

# Brief Introduction about Cloud computing

- Cloud computing provides different facilities and amenities like databases, servers, storage, applications, etc., through the Internet. For example, instead of storing data in local storage on a hard drive, cloud computing helps us in storing and saving data on a remote database. Given that the device we are using has access to the internet, it will have access to the data as well.
- Basically, cloud computing is somewhat outsourcing computer programs. These computer programs are hosted by an external party and are located in the cloud. Because of this, the users have no worries about storage and power and can be at ease where their data is concerned. Nowadays, many people are opting for cloud computing for a variety of reasons, including increased productivity, better monetary value, time and speed efficiency, security, and performance.

# Introduction to Cloud computing(CO1)

- Cloud computing is the on demand delivery of compute power, database storage, application and other IT resources through a cloud service platform via internet with pay as you go.
- Cloud Computing provides us a means by which we can access the applications as utilities, over the Internet.
- It allows us to create, configure, and customize applications online.



# Introduction to cloud computing(CO1)

- Cloud computing is the on demand delivery of computing services over the internet with pay as you go option.
- ‘Cloud’ in Cloud Computing refers to availability of computing resources to everyone, everywhere and anytime.

## Introduction to Cloud Computing



# Introduction to Cloud computing(CO1)

- Computing refers to services as like: Computing engine, storage, Load balancer, Virtual Machines etc.
- Cloud computing relies on sharing of resources to achieve coherence (the quality of being logical and consistent).
- **Cloud computing** is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user.
- Cloud Computing provides us a means by which we can assess the applications as utilities, over the Internet.

It allows us to create, configure, and customize applications and services online.

**Example-** cloud service platform

Amazon web service

Microsoft Azure

Alibaba

Google

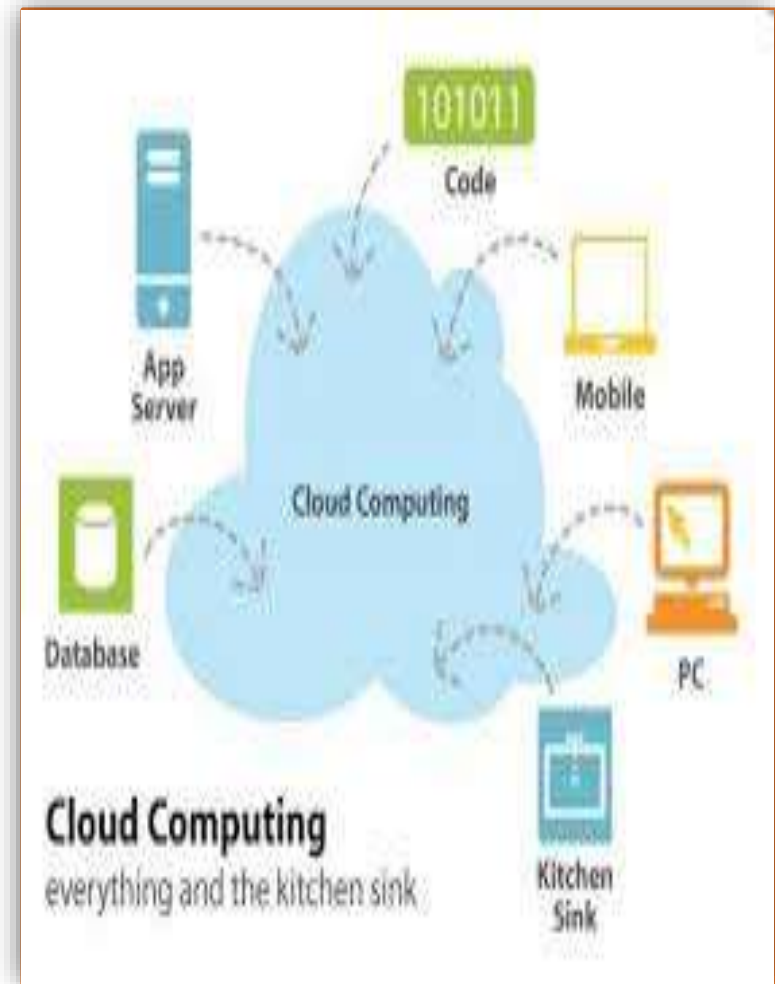
oracle

# Cloud computing (CO1)

- Whenever you travel through a bus or train, you take a ticket for your destination and hold back to your seat till you reach your destination.
- Likewise other passengers also takes ticket and travel in the same bus with you and it hardly bothers you where they go.
- When your stop comes you get off the bus thanking the driver.
- Cloud computing is just like that bus, carrying data and information for different users and allows to use its service with minimal cost.

# Cloud(CO1..)

- 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 network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN.
- - Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud.



# Cloud Service providers

- Amazon web service
- Microsoft Azure
- Google
- Adobe
- IBM Cloud Services
- Oracle

- Vmware
- Rackspace
- Red Hat
- Salesforce
- SAP
- Verizon Cloud
- Dropbox

# Common Cloud Services company

- Gmail, provided by companies like Google
- cloud storage, provided by companies like Dropbox
- streaming music, provided by companies like Spotify.
- These services, applications and files are stored in the cloud and can be accessed by users via any device.



# Cloud providers and services

Name of Company	IaaS	Paas	SaaS
<b>AWS</b>	Amazon EC2	Amazon Web Services	Amazon Web Services
<b>Microsoft</b>	Microsoft Private Cloud	Microsoft Azure	Microsoft Office 365
<b>Google</b>	—	Google App Engine (Python, Java and many)	Google Applications
<b>IBM</b>	Smart Cloud Enterprise	Smart Cloud Application Services	SaaS Products
<b>Adobe</b>	—	Adobe Creative Cloud	Acrobat, Flashplayer, etc.

# Why cloud computing(CO1)

- 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.

# Why cloud computing(CO1)

- 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.

# Cloud Computing Advantages(CO1)

- Lower IT infrastructure and computer costs for users
- Improved performance
- Fewer Maintenance issues
- Instant software updates

# Cloud Computing advantages(CO1)

- Improved compatibility between Operating systems
- Backup and recovery
- Performance and Scalability
- Increased storage capacity
- Increase data safety

# Cloud Computing Disadvantages(CO1)

- Network Dependency
- Limited features
- No longer in control
- No redundancy/bandwidth issue
- Technical Issues

# Operations using Cloud Computing(CO1)

- 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

# Cloud Computing Services(CO1)

## The various cloud based services commonly offered are:

- Web Based Cloud Computing: Companies use the functionality provided by web services and do not have to develop a full application for their needs.
- [Infrastructure as a Service \(IaaS\)](#): Organizations make use of the unlimited storage potential of the cloud infrastructure. They can expand and shrink their storage space as needed without having to worry about dedicated servers on site.
- Software as a Service (SaaS): It allows people to access the functionality of a particular software without worrying about storage or other issues.
- [Platform as a Service \(PaaS\)](#): Companies can run their applications on the cloud service's platform without having to worry about maintaining hard drives and servers.
- Utility Services: Companies that need to store a lot of data can store all of their data remotely and can even create a virtual data center.
- Managed Services: These are applications used by the cloud service providers, such as anti-spam service.
- Service Commerce: It is the creation of a hub of applications that can be used by an organization's members. It provides organisations the applications they need along with the services they desire.



# Cloud Computing Services(IaaS)

- It offers the fundamental infrastructure of virtual servers, network, and data storage drives.
- It allows for the flexibility, reliability and scalability that many businesses seek with the cloud
- removes the need for hardware in the office

# Cloud Computing Services(PaaS)

- Cloud computing providers deploy the infrastructure and software framework.
- Businesses can develop and run their own applications.
- Web applications can be created quickly and easily via PaaS
- PaaS solutions are scalable and ideal for business environments where multiple developers are working on a single project..

# Cloud Computing Services(SaaS)

- This cloud computing solution involves the deployment of software over the internet to various businesses.
- pay via subscription or a pay-per-use model.

# Features/Characteristics of cloud computing



## Top 10 Major Characteristics of Cloud Computing



# Features/Characteristics of cloud computing

- **1. Resources Pooling**

Resource pooling is one of the essential features of cloud computing. Resource pooling means that a cloud service provider can share resources among multiple clients, each providing a different set of services according to their needs

- **2. On-Demand Self-Service**

It is one of the important and essential features of cloud computing. This enables the client to continuously monitor server uptime, capabilities and allocated network storage.

- **3. Easy Maintenance**

This is one of the best cloud features. Servers are easily maintained, and downtime is minimal or sometimes zero. Cloud computing powered resources often undergo several updates to optimize their capabilities and potential. Updates are more viable with devices and perform faster than previous versions.

- **4. Scalability And Rapid Elasticity**

A key feature and advantage of cloud computing is its rapid scalability. 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.

- **5. Economical**

This cloud feature helps in reducing the IT expenditure of the organizations. In cloud computing, clients need to pay the administration for the space used by them. There is no cover-up or additional charges that need to be paid. Administration is economical, and more often than not, some space is allocated for free.

# Features/Characteristics of cloud computing

- **6. Measured And Reporting Service**

Reporting Services is one of the many cloud features that make it the best choice for organizations. The measurement and reporting service is helpful for both cloud providers and their customers.

- **7. Security**

Data security is one of the best features of cloud computing. Cloud services make a copy of the stored data to prevent any kind of data loss. If one server loses data by any chance, the copied version is restored from the other server.

- **8. Automation**

Automation is an essential feature of cloud computing. The ability of cloud computing to automatically install, configure and maintain a cloud service is known as automation in cloud computing. In simple words, it is the process of making the most of the technology and minimizing the manual effort. However, achieving automation in a cloud ecosystem is not that easy.

- **9. Resilience**

Resilience in cloud computing means the ability of a service to quickly recover from any disruption. The resilience of a cloud is measured by how fast its servers, databases and network systems restart and recover from any loss or damage. Availability is another key feature of cloud computing. Since cloud services can be accessed remotely, there are no geographic restrictions or limits on the use of cloud resources.

- **10. Large Network Access**

A big part of the cloud's characteristics is its ubiquity. 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.

# Types of cloud computing

- **PUBLIC CLOUD** : The Public Cloud allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.
- **PRIVATE CLOUD** : The Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature.

# Types of cloud computing

- **COMMUNITY CLOUD** : The Community Cloud allows systems and services to be accessible by group of organizations.
- **HYBRID CLOUD** : The Hybrid Cloud is mixture of public and private cloud.
- However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.



# Evolution of cloud computing (CO1..)

- Before emerging the cloud computing, there was various computing technique.

## **Desktop computing**

- a personal computer small enough to fit conveniently in an individual workspace
- personal computer  
a small digital computer based on a microprocessor and designed to be used by one person at a time

# client/server computing (co1)

- In client/server computing, a server takes requests from client computers and shares its resources, applications and/or data with one or more client computers on the network,
- a client is a computing device that initiates contact with a server in order to make use of a shareable resource. **OR**

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. Example banking

# Cluster computing

- Sharing the computation tasks among multiple computers and those computers or machines form the cluster.
- It works on the distributed system with the networks.

# Cluster computing

- Several types of cluster computing are used based upon the business implementations, performance optimization and the architectural preference such as load balancing clusters, high availability (HA) clusters, high performance (HP) clusters.
- Some of the advantages are processing speed, cost efficiency, scalability, high availability of resources.

# Grid computing

- Grid computing is the use of widely distributed computer resources to reach a common goal.
- Grid computing is distinguished from conventional high-performance computing systems such as cluster computing
- Grid computers have each node set to perform a different task/application. Grid computers also tend to be more heterogeneous and geographically dispersed

# Grid computing

- Heterogeneous server
- Different operating system
- Different applications server
- Database server
- File server
- Mail server
- Web server

# Cloud computing

- It's a combination
- of cluster and grid computing.
- grid of clusters
- **Companies**
- Toyota
- wall mart and Tata group
- City bank
- **Software companies-**
- SAP, oracle , Microsoft dynamics

## **Maintenance company**

IBM, Dell, HP, SUN

1. IaaS (Infrastructure as a Service)
2. PaaS (Platform as a Service)
3. SaaS (Software as a Service)
4. Cloud Computing Deployment Models

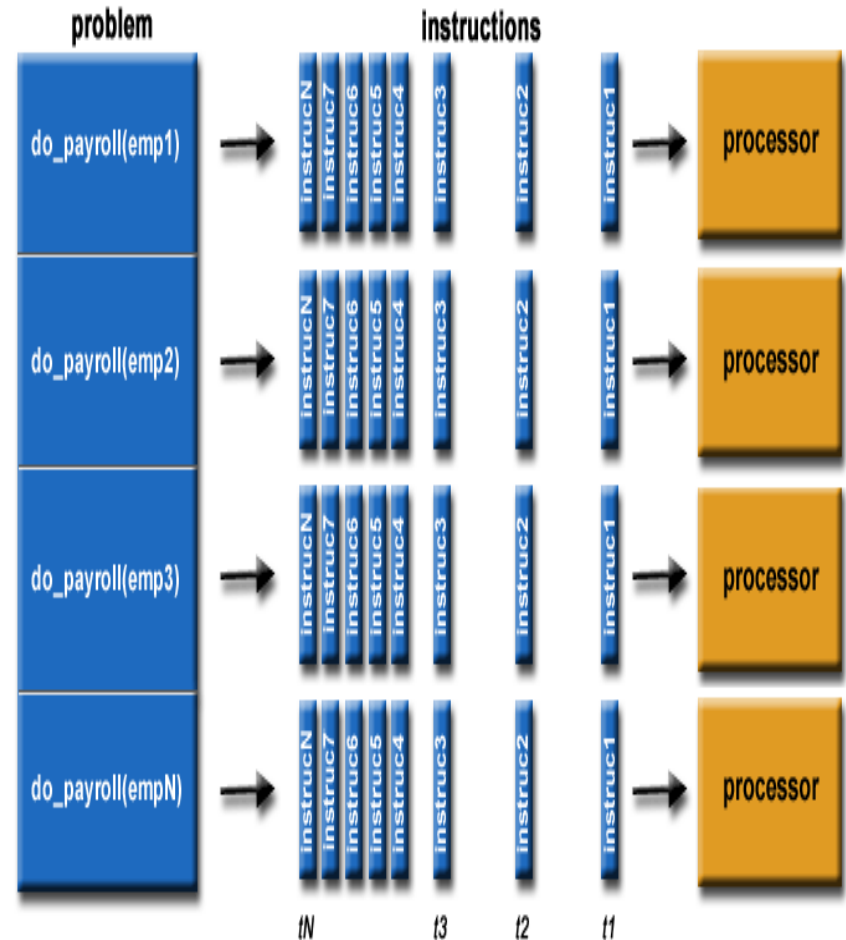
There are three **cloud computing models** used for deployment:

- Public cloud
- Private cloud
- Hybrid cloud



# Parallel computing(CO1)

- **Parallel computing** is a type of **computation** in which many calculations or the execution of processes are carried out simultaneously.
- Large problems can often be divided into smaller ones, which can then be solved at the same time.
- It saves time and money as many resources working together will reduce the time.



# Cluster and grid computing(CO1)

## Cluster computing

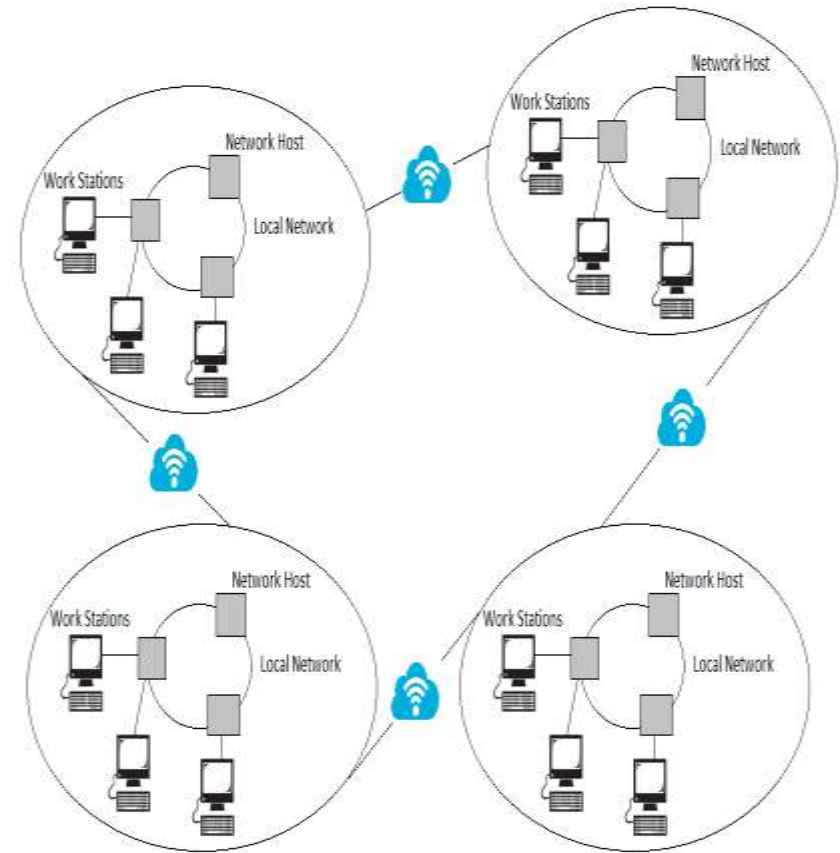
- a group of computers are linked together so that they can act like a single entity .
- It is the technique of linking two or more computers into a network (LAN) or homogenous network
- take advantage of the parallel processing power of those computers.
- In Cluster computing network, whole system works as a unit.

## Grid computing

- Computers of Grid Computing can be present at different locations and are usually connected by internet or a low
- Grid computer can have homogeneous or heterogeneous network.
- In Grid Computing, each node is independently managing each own resources.

# Distributed computing(CO1)

- A distributed computer system consists of multiple software components that are on multiple computers, but run as a single system.
- The computers that are in a distributed system can be physically close together and connected by a local network, or they can be geographically distant and connected by a wide area network
- Such systems are independent of the underlying software



# Evolution phases

- **The evolution of cloud computing can be bifurcated into three basic phases:**
- **1. The Idea Phase-** This phase inceptioned in the early 1960s with the emergence of utility and grid computing and lasted till pre-internet bubble era. Joseph Carl Robnett Licklider was the founder of cloud computing.
- **2. The Pre-cloud Phase-** The pre-cloud phase originated in 1999 and extended to 2006. In this phase the internet as the mechanism to provide Application as Service.
- **3. The Cloud Phase-** The much talked about real cloud phase started in the year 2007 when the classification of IaaS, PaaS, and SaaS got formalized. The history of cloud computing has witnessed some very interesting breakthroughs launched by some of the leading computer/web organizations of the world.

- 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
- *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.

# continue

- *In 2002, **Amazon** started Amazon Web Services, providing services like storage, computation and even human intelligence.*
- *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*

# Characteristics of cloud computing(CO1)

- On-demand self-service.
- Broad network access
- Resource pooling.
- Rapid elasticity.
- Measured service.

# Cloud Eco-system

- In a cloud computing ecosystem, there are a number of computers, servers, and data storage equipment that together make the **cloud** of computing services.
- A cloud ecosystem is a complex system of interdependent components that all work together to enable [cloud services](#). In nature, an ecosystem is composed of living and nonliving things that are connected and work together.
- In cloud computing, the ecosystem consists of hardware and software as well as cloud customers, [cloud engineers](#), consultants, [integrators](#) and partners



# Cloud computing applications

- Cloud service providers provide various applications in the field of art, business, data storage and backup services, education, entertainment, management, social networking, etc.
- **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

# Cloud computing applications

## 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 -

### MailChimp

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

### Salesforce

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

# Cloud computing applications

## Chatter

- Chatter helps us to **share important information** about the organization in real time.

## Bitrix24

- Bitrix24 is a **collaboration** platform which provides communication, management, and social collaboration tools.

## 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.

## 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.

## 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

# Cloud computing applications

## 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 -

### 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.

### 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.

### 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.

# Cloud computing applications

- **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.

## 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.

# Cloud computing 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.

# Cloud computing applications

## 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**
- Today, cloud gaming becomes one of the most important entertainment media. It offers various online games that run remotely from the cloud. The best cloud gaming services are Shaow, GeForce Now, Vortex, Project xCloud, and PlayStation Now.
- **ii. Video Conferencing Apps**
- Video conferencing apps provides a simple and instant connected experience. It allows us to communicate with our business partners, friends, and relatives using a cloud-based video conferencing. The benefits of using video conferencing are that it reduces cost, increases efficiency, and removes interoperability.

# Cloud computing applications

## Social Applications

- Social cloud applications allow a large number of users to connect with each other using social networking applications such as **Facebook, Twitter, LinkedIn**, etc.
- There are the following cloud based social applications -
- **i. Facebook**
- Facebook is a **social networking website** which allows active users to share files, photos, videos, status, more to their friends, relatives, and business partners using the cloud storage system. On Facebook, we will always get notifications when our friends like and comment on the posts.
- **ii. Twitter**
- Twitter is a **social networking** site. It is a **microblogging** system. It allows users to follow high profile celebrities, friends, relatives, and receive news. It sends and receives short posts called tweets.
- **iii. Yammer**
- Yammer is the **best team collaboration** tool that allows a team of employees to chat, share images, documents, and videos.
- **iv. LinkedIn**
- LinkedIn is a **social network** for students, freshers, and professionals.



# How does cloud computing work

- Assume that you are an executive at a very big corporation. Your particular responsibilities include to make sure that all of your employees have the right hardware and software they need to do their jobs.
- To buy computers for everyone is not enough. You also have to purchase software as well as software licenses and then provide these softwares to your employees as they require. Whenever you hire a new employee.
- you need to buy more software or make sure your current software license allows another user. It is so stressful that you have to spend lots of money.

# How does cloud computing work

- But, there may be an alternative for executives like you. So, instead of installing a suite of software for each computer, you just need to load one application. That application will allow the employees to log-in into a Web-based service which hosts all the programs for the user that is required for his/her job.
- Remote servers owned by another company and that will run everything from e-mail to word processing to complex data analysis programs. It is called cloud computing, and it could change the entire computer industry
- In a cloud computing system, there is a significant workload shift. Local computers have no longer to do all the heavy lifting when it comes to run applications. But cloud computing can handle that much heavy load easily and automatically.
- Hardware and software demands on the user's side decrease. The only thing the user's computer requires to be able to run is the cloud computing interface software of the system, which can be as simple as a Web browser and the cloud's network takes care of the rest.

# Cloud computing technology

- [Virtualization](#)
- [Service-Oriented Architecture \(SOA\)](#)
- [Grid Computing](#)
- [Utility Computing](#)

# Cloud computing technology

- Virtualization
- Virtualization is the process of creating a virtual environment to run multiple applications and operating systems on the same server. The virtual environment can be anything, such as a single instance or a combination of many operating systems, storage devices, network application servers, and other environments.
- The concept of Virtualization in cloud computing increases the use of virtual machines. A virtual machine is a software computer or software program that not only works as a physical computer but can also function as a physical machine and perform tasks such as running applications or programs as per the user's demand.

# Cloud computing technology

- **Service-Oriented Architecture (SOA)**
- Service-Oriented Architecture (SOA) allows organizations to access **on-demand** cloud-based computing solutions according to the change of business needs. It can work without or with cloud computing. The advantages of using SOA is that it is easy to maintain, platform independent, and highly scalable.
- Service Provider and Service consumer are the two major roles within SOA.
- Applications of Service-Oriented Architecture
- There are the following applications of Service-Oriented Architecture -
- It is used in the healthcare industry.
- It is used to create many mobile applications and games.
- In the air force, SOA infrastructure is used to deploy situational awareness systems.

# Cloud computing technology

- Grid Computing
- Grid computing is also known as **distributed computing**.
- It is a processor architecture that combines various different computing resources from multiple locations to achieve a common goal.
- In grid computing, the grid is connected by parallel nodes to form a computer cluster. These computer clusters are in different sizes and can run on any operating system.

# Utility Computing

- Utility computing is the most trending IT service model. It provides on-demand computing resources (computation, storage, and programming services via API) and infrastructure based on the **pay per use** method.
- It minimizes the associated costs and maximizes the efficient use of resources.
- The advantage of utility computing is that it reduced the IT cost, provides greater flexibility, and easier to manage.
- Large organizations such as **Google** and **Amazon** established their own utility services for computing storage and application.

# Data center

- a data center is a physical facility that organizations use to house their critical applications and data.
- A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data.
- The key components of a data center design include routers, switches, firewalls, storage systems, servers, and application-delivery controllers.

## Cloud data centers

- In this off-premises form of data center, data and applications are hosted by a cloud services provider such as Amazon Web Services (AWS), Microsoft (Azure), or IBM Cloud or other public cloud provider.