Cloud Computing

INTRODUCTION

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.

With Cloud Computing users can access database resources via the internet from anywhere for as long as they need without worrying about any maintenance or management of actual resources.

What is Cloud?

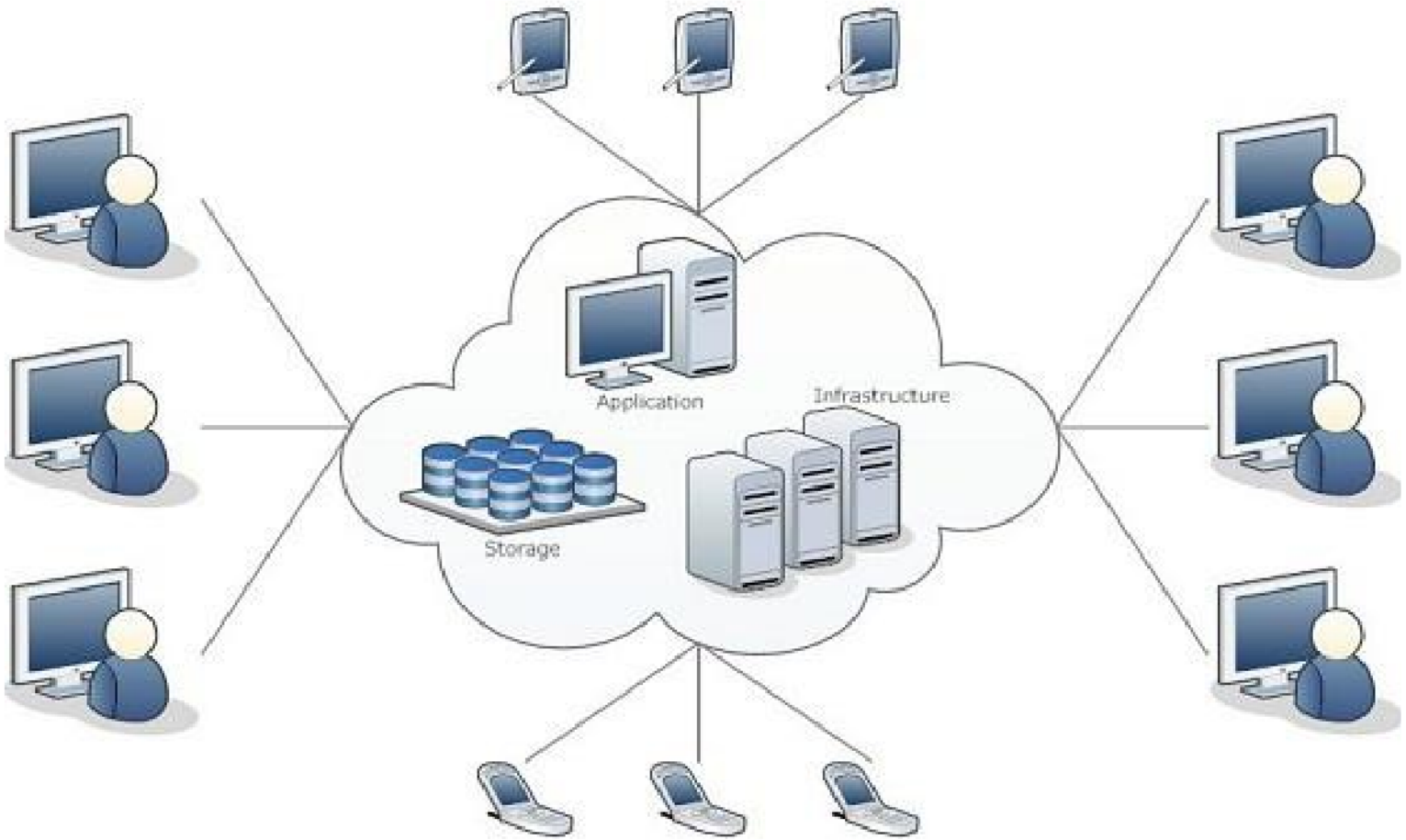
The term **Cloud** refers to a **Network** or **Internet**.
In other words, we can say that Cloud is something, which is present at remote location.
Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN.
Applications such as **e-mail, web conferencing, customer relationship management (CRM),** all run in cloud.

What is Cloud Computing?

Cloud Computing refers to **manipulating, configuring,** and **accessing** the applications online. It offers online data storage, infrastructure and application.

Cloud Computing is both a combination of software and hardware based computing resources delivered as a network service.

Cloud Computing Architecture



Basic Concepts

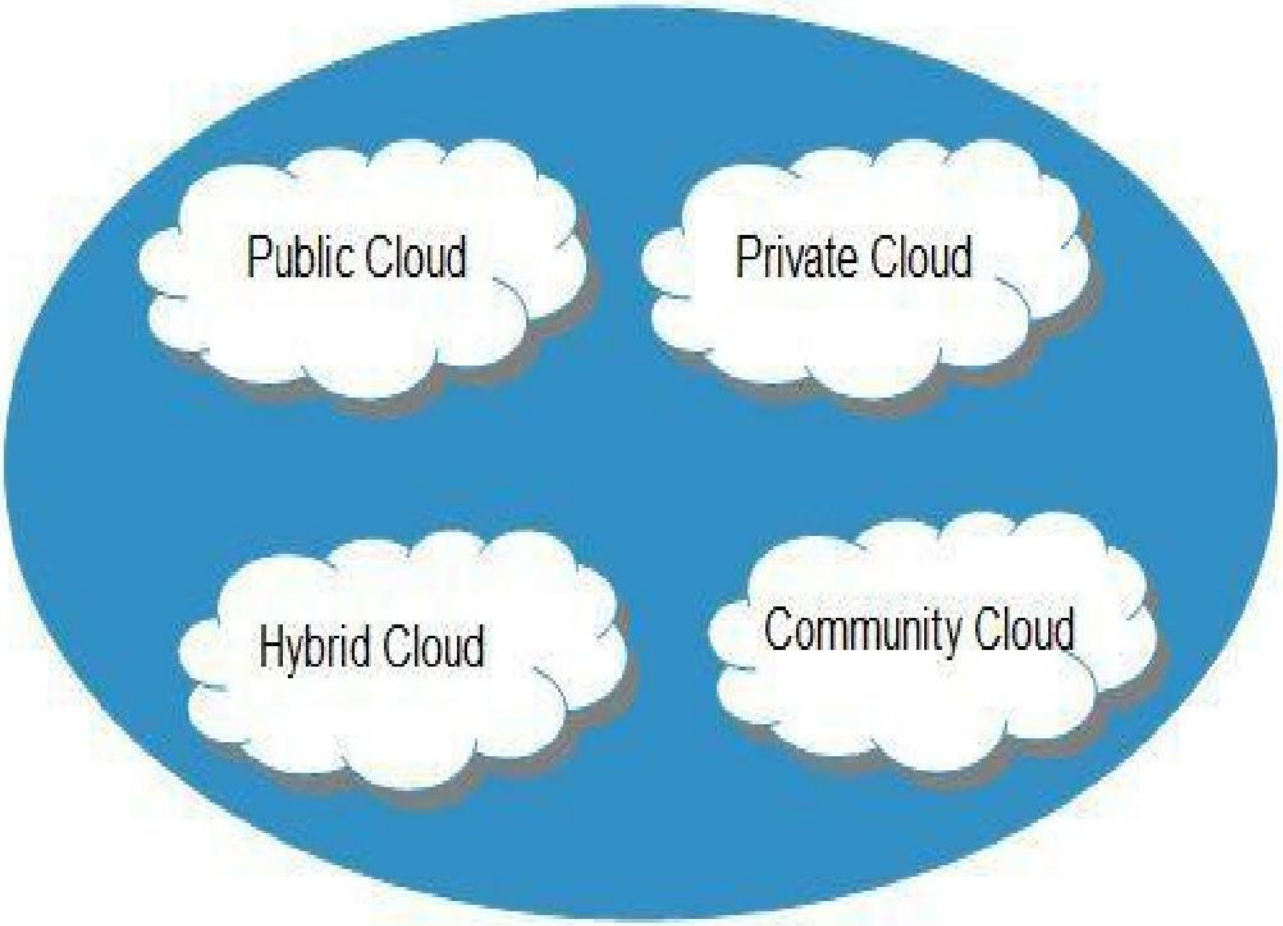
There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:

1. Deployment Models

2. Service Models

Deployment Models

Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid and Community.


Public Cloud
Private Cloud
Hybrid Cloud
Community Cloud

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.

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.

Service Models

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

1. Infrastructure as a Service (IaaS)

2. Platform as a Service (PaaS)

3. Software as a Service (SaaS)

Infrastructure as a Service (IaaS)

IaaS is the delivery of technology infrastructure as an on demand scalable service.

IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

- Usually billed based on usage
- Usually multi tenant virtualized environment
- Can be coupled with Managed Services for OS and application support

IaaS Examples

Platform as a Service (PaaS)

PaaS provides the runtime environment for applications, development & deployment tools, etc.

PaaS provides all of the facilities required to support the complete life cycle of building and delivering web applications and services entirely from the Internet.

Typically applications must be developed with a particular platform in mind

- Multi tenant environments
- Highly scalable multi tier architecture

PaaS Examples

Software as a Service (SaaS)

SaaS model allows to use software applications as a service to end users.

SaaS is a software delivery methodology that provides licensed multi-tenant access to software and its functions remotely as a Web-based service.

- Usually billed based on usage
- Usually multi tenant environment
- Highly scalable architecture

SaaS Examples

salesforce.com
Success On Demand.

NETSUITE
ONE SYSTEM. NO LIMITS.

postini

Microsoft Online Services: Business Productivity Online Suite

SharePoint Online
Office Communications Online
Exchange Online
Office Live Meeting

facebook

Do you Use the Cloud?

Advantages

- Lower computer costs
- Improved performance:
- Reduced software costs
- Instant software updates
- Improved document format compatibility
- Unlimited storage capacity
- Increased data reliability
- Universal document access
- Latest version availability
- Easier group collaboration
- Device independence

Disadvantages

- Requires a constant Internet connection
- Does not work well with low-speed connections
- Features might be limited
- Can be slow
- Stored data can be lost
- Stored data might not be secure

Amazon Web Services

An overview of AWS

- AWS is Amazon's umbrella description of all of their web-based technology services.
- Mainly infrastructure services:
  - Amazon Elastic Compute Cloud (EC2)
  - Amazon Simple Storage Service (S3)
  - Amazon Simple Queue Service (SQS)
  - Amazon CloudFront
  - Amazon SimpleDB

What Is Amazon EC2?

- Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud.
- Using Amazon EC2 eliminates your need to invest in hardware up front, so you
- can develop and deploy applications faster.
- You can use Amazon EC2 to launch as many or as few virtual
- servers as you need, configure security and networking, and manage storage.

Continue...

- Amazon EC2 enables you
- to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to
- forecast traffic.

Features of ES2

- Virtual computing environments, known as *instances.*
- Preconfigured templates for your instances, known as *Amazon Machine Images (AMIs), that package*
- the bits you need for your server (including the operating system and additional software)
- Various configurations of CPU, memory, storage, and networking capacity for your instances, known as
- *instance types*

Continue...

- Secure login information for your instances using *key pairs (AWS stores the public key, and you store*
- the private key in a secure place).
- Storage volumes for temporary data that's deleted when you stop or terminate your instance, known as *instance store volumes.*
- Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as
- *Amazon EBS volumes*

Setting up with Amazon ES2

- If you've already signed up for Amazon Web Services (AWS), you can start using Amazon EC2 immediately. You can open the Amazon EC2 console,
- choose **Launch Instance, and follow the steps in** the launch wizard to launch your first instance.

Amazon RDS

- Amazon Relational Database Service (Amazon RDS) is a web service that makes it easier to set up,operate, and scale a relational database in the cloud.
- It provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks.

Overview of Amazon RDS

- When you buy a server, you get CPU, memory, storage, and IOPS, all bundled together. With Amazon RDS, these are split apart so that you can scale them independently. If you need more CPU, less IOPS, or more storage, you can easily allocate them.
- Amazon RDS manages backups, software patching, automatic failure detection, and recovery.

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- To deliver a managed service experience, Amazon RDS doesn't provide shell access to DB instances, and it restricts access to certain system procedures and tables that require advanced privileges.
- You can use the database products you are already familiar with: MySQL, MariaDB, PostgreSQL, Oracle,
- Microsoft SQL Server.

Continue...

- In addition to the security in your database package, you can help control who can access your RDS databases by using AWS Identity and Access Management (IAM) to define users and permissions.
- Youcan also help protect your databases by putting them in a virtual private cloud.

DB Instances

- The basic building block of Amazon RDS is the *DB instance.*
- A DB instance is an isolated database
- environment in the cloud.
- A DB instance can contain multiple user-created databases, and you can access it by using the same tools and applications that you use with a stand-alone database instance

Continue...

- You can create and modify a DB instance by using the AWS Command Line Interface, the Amazon RDS API, or the AWS Management Console.
- Each DB instance runs a *DB engine. Amazon RDS currently supports the MySQL, MariaDB, PostgreSQL,* Oracle, and Microsoft SQL Server DB engines.

What Is Amazon S3

- Amazon Simple Storage Service is storage for the Internet.
- It is designed to make web-scale computing easier for developers.
- Amazon S3 has a simple web services interface that you can use to store and retrieve any amount of data, at any time, from anywhere on the web.
- It gives any developer access to the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its own global network of web sites.

Advantages to Amazon S3

- **Create Buckets** – Create and name a bucket that stores data. Buckets are the fundamental container in Amazon S3 for data storage.
- **Store data in Buckets** – Store an infinite amount of data in a bucket. Upload as many objects as you like into an Amazon S3 bucket. Each object can contain up to 5 TB of data. Each object is stored and retrieved using a unique developer-assigned key.

Continue...

- **Download data** – Download your data or enable others to do so. Download your data any time you like or allow others to do the same.
- **Permissions** – Grant or deny access to others who want to upload or download data into your Amazon S3 bucket. Grant upload and download permissions to three types of users. Authentication mechanisms can help keep data secure from unauthorized access.

AWS CLI

- AWS Command Line Interface
- The AWS CLI is an open source tool that enables you to interact with AWS services using commands in your command-line shell. With minimal configuration.
- you can start using functionality equivalent to that provided by the browser-based AWS Management Console from the command prompt in your favorite terminal program.

Continue...

- Linux shell
- Window shell
- The AWS CLI provides direct access to AWS services' public APIs. You can explore a service's capabilities with the AWS CLI, and develop shell scripts to manage your resources. Or, you can take what you learn to develop programs in other languages with the AWS SDKs.