made available by the cloud provider. Specifically, the cloud consumer uses a cloud service consumer to access a cloud service



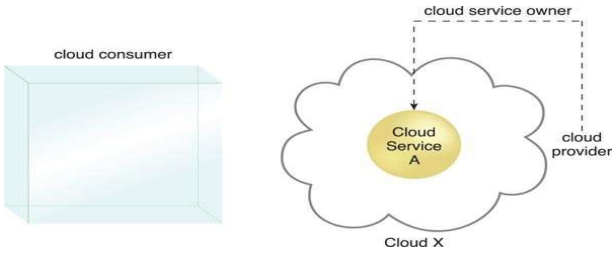
Cloud Service Owner

The person or organization that legally owns a cloud service is called a *cloud service owner*. The cloud service owner can be the cloud consumer, or the cloud provider that owns the cloud within which the cloud service resides.

For example, either the cloud consumer of Cloud X or the cloud provider of Cloud X could own Cloud Service A



A cloud consumer can be a cloud service owner when it deploys its own service in a cloud.



A cloud provider becomes a cloud service owner if it deploys its own cloud service, typically for other cloud consumers to use.

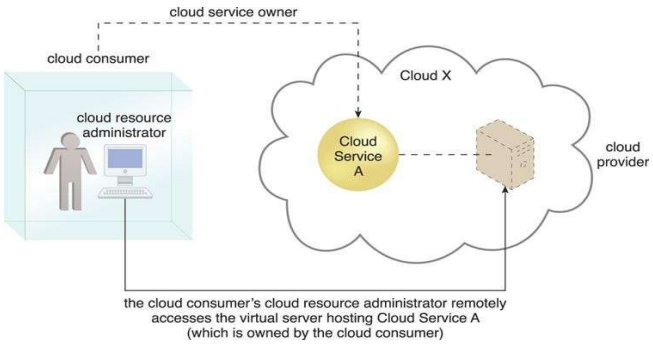
Note that a cloud consumer that owns a cloud service hosted by a third- party cloud does not necessarily need to be the user (or consumer) of the cloud service. Several cloud consumer organizations develop and deploy cloud services in clouds owned by other parties for the purpose of making the cloud services available to the general public.

Cloud Resource Administrator

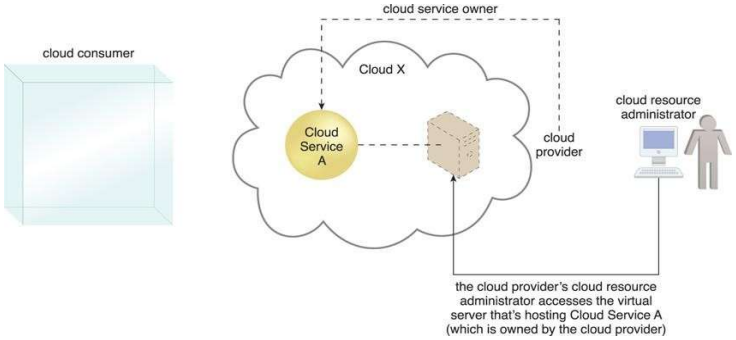
A *cloud resource administrator* is the person or organization responsible for administering a cloud-based IT resource (including cloud services).

The cloud resource administrator can be (or belong to) the cloud consumer or cloud provider of the cloud within which the cloud service resides. Alternatively, it can be (or belong to) a third-party organization contracted to administer the cloud-based IT resource.

For example, a cloud service owner can contract a cloud resource administrator to administer a cloud service



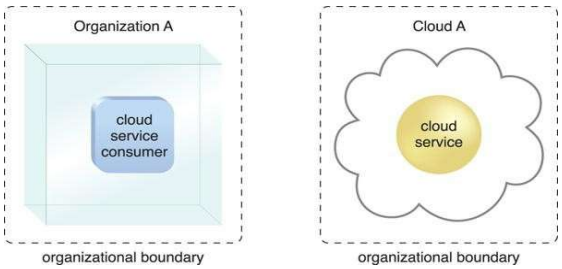
A cloud resource administrator can be with a cloud consumer organization and administer remotely accessible IT resources that belong to the cloud consumer



A cloud resource administrator can be with a cloud provider organization for which it can administer the cloud provider's internally and externally available IT resources.

Organizational Boundary

An *organizational boundary* represents the physical perimeter that surrounds a set of IT resources that are owned and governed by an organization. The organizational boundary does not represent the boundary of an actual organization, only an organizational set of IT assets and IT resources. Similarly, clouds have an organizational boundary

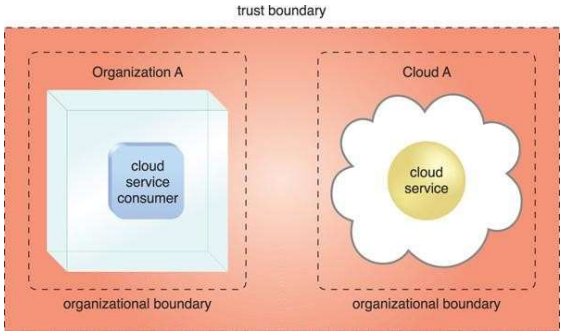


Organizational boundaries of a cloud consumer (left), and a cloud provider (right), represented by a broken line notation.

Trust Boundary

When an organization assumes the role of cloud consumer to access cloud-based IT resources, it needs to extend its trust beyond the physical boundary of the organization to include parts of the cloud environment.

A *trust boundary* is a logical perimeter that typically spans beyond physical boundaries to represent the extent to which IT resources are trusted. When analyzing cloud environments, the trust boundary is most frequently associated with the trust issued by the organization acting as the cloud consumer.



An extended trust boundary encompasses the organizational boundaries of the cloud provider and the cloud consumer.

5) What are the Cloud Characteristics? Explain its work.

Ans)

1. **On-demand self-services:** The Cloud computing services does not require any human administrators, user themselves are able to provision, monitor and manage computing resources as needed.
2. **Broad network access:** The Computing services are generally provided over standard networks and heterogeneous devices.

3. **Rapid elasticity:** The Computing services should have IT resources that are able to scale out and in quickly and on a need basis. Whenever the user require services it is provided to him and it is scale out as soon as its requirement gets over.
4. **Resource pooling:** The IT resource (e.g., networks, servers, storage, applications, and services) present are shared across multiple applications and occupant in an uncommitted manner. Multiple clients are provided service from a same physical resource.
5. **Measured service:** The resource utilization is tracked for each application and occupant, it will provide both the user and the resource provider with an account of what has been used. This is done for various reasons like monitoring billing and effective use of resource.
6. **Multi-tenancy:** Cloud computing providers can support multiple tenants (users or organizations) on a single set of shared resources.
7. **Virtualization:** Cloud computing providers use virtualization technology to abstract underlying hardware resources and present them as logical resources to users.
8. **Resilient computing:** Cloud computing services are typically designed with redundancy and fault tolerance in mind, which ensures high availability and reliability.
9. **Flexible pricing models:** Cloud providers offer a variety of pricing models, including pay-per-use, subscription-based, and spot pricing, allowing users to choose the option that best suits their needs.
10. **Security:** Cloud providers invest heavily in security measures to protect their users' data and ensure the privacy of sensitive information.
11. **Automation:** Cloud computing services are often highly automated, allowing users to deploy and manage resources with minimal manual intervention.
12. **Sustainability:** Cloud providers are increasingly focused on sustainable practices, such as energy-efficient data centers and the use of renewable energy sources, to reduce their environmental impact.

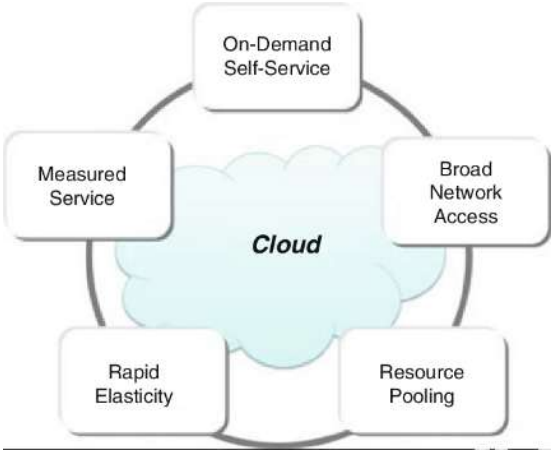
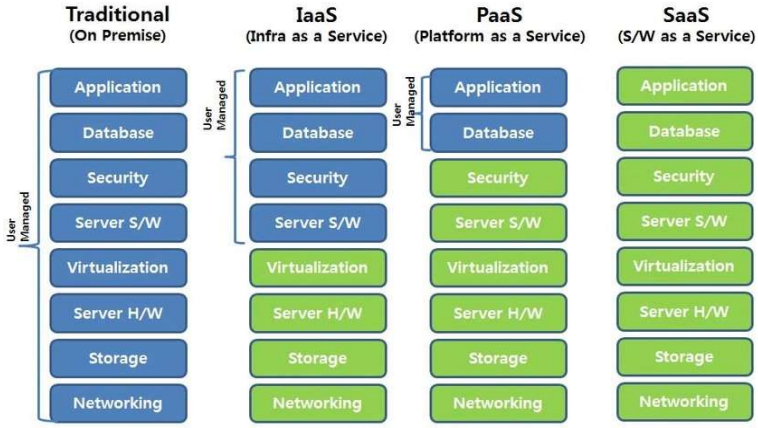


Fig – characteristics of cloud computing

6) What are Cloud Delivery Models?

Ans) A cloud delivery model represents a specific, pre-packaged combination of computing resources offered by a cloud provider. Each model is classified as a different type of cloud service offering. The three main cloud delivery models are:

- IaaS - Infrastructure as a Service
- PaaS - Platform as a Service
- SaaS - Software as a Service
- DaaS - Data as a Service



Infrastructure as a Service (IaaS):

IaaS is also known as **Hardware as a Service (HaaS)**. It is a computing infrastructure managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.

Characteristics of IaaS

There are the following characteristics of IaaS -

- Resources are available as a service
- Services are highly scalable
- Dynamic and flexible
- GUI and API-based access
- Automated administrative tasks

Example: DigitalOcean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud.

Platform as a Service (PaaS):

PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications.

Characteristics of PaaS

There are the following characteristics of PaaS -

- Accessible to various users via the same development application.
- Integrates with web services and databases.
- Builds on virtualization technology, so resources can easily be scaled up or down as per the organization's need.
- Support multiple languages and frameworks.
- Provides an ability to "**Auto-scale**".

Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

Software as a Service (SaaS):

SaaS is also known as "**on-demand software**". It is a software in which the applications are hosted by a cloud service provider. Users can access these applications with the help of internet connection and web browser.

Characteristics of SaaS

There are the following characteristics of SaaS -

- Managed from a central location
- Hosted on a remote server
- Accessible over the internet
- Users are not responsible for hardware and software updates. Updates are applied automatically.
- The services are purchased on the pay-as-per-use basis

Example: BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.

7) Differentiate between IaaS, PaaS, and SaaS? What are the advantages & disadvantages of the Cloud Computing Models?

Ans) The difference between IaaS, PaaS, and SaaS -

IaaS	Paas	SaaS
It provides a virtual data center to store information and create platforms for app development, testing, and deployment.	It provides virtual platforms and tools to create, test, and deploy apps.	It provides web software and apps to complete business tasks.

It provides access to resources such as virtual machines, virtual storage, etc.	It provides runtime environments and deployment tools for applications.	It provides software as a service to the end-users.
It is used by network architects.	It is used by developers.	It is used by end users.
IaaS provides only Infrastructure.	PaaS provides Infrastructure+Platform.	SaaS provides Infrastructure+Platform +Software.

Advantages of Cloud Service Models:

Cost Efficiency: Cloud providers provide a pricing model that permits customers to pay only for the sources they consume. This gets rid of the need for advanced infrastructure investments and allows price efficiency as businesses scale resources based totally on need.

Scalability: Cloud services provide the potential to scale sources up or down speedily and respond to changing workloads and commercial organization requirements. This flexibility ensures that agencies can correctly manipulate fluctuating needs without over-provisioning.

Accessibility and Flexibility: Cloud computing allows one to get access to applications and facts remotely from everywhere with an internet connection. This fosters collaboration among geographically dispersed groups and allows users to work flexibly.

Rapid Deployment: Cloud provider models facilitate rapid deployment of programs. Users can provision sources and deploy programs quickly, decreasing time-to-market and allowing faster innovation.

Managed Services: Cloud providers offer more than a few managed offerings, managing duties together with safety, tracking, and safety. This helps agencies dump operational obligations, pay attention to relevant skills, and experience the records of cloud carriers.

Automatic Updates and Patch Management: Cloud providers manipulate software application updates, patches, and protection functions robotically. This ensures that clients always have to get proper entry to the required abilities and protection upgrades without the need for guide intervention.

Disadvantages of Cloud Service Models:

Security Concerns: Security remains a top concern for companies moving to the cloud. Storing information and programs on out-of-door servers will increase questions on statistics' privateness, regulatory compliance, and the functionality of unauthorized access.

Dependency on Internet Connectivity: Cloud services require a reliable internet connection. Downtime or disruptions in internet connectivity can impact the right to access essential applications and information, affecting business operations.

Limited Customization in SaaS: While SaaS offers convenience, it is able to lack the extent of customization that a few organizations require. Users depend on the capabilities and configurations supplied by the useful resources of the SaaS company, restricting flexibility.

Data Transfer Costs: Moving huge volumes of records from the cloud can require extra charges. Organizations need to cautiously recollect and manipulate facts and switch fees, in particular at the same time as dealing with enormous amounts of records.

Vendor Lock-In: Adopting certain cloud providers can also result in provider lock-in, wherein it becomes hard to migrate packages and statistics to a different employer or again to on-premises surroundings. This can limit flexibility and cause lengthy periods of dependence on a specific cloud organization.

Potential for Downtime: Cloud company companies may also experience outages or downtime, impacting the supply of services. While respectable businesses try for immoderate availability, occasional disruptions can occur, affecting users who get proper entry to agency continuity.

8) What is a Cloud Deployment Model? Explain Types of Cloud Computing Deployment Models?

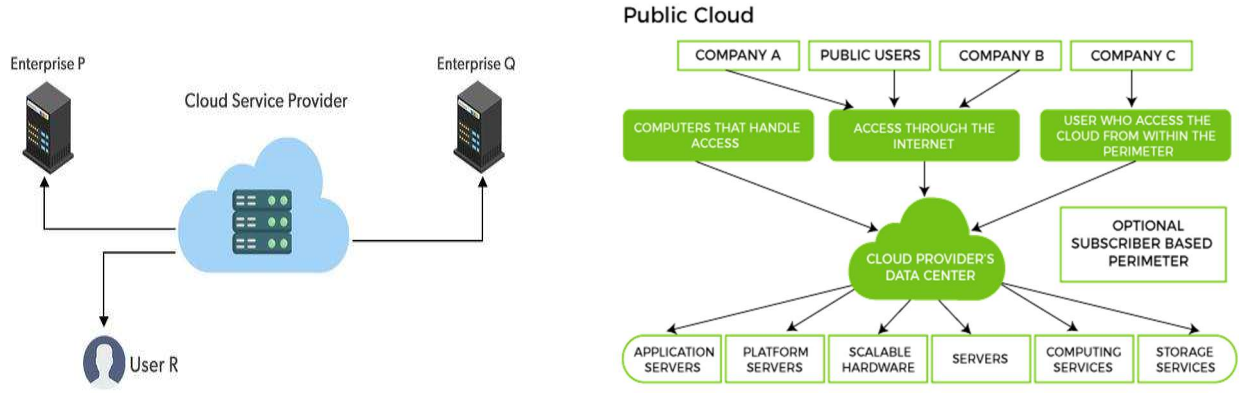
Ans) Cloud Deployment Model functions as a virtual computing environment with a deployment architecture that varies depending on the amount of data you want to store and who has access to the infrastructure.

Types of Cloud Computing Deployment Models

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

1. Public Cloud

- **Definition:** Services are delivered over the public internet and shared across multiple organizations.
- **Examples:** Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP).



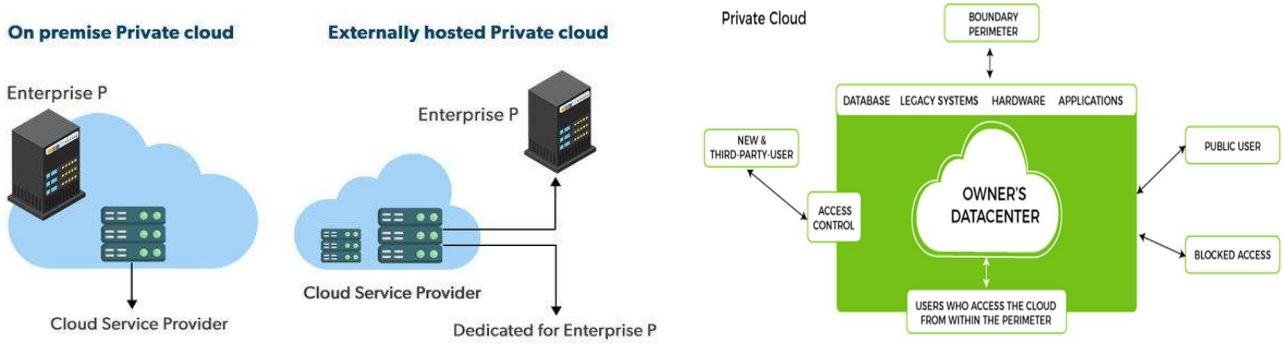
Public Cloud

- **Advantages:**
  - Cost-effective: Pay-as-you-go model.
  - Scalable: Easily scale resources up or down.
  - Maintenance: Managed by the service provider.

- **Disadvantages:**
    - Security: Potential risks due to multi-tenancy.
    - Compliance: Regulatory compliance can be challenging.

2. Private Cloud

- **Definition:** Cloud infrastructure is operated solely for a single organization, either on-premises or hosted by a third party.
- **Examples:** Private clouds built using technologies like VMware, OpenStack.

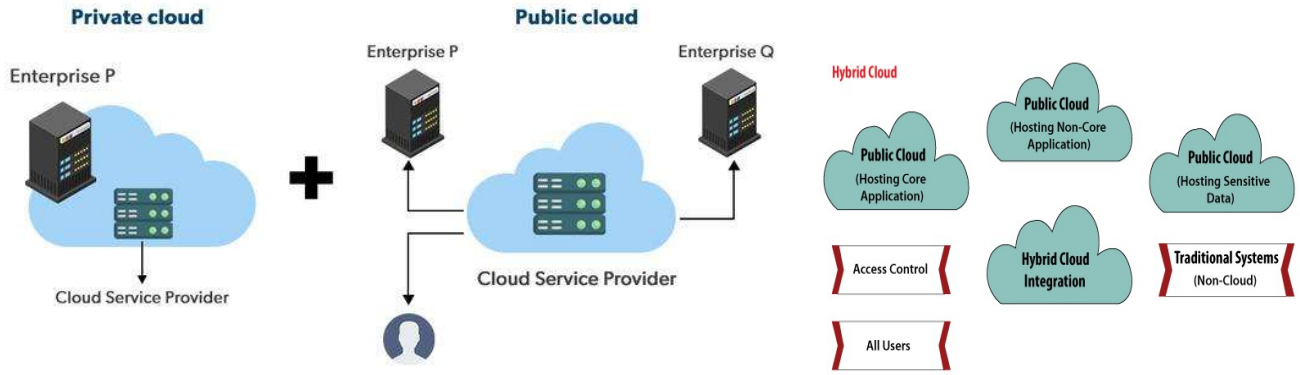


Private Cloud

- **Advantages:**
    - Control: Greater control over data and infrastructure.
    - Security: Enhanced security as resources are not shared.
    - Customization: Tailored to specific business needs.
- **Disadvantages:**
    - Cost: Higher initial investment and maintenance costs.
    - Scalability: Limited scalability compared to public cloud.
    - Maintenance: Requires in-house IT expertise and resources.

3. Hybrid Cloud

- **Definition:** Combines private and public clouds to allow data and applications to be shared between them.
- **Examples:** Using AWS for scalable storage while keeping sensitive data in a private cloud.

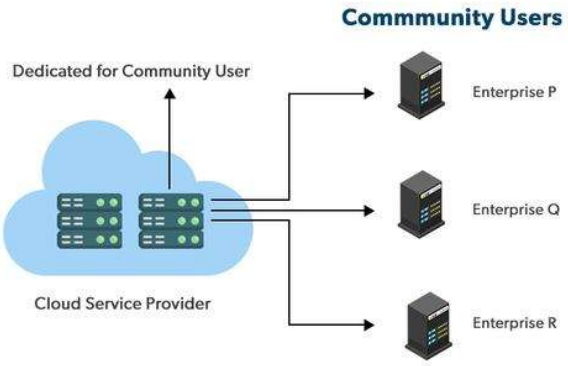


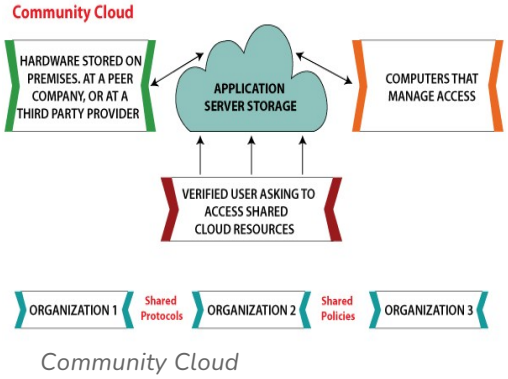
Hybrid Cloud

- **Advantages:**
  - Flexibility: Balance between cost and control.
  - Scalability: Leverage the scalability of the public cloud.
  - Security: Maintain sensitive data on-premises.
- **Disadvantages:**
  - Complexity: Managing hybrid environments can be challenging.
  - Compatibility: Ensuring compatibility between public and private clouds.
  - Security: Coordinating security measures across environments.

4. Community Cloud

- **Definition:** Shared infrastructure for a specific community of organizations with common goals or requirements.
- **Examples:** Government agencies or healthcare organizations sharing cloud resources.





Community Cloud

- **Advantages:**
  - Cost Sharing: Shared cost among organizations.
  - Collaboration: Promotes collaboration within the community.
  - Security: Tailored security and compliance for the specific community.
- **Disadvantages:**
  - Limited Control: Less control compared to private cloud.
  - Compliance: Ensuring compliance across all participating organizations.
  - Scalability: Potentially limited scalability compared to public cloud.