CLOUD COMPUTING

UNIT 1

INTRODUCTION

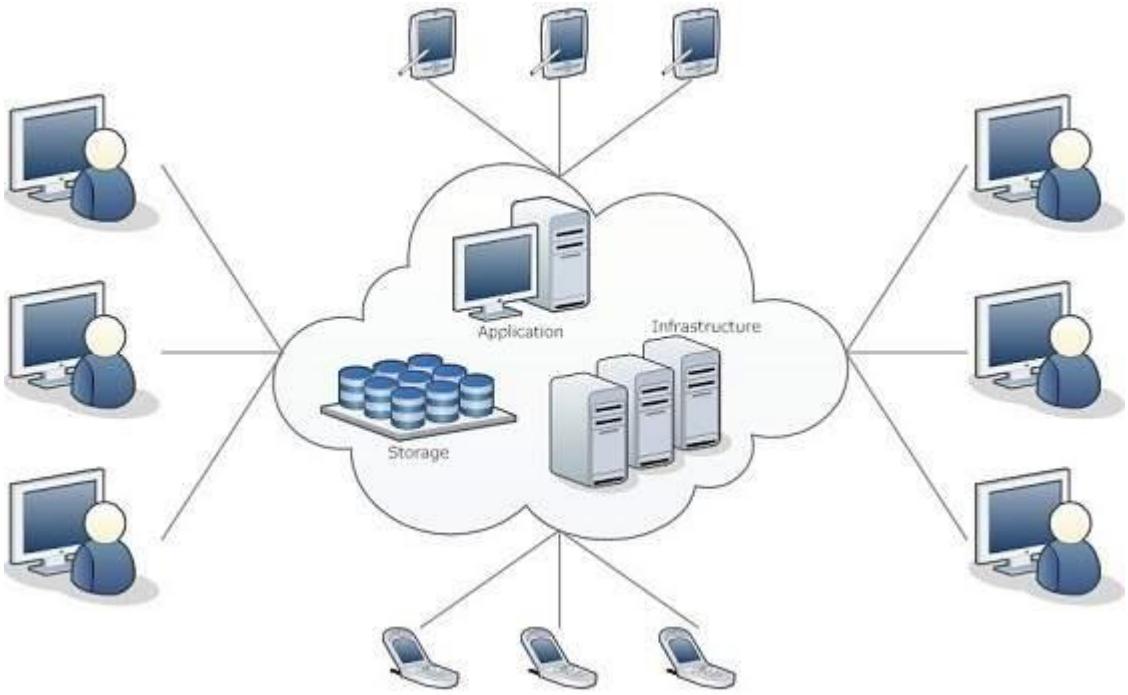
What is Cloud?

The term **Cloud** refers to a **Network** or **Internet.** In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over public and private networks, i.e., WAN, LAN or VPN.

Applications such as e-mail, web conferencing, customer relationship management (CRM) execute on cloud.

What is Cloud Computing?

Cloud Computing refers to **manipulating, configuring,** and **accessing** the hardware and software resources remotely. It offers online data storage, infrastructure, and application.



Cloud computing offers **platform independency,** as the software is not required to be installed locally on the PC. Hence, the Cloud Computing is making our business applications **mobile** and **collaborative.**

History of Cloud Computing

Before emerging the cloud computing, there was Client/Server computing which is basically a centralized storage in which all the software applications, all the data and all the controls are resided on the server side.

If a single user wants to access specific data or run a program, he/she need to connect to the server and then gain appropriate access, and then he/she can do his/her business.

Then after, distributed computing came into picture, where all the computers are networked together and share their resources when needed.

On the basis of above computing, there was emerged of cloud computing concepts that later implemented.

At around in 1961, John MacCharty suggested in a speech at MIT that computing can be sold like a utility, just like a water or electricity. It was a brilliant idea, but like all brilliant ideas, it was ahead if its time, as for the next few decades, despite interest in the model, the technology simply was not ready for it.

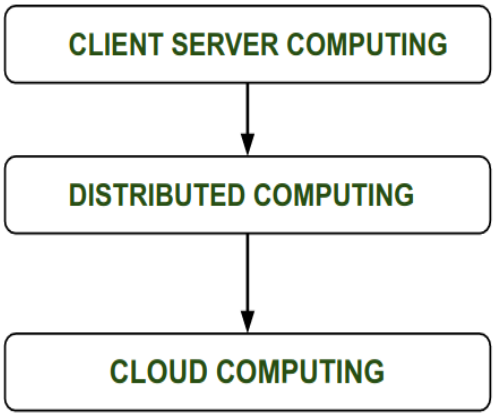
But of course time has passed and the technology caught that idea and after few years we mentioned that:

In 1999, Salesforce.com *started delivering of applications to users using a simple website*. The applications were delivered to enterprises over the Internet, and this way the dream of computing sold as utility were true.

In 2002, Amazon *started Amazon Web Services,* providing services like storage, computation and even human intelligence. However, only starting with the launch of the Elastic Compute Cloud in 2006 a truly commercial service open to everybody existed.

In 2009, Google Apps *also started to provide cloud computing enterprise applications.*

Of course, all the big players are present in the cloud computing evolution, some were earlier, some were later. *In 2009,* Microsoft *launched Windows Azure,* and companies like Oracle and HP have all joined the game. This proves that today, cloud computing has become mainstream



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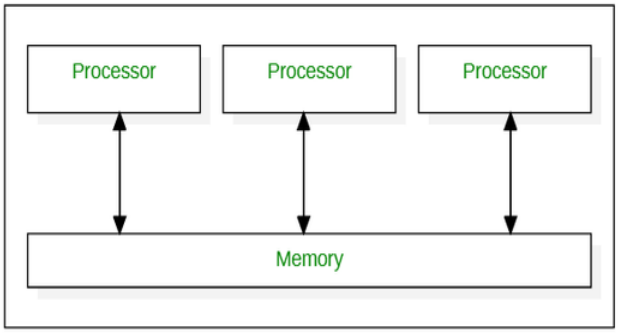
DIFFERENT COMPUTING PARADIGMS

Over the years different computing paradigms have been developed and used. In fact different computing paradigms have existed before the cloud computing paradigm. Let us take a look at all the computing paradigms below.

1. Parallel computing
2. Distributed computing
3. Cluster computing
4. Grid computing
5. Cloud computing

Parallel computing:

Parallel computing is defined as a type of computing where multiple computer systems are used simultaneously. Here a problem is broken into sub-problems and then further broken down into instructions. These instructions from each sub-problem are executed concurrently on different processors.



Distributed computing:

- A distributed system consists of multiple autonomous computers, each having its own private memory, communicating through a computer network
- Information exchange in a distributed system is accomplished through message passing.
- A computer program that runs in a distributed system is known as a distributed program.
- The process of writing distributed programs is referred to as distributed programming.
- Distributed computing system uses multiple computers to solve large-scale problems over the Internet using a centralized computer to solve computational problems.

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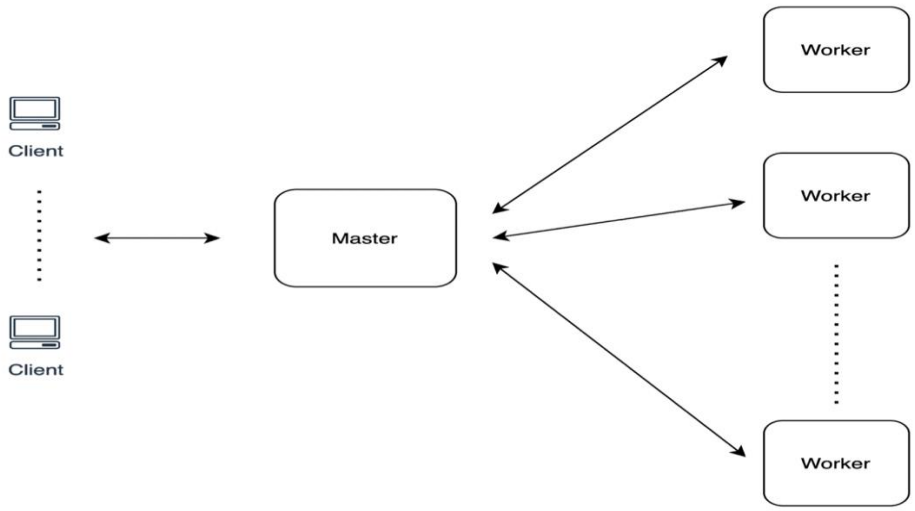
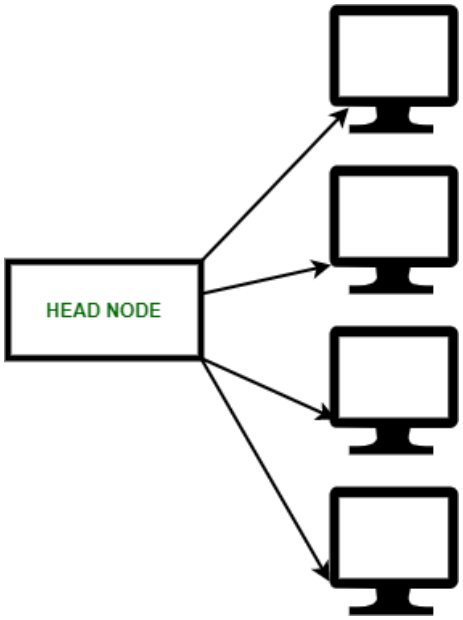


Cluster computing:

Cluster computing defines several computers linked on a network and implemented like an individual entity. Each computer that is linked to the network is known as a node.

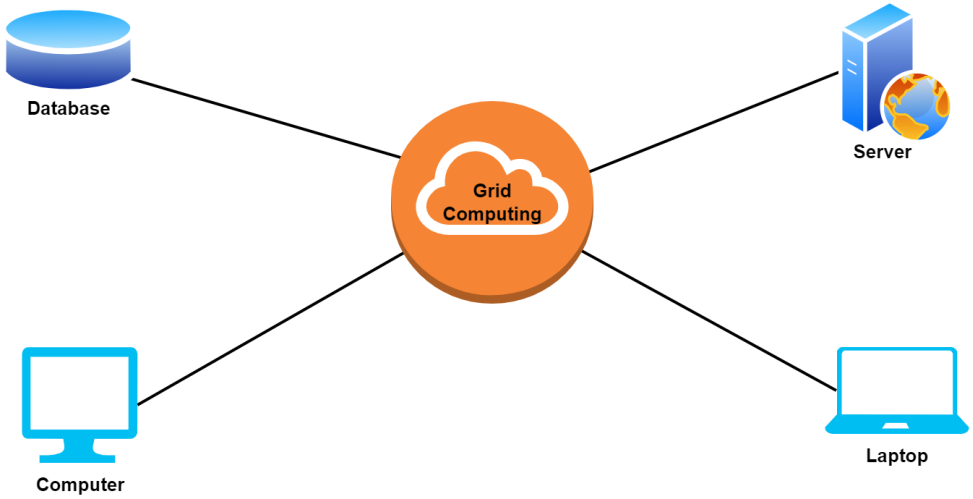
Cluster computing provides solutions to solve difficult problems by providing faster computational speed, and enhanced data integrity. The connected computers implement operations all together thus generating the impression like a single system (virtual device). This procedure is defined as the transparency of the system.



Grid computing:

Grid Computing comes under the evolution of cloud computing which includes all the nodes that are located in different locations. It has heterogeneous nodes that are located in a

different company. Some nodes are set ideal and these nodes can be combined to perform any one task. It is highly preferable to perform complex activities as there are many computers or nodes involved in the same network.



Cloud Computing:

- An Internet cloud of resources can be either a centralized or a distributed computing system. The cloud applies parallel or distributed computing, or both.
- Clouds can be built with physical or virtualized resources over large data centre's that are centralized or distributed.
- Cloud computing can also be a form of utility computing or service computing.

CHARACTERISTICS OF CLOUD COMPUTING

There are many characteristics of Cloud Computing here are few of them:

- **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.
- **Broad network access:** The Computing services are generally provided over standard networks and heterogeneous devices.
- **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 require services it is provided to him and it is scale out as soon as its requirement gets over.
- **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.
- **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.

- **Multi-tenancy:** Cloud computing providers can support multiple tenants (users or organizations) on a single set of shared resources.
- **Virtualization:** Cloud computing providers use virtualization technology to abstract underlying hardware resources and present them as logical resources to users.
- **Resilient computing:** Cloud computing services are typically designed with redundancy and fault tolerance in mind, which ensures high availability and reliability.
- **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.
- **Security:** Cloud providers invest heavily in security measures to protect their users' data and ensure the privacy of sensitive information.
- **Automation:** Cloud computing services are often highly automated, allowing users to deploy and manage resources with minimal manual intervention.
- **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.

ADVANTAGES OF CLOUD COMPUTING

Cost Reduction

The major reason companies shift towards cloud computing is that it takes lower costs. The business does not need to build its own IT infrastructure or purchase hardware or equipment. Costs include physical hardware for data storage purposes like hard drives, solid-state drives or disks, etc.

Better Collaboration

Cloud computing allows people to access cloud data from any device, from anywhere, from any time as long as they have an internet connection.

Suppose the team is working remotely. The team is spread worldwide, so it is a good option to go ahead with cloud computing as employees can access data from anywhere in the world, at any time, and from any device.

Backup and Restore Data

As the data is stored in the cloud, it is a lot easier to get the backup and recovery of that data with just a few clicks; otherwise, manually, it is a very time-consuming process on premise.

Security

Due to different security reasons, cloud providers have designed very high-security cloud features so that you can allow what data is accessible to which person groups.

Cloud providers also hire top security experts and develop the most advanced security solutions, providing robust protection. Research by RapidScale says that 94% of businesses saw major security improvements after switching to the cloud.

Pay as you go

Cloud computing allows you flexibility because you have to pay only for what you use as a service.

Boundless storage capacity

No storage capacity is predefined, so you can increase or decrease storage capacity according to your needs at any time.

Accessibility

Cloud computing allows you to quickly and easily store, access, and manipulate information on the cloud.

Mobility

Cloud computing allows easy access to all cloud data via mobile through the internet.

Quicker Deployments

Cloud computing allows us to deploy our services to the cloud more quickly and with fewer clicks. As compared to setting up all the configurations on the normal deployments.

Automatic Software Integrations

Cloud computing allows you to set automation of software updates and upgrades. So as soon as a newer version of any software is released, it will automatically integrate into the services you are using.

DISADVANTAGES OF CLOUD COMPUTING

Internet Connectivity

In cloud computing, data (files, images, video, audio, etc.) is stored in the cloud. So to access the data, an internet connection is required. In the absence of the internet, we can't access it.

Downtime

We can't access the data if there is downtime (internet loss at the cloud provider's end). Other than this, downtime also includes cloud providers that may face power loss, service maintenance, etc.

Limited Bandwidth

As the Cloud provider provides limited bandwidth to all its users, you have to pay significantly higher costs if your organization surpasses that limit.

Security

Even though the cloud providers are storing information very securely, we still don't have to forget that data is vulnerable to cyber-attacks when stored in the cloud. Many organizations and companies have suffered from security breaches and their potential risks in the cloud.

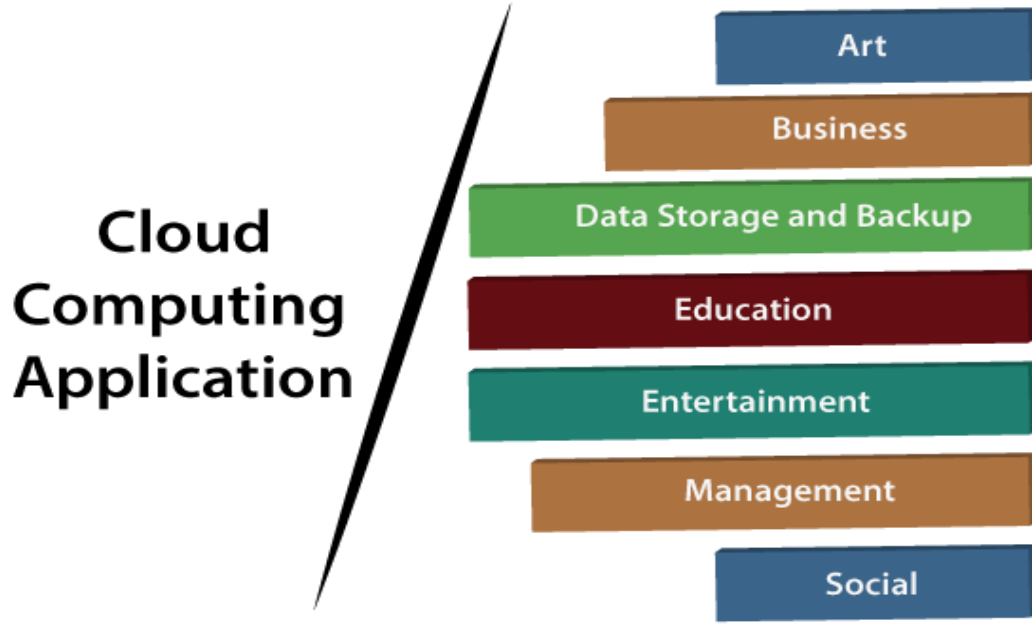
Performance Variation

As the server is hosted on a cloud provider, which also provides services to other businesses, any cyberattack on shared resources may slow down your services.

Lack of support staff

Some cloud companies do not provide proper support to their clients; then, you have to only depend on FAQs or online help.

APPLICATIONS OF CLOUD COMPUTING



1.Art Applications

Cloud computing offers various art applications for quickly and easily design attractive cards, booklets, and images. Some most commonly used cloud art applications are given below:

i. Moo is one of the best cloud art applications. It is used for designing and printing business cards, postcards, and mini cards.

ii. Vistaprint: Vista print allows us to easily design various printed marketing products such as business cards, Postcards, Booklets, and wedding invitations cards.

iii. Adobe Creative Cloud: Adobe creative cloud is made for designers, artists, filmmakers, and other creative professionals

2. Business Applications

Business applications are based on cloud service providers. Today, every organization requires the cloud business application to grow their business. It also ensures that business applications are 24*7 available to users.

There are the following business applications of cloud computing -

i. MailChimp: MailChimp is an email publishing platform which provides various options to design, send, and save templates for emails.

iii. Salesforce: Salesforce platform provides tools for sales, service, marketing, e-commerce, and more. It also provides a cloud development platform.

iv. Chatter: Chatter helps us to share important information about the organization in real time.

v. Bitrix24: Bitrix24 is a collaboration platform which provides communication, management, and social collaboration tools.

vi. Paypal: Paypal offers the simplest and easiest online payment mode using a secure internet account. Paypal accepts the payment through debit cards, credit cards, and also from Paypal account holders.

vii. Slack: Slack stands for Searchable Log of all Conversation and Knowledge. It provides a user-friendly interface that helps us to create public and private channels for communication.

viii. Quickbooks: Quickbooks works on the terminology "Run Enterprise anytime, anywhere, on any device." It provides online accounting solutions for the business. It allows more than 20 users to work simultaneously on the same system.

3.Data storage and backup applications

Cloud computing allows us to store information (data, files, images, audios, and videos) on the cloud and access this information using an internet connection. As the cloud provider is responsible for providing security, so they offer various backup recovery application for retrieving the lost data.

A list of data storage and backup applications in the cloud are given below -

i. Box.com

Box provides an online environment for **secure content management, workflow,** and **collaboration**. It allows us to store different files such as Excel, Word, PDF, and images on the cloud. The main advantage of using box is that it provides drag & drop service for files and easily integrates with Office 365, G Suite, Salesforce, and more than 1400 tools.

ii. Mozy

Mozy provides powerful **online backup solutions** for our personal and business data. It schedules automatically back up for each day at a specific time.

iii. Joukuu

Joukuu provides the simplest way to **share** and **track cloud-based backup files**. Many users use joukuu to search files, folders, and collaborate on documents.

iv. Google G Suite

Google G Suite is one of the best **cloud storage** and **backup** application. It includes Google Calendar, Docs, Forms, Google+, Hangouts, as well as cloud storage and tools for managing cloud apps. The most popular app in the Google G Suite is Gmail. Gmail offers free email services to users.

4. Education Applications

Cloud computing in the education sector becomes very popular. It offers various **online distance learning platforms** and **student information portals** to the students. The advantage of using cloud in the field of education is that it offers strong virtual classroom environments, Ease of accessibility, secure data storage, scalability, greater reach for the students, and minimal hardware requirements for the applications.

There are the following education applications offered by the cloud -

i. Google Apps for Education

Google Apps for Education is the most widely used platform for free web-based email, calendar, documents, and collaborative study.

ii. Chromebooks for Education

Chromebook for Education is one of the most important Google's projects. It is designed for the purpose that it enhances education innovation.

iii. Tablets with Google Play for Education

It allows educators to quickly implement the latest technology solutions into the classroom and make it available to their students.

iv. AWS in Education

AWS cloud provides an education-friendly environment to universities, community colleges, and schools.

5. Entertainment Applications

Entertainment industries use a **multi-cloud strategy** to interact with the target audience. Cloud computing offers various entertainment applications such as online games and video conferencing.

i. Online games

ii. Video Conferencing Apps

6. Management Applications

Cloud computing offers various cloud management tools which help admins to manage all types of cloud activities, such as resource deployment, data integration, and disaster recovery. These management tools also provide administrative control over the platforms, applications, and infrastructure.

Some important management applications are -

i. Toggl

Toggl helps users to track allocated time period for a particular project.

ii. Evernote

Evernote allows you to sync and save your recorded notes, typed notes, and other notes in one convenient place. It is available for both free as well as a paid version.

It uses platforms like Windows, macOS, Android, iOS, Browser, and Unix.

iii. Outright

Outright is used by management users for the purpose of accounts. It helps to track income, expenses, profits, and losses in real-time environment.

iv. GoToMeeting

GoToMeeting provides **Video Conferencing** and **online meeting apps**, which allows you to start a meeting with your business partners from anytime, anywhere using mobile phones or tablets. Using GoToMeeting app, you can perform the tasks related to the management such as join meetings in seconds, view presentations on the shared screen, get alerts for upcoming meetings, etc.

7. Social Applications

Social cloud applications allow a large number of users to connect with each other using social networking applications such as **Facebook, Twitter, Linkedln,** etc.

There are the following cloud based social applications -

i. Facebook

ii. Twitter

iii. LinkedIn