

CC UNIT I

CLOUD COMPUTING OVERVIEW ORIGINS OF CLOUD COMPUTING

1. INTRODUCTION TO CLOUD COMPUTING

- Cloud computing is a virtualization-based technology that allows us to create, configure, and customize applications via an internet connection.

(Virtualization is technology that you can use to create virtual representations of servers, storage, networks, and other physical machines)

- The cloud technology includes a development platform, hard disk, software application, and database.
- 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

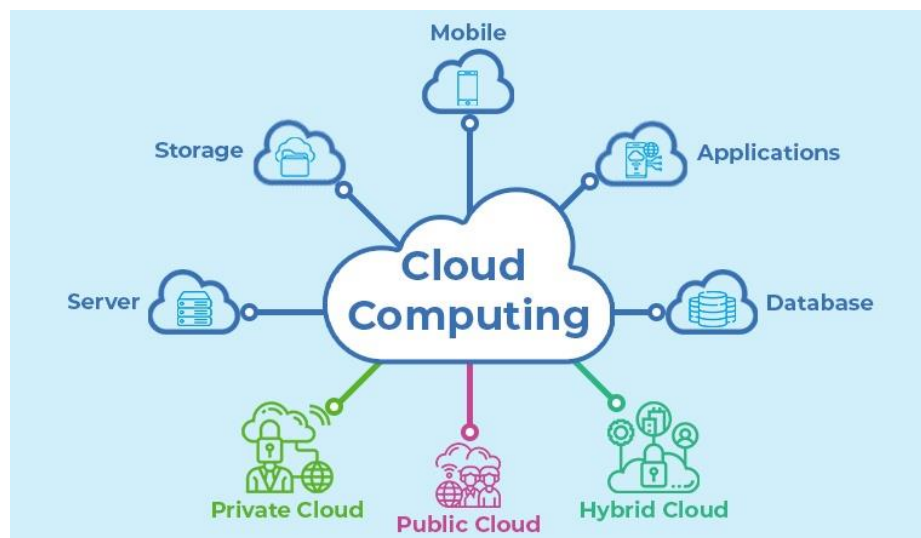


Figure 1: Cloud Computing

1.1. CLOUD COMPONENTS

- Cloud computing solution is made up of several elements and these elements make up the three components of a cloud computing solution.
 - Clients
 - The data center
 - Distributed servers.

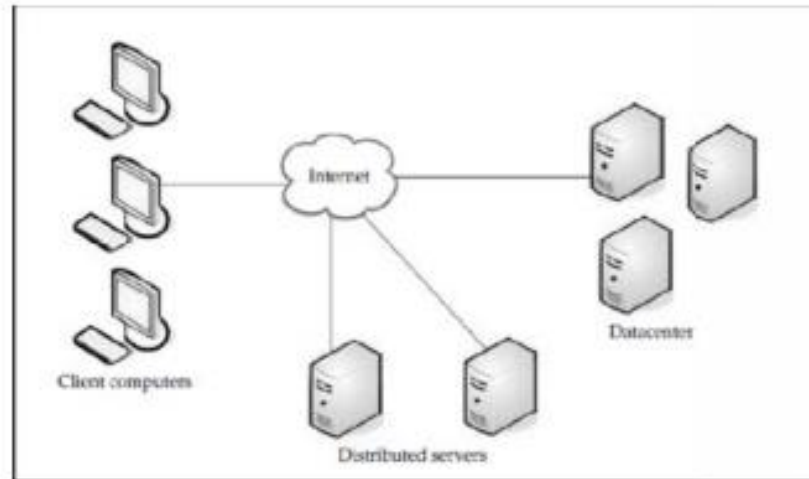


Figure 2: Cloud Computing Components

Clients:

- Devices that end users interact with to manage their information on cloud.
- There can be different types of clients such as:

Mobile Clients	Includes PDAs or smartphones, like a Blackberry, Windows Mobile Smartphone, or an iPhone.
Thin Clients	Computers that do not have internal hard drives, but rather let the server do all the work, but then display the information.
Thick Clients	Thick clients are regular computer, using a web browser like Firefox or Internet Explorer to connect to the cloud.

Datacenter:

- Datacenter has a collection of servers where the application to which you subscribe is housed.
- It could be a large room in the basement of your building or a room full of servers on the other side of the world that you access via the Internet.
- There is a growing trend in the IT world of virtualizing servers.
- The software can be installed allowing multiple instances of virtual servers to be used.
- There can be half a dozen virtual servers running on one physical server.

Distributed Servers:

- The distributed servers are in geographically disparate locations.
- They give the service provider more flexibility in options and security.

- For instance, Amazon has their cloud solution in servers all over the world. If something were to happen at one site, causing a failure, the service would still be accessed through another site.

1.2. ESSENTIAL CHARACTERISTICS

On-demand self-services:

- The Cloud computing services do not require any human administrators
- This enables the client to continuously monitor server uptime, capabilities and allocated network storage.

(Uptime is the amount of time a server is up and operational. It is usually an internal measure of the server – i.e., it is reported by the server itself.)

- This is a fundamental feature of cloud computing, and a customer can also control the computing capabilities according to their needs.

Broad network access:

- The Computing services are generally provided over standard networks and heterogeneous devices.
- A big part of the cloud's characteristics is its ubiquity.

(Ubiquity refers to the state of being everywhere at once)

- The client can access cloud data or transfer data to the cloud from any location with a device and internet connection.
- These capabilities are available everywhere in the organization and are achieved with the help of internet.
- Cloud providers deliver that large network access by monitoring and guaranteeing measurements that reflect how clients access cloud resources and data: latency, access times, data throughput, and more.

Rapid elasticity:

- The Computing services should have IT resources that are able to scale out and in quickly and on as needed basis.
- Whenever the user requires services, it is provided to him and it is scaled out as soon as its requirement gets over.
- This cloud feature enables cost-effective handling of workloads that require a large number of servers but only for a short period.
- Many customers have workloads that can be run very cost-effectively due to the rapid scalability of cloud computing.

Resource pooling:

(An IT resource refers to networks, servers, storage, applications, and services)

- Resource pooling means that a cloud service provider can share resources among multiple clients
- Each service provider provides a different set of services according to the client's needs.
- It is a multi-client strategy that can be applied to data storage, processing and bandwidth-delivered services.
- The administration process of allocating resources in real-time does not conflict with the client's experience.

Measured service:

- The measurement and reporting service is helpful for both cloud providers and their customers.
- This enables both the provider and the customer to monitor and report which services have been used and for what purposes.
- It helps in monitoring billing and ensuring optimum utilization of resources.

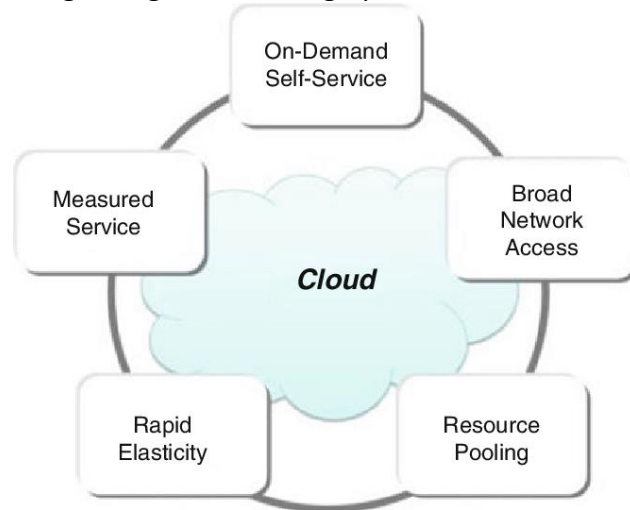


Figure 3: Characteristics of Cloud Computing

2. COMPARISON OF CLOUD PROVIDERS WITH TRADITIONAL IT SERVICE PROVIDERS

Cloud Computing/Providers	Traditional Computing/Providers
It refers to delivery of different services such as data and programs through internet on different servers.	It refers to delivery of different services on local server.
It takes place on third-party servers that is hosted by third-party hosting companies.	It takes place on physical hard drives and website servers.
It is ability to access data anywhere at any time by user.	User can access data only on system in which data is stored.
It is more cost effective as compared to tradition computing as operation and maintenance of server is shared among several parties that in turn reduce cost of public services.	It is less cost effective as compared to cloud computing because one has to buy expensive equipment's to operate and maintain server.
It is more user-friendly as compared to traditional computing because user can have access to data anytime anywhere using internet.	It is less user-friendly as compared to cloud computing because data cannot be accessed anywhere and if user has to access data in another system, then he need to save it in external storage medium.
It requires fast, reliable and stable internet connection to access information anywhere at any time.	It does not require any internet connection to access data or information.
It provides more storage space and servers as well as more computing power so that applications and software run must faster and effectively.	It provides less storage as compared to cloud computing.

It also provides scalability and elasticity i.e., one can increase or decrease storage capacity, server resources, etc., according to business needs.	It does not provide any scalability and elasticity.
Cloud service is served by provider's support team.	It requires own team to maintain and monitor system that will need a lot of time and efforts.
Software is offered as an on-demand service (SaaS) that can be accessed through subscription service.	Software is purchased individually for every user and requires to be updated periodically.

3. ROOTS OF CLOUD COMPUTING

- Roots of cloud computing can be traced by focusing at the advancement of technologies in hardware (multi-core chips, virtualization), Internet technologies (Web 2.0, web services, service-oriented architecture), distributed computing (grids or clusters) and system management (data center automation, autonomous computing).
- Some of the technologies are marked in the early stages of their development; A specification process was followed, leading to maturity and universal adoption as a result.
- The emergence of cloud computing is linked to these technologies.
- Cloud computing Internet technologies have so many roots.
- The cloud is a collection of the four roots running on the remote server.
- They help the computers to increase their capability and make them more powerful.

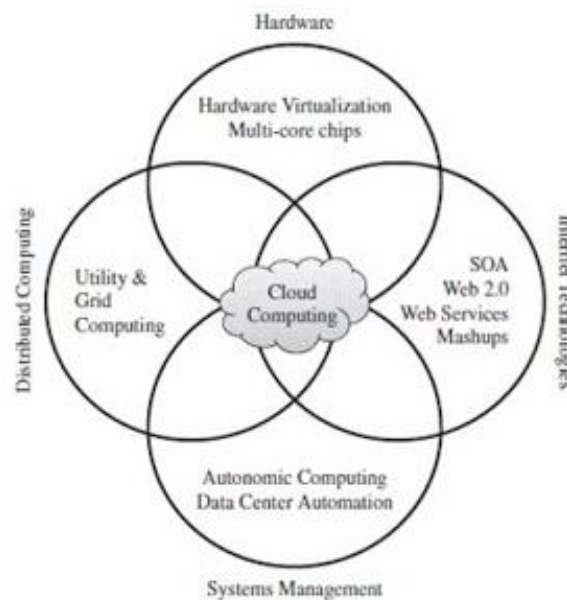


Figure 4: Roots of Cloud Computing

Root 1: Internet Technologies

- It includes service-oriented architecture, Web 2.0, and also the web services.
- Internet technologies are commonly accessible by the public. People access content and run applications that depend on network connections.

- Cloud computing relies on centralized storage, networks and bandwidth. However, the Internet is not a network - it is highly multiplexed and centralized management.
- Therefore, anyone can host the number of websites anywhere in worldwide. Because of network servers, a lot of websites can be created.
- Service-Oriented Architecture is a self-contained module designed for business functions.
- It is provided for authentication services business management and event logging, it also saves us a lot of paperwork and time.
- Web services such as XML and HTTP provide web delivery services by common mechanisms. It is a universal concept of web service globally.
- Web 2.0 services are more convenient for the users, and they do not need to know much about programming and coding concepts to work.
- Information technology companies provide services in which people can access the services on a platform.
- Predefined templates and blocks make it easy to work with, and they can work together via a centralized cloud computing system.
- Examples of Web 2.0 services are hosted services such as Google Maps, micro blogging sites such as Twitter, and social sites such as Facebook.

Root 2: Distributed Computing

- The second root of cloud computing is distributed computing, that includes the grid, utility computing, and cluster.
- To understand it more easily, here's an example, computer is a storage area, and save documents in the form of files or pictures.
- Each document stored in a computer has some specific location, on a hard disk or stored on the Internet.
- When someone visits the website on the Internet, that person browses by downloading the files.
- Users can access files at a location after processing; it can send the file back to the server.
- So, it is known as the distributed computing of the cloud. People can access it from anywhere in overseas.
- All resources in memory space, processor speed and hard disk space are used with the help of the route.
- The company using the technology never faces any problem and will always be in competition with other companies too.

Root 3: Hardware

- The third one is the hardware by the roots of cloud computing, that includes multi-core chips and virtualization.
- When we talk about the hardware, it is virtual cloud computing and people do not need it more.
- Computers require hardware like Random access memory, CPU, Read Only Memory and motherboard to store, process, analyze and manage the data and information.

- There are no hardware devices because in cloud computing all the apps are managed by the internet.
- If you are using huge amount of data, it becomes so difficult for your computer to manage the continuous increase in data.
- The cloud stores the data on its own computer slightly than the computer that holds the data.
- Virtualization allows the people to access the resources from virtual machines in cloud computing. It makes it cheaper for customers to use the cloud services.
- Furthermore, in the Service Level Agreement based cloud computing model, each customer gets their virtual machine called a Virtual Private Cloud (VPC).
- The single cloud computing platform which distribute the hardware, software and operating systems.

Root 4: System Management

- The fourth root of cloud computing contains autonomous cloud and data center automation here.
- System management handles operations to improve productivity and efficiency of the root system.
- To achieve it, the system management ensures that all the employees have an easy access to the necessary data and information.
- Employees can change the configuration, receive/retransmit information and perform other related tasks from any location.
- It makes for the system administrator to respond to any user demand. In addition, the administrator can restrict or deny access for different users.
- In the autonomous system, the administrator task becomes easier as the system is autonomous or self-managing. Additionally, data analysis is controlled by sensors.
- System responses perform many functions such as optimization, configuration, and protection based on the data.
- Therefore, human involvement is low here, but here the computing system handles most of the work.