

Cloud Computing

Cloud computing is a virtualization-based technology that allows us to create, configure, and customize applications via an internet connection. The cloud technology includes a development platform, hard disk, software application, and database.

What is Cloud Computing?

The term cloud refers to a network or the internet. It is a technology that uses remote servers on the internet to store, manage, and access data online rather than local drives. The data can be anything such as files, images, documents, audio, video, and more.

There are the following operations that we can do using cloud computing:

- Developing new applications and services
- Storage, back up, and recovery of data
- Hosting blogs and websites
- Delivery of software on demand
- Analysis of data
- Streaming videos and audios

Why Cloud Computing?

Peak loads vary (high during weekends and holidays)

Small as well as large IT companies, follow the traditional methods to provide the IT infrastructure. That means for any IT company, we need a Server Room that is the basic need of IT companies.

In that server room, there should be a database server, mail server, networking, firewalls, routers, modem, switches, QPS (Query Per Second means how much queries or load will be handled by the server), configurable system, high net speed, and the maintenance engineers.

To establish such IT infrastructure, we need to spend lots of money. To overcome all these problems and to reduce the IT infrastructure cost, Cloud Computing comes into existence.

Five Characteristics of Cloud Computing

- On-demand self service
- Broad network access

- Multi-tenancy and resource pooling
- Rapid elasticity and scalability
- Measured service

Advantages and Disadvantages:

| Advantage | Disadvantages |
|------------------------------------|----------------------------|
| Backup and restore data | Internet Connectivity |
| Improved Collaboration | Vendor lock-in |
| Excellent Accessibility | Limited control |
| Low maintenance cost | Security |
| Data security | Compliance and legal risk |
| IServices in the pay-per-use model | Cost concerns |
| Unlimited storage capacity | Loss of cloud data service |

Types of Cloud :

• Private Cloud

- ⇒ Private cloud provides computing services to a private internal network (within the organization) and selected users instead of the general public.
- ⇒ Private cloud provides a high level of security and privacy to data through firewalls and internal hosting. It also ensures that operational and sensitive data are not accessible to third-party providers.

Benefits :

- Better security
- Better control
- Predictable costs
- Legal compliances

Limitation :

- Limited scalability
- Huge initial capex
- Limited access

• Public Cloud

- ⇒ Public Cloud provides a shared platform that is accessible to the general public through an Internet connection. Public cloud operated on the pay-as-per-use model and administrated by the third party, i.e., Cloud service provider. In the Public cloud, the same storage is being used by multiple users at the same time.

Benefits :

- No up front capex
- Pay as you go
- No maintenance
- Highly scalable
- Highly reliable

Limitation :

- Low visibility and control
- Compliance and legal risks
- Cost concerns

• Hybrid Cloud

- ⇒ Hybrid cloud is a combination of public and private clouds. Hybrid cloud = public cloud + private cloud. The main aim to combine these cloud (Public and Private) is to create a unified, automated, and well-managed computing environment. In the Hybrid cloud, non-critical activities are performed by the public cloud and critical activities are performed by the private cloud.

Benefits :

- Best of both the world
- Better control
- Cost-effective

Limitations :

- Low visibility and control
- Additional complexity
- Compliance and legal
- Cost concern

Cloud related Service :**• IaaS (Infrastructure as a service)**

- ⇒ IaaS is also known as **Hardware as a Service (HaaS)**. It is one of the layers of the cloud computing platform. It allows customers to outsource their IT infrastructures such as servers, networking, processing, storage, virtual machines, and other resources. Customers access these resources on the Internet using a pay-as-per use model.

Management :

YOU Manage

- Application
- Data
- Runtime
- Middleware
- OS

Cloud Service Provider

- Virtualization
- Servers
- Storage
- Networking

Benefits :

- Reduce financial risk
- Deployment speed
- Geographical advantages
- Unlimited scalability

Example :

- Amazon EC2 (on AWS)
- GCP, Azure, Rackspace, Digital Ocean, Linode

- **PaaS (Platform as a service)**

⇒ Platform as a Service (PaaS) provides a runtime environment. It allows programmers to easily create, test, run, and deploy web applications. You can purchase these applications from a cloud service provider on a pay-as-per use basis and access them using the Internet connection.

Management :

YOU Manage

- Application
- Data

Cloud Service Provider

- Runtime
- OS
- Middleware
- Virtualization

- Servers
- Storage
- Networking

Benefits :

- Reduce deployment time
- Support global team
- Develop for multiplatform
- Affordability

Example :

- Elastic Beanstalk (on AWS)
- Heroku, Google App Engine (GCP), Windows Azure (Microsoft)

- **SaaS (Software as a service)**

- ⇒ SaaS is also known as "On-Demand Software". It is a software distribution model in which services are hosted by a cloud service provider. These services are available to end-users over the internet so, the end-users do not need to install any software on their devices to access these services.

Management :

Cloud Service Provider

- Application
- Data
- Runtime
- OS
- Middleware
- Virtualization
- Servers
- Storage
- Networking

Benefits :

- Very easy to get started
- Accessibility
- Automatic updates
- Flexible usage-based pricing
- Reduced financial risk
- Affordability

Example :

- Many AWS services (ex: Recognition for Machine Learning)
- Google Apps (Gmail), Dropbox, Zoom

Cloud Computing Technologies :

- Virtualization
- Service-Oriented Architecture (SOA)
- Grid Computing
- Utility Computing

Virtualization : Virtualization is the process of creating a virtual environment to run multiple applications and operating systems on the same server.

A list of types of Virtualization is given below -

- i. Hardware virtualization
- ii. Server virtualization
- iii. Storage virtualization
- iv. Operating system virtualization
- v. Data Virtualization

Cloud Service Provider Companies

Cloud Service providers (CSP) offers various services such as Software as a Service, Platform as a service, Infrastructure as a service, network services, business applications, mobile applications, and infrastructure in the cloud. The cloud service providers host these services in a data center, and users can access these services through cloud provider companies using an Internet connection.

1. AWS (Amazon Web Service)
2. Microsoft Azure
3. Google Cloud Platform
4. IBM Cloud Services
5. VMware Cloud
6. Oracle Cloud
7. Red Hat

8. Digital Ocean
9. Rackspace
10. Alibaba Cloud