Experiment Number 1

Title: Introduction and overview of cloud computing.

Objectives:

- To understand the origin of cloud computing,
- cloud cube model,
- NIST model,
- characteristics of cloud,
- different deployment models,
- service models,
- advantages and disadvantages.

Theory:

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 locations. Cloud can provide services over the 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 the 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

Cloud computing architecture is divided into the following two parts -

1. Front End
2. Back End

Front End

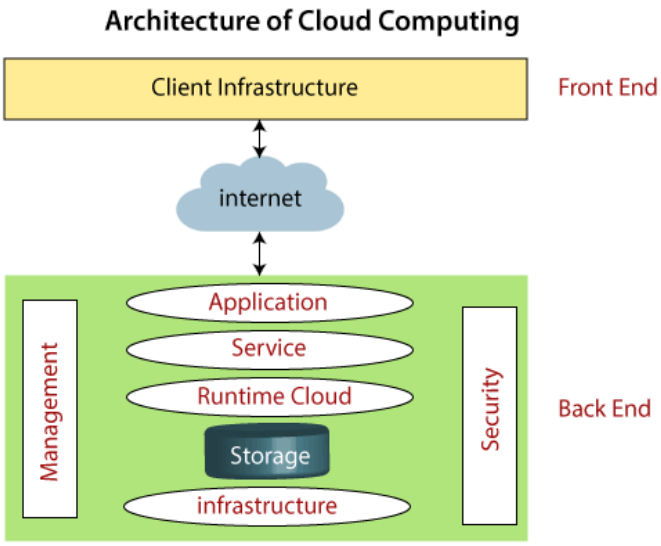
The front end is used by the client. It contains client-side interfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

Components of Cloud Computing Architecture

There are the following components of cloud computing architecture -



1. Client Infrastructure: Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

2. Application: The application may be any software or platform that a client wants to access.

3. Service: A Cloud Services manages which type of service you access according to the client's requirement.

4. Runtime Cloud: Runtime Cloud provides the execution and runtime environment to the virtual machines.

5. Storage: Storage is one of the most important components of cloud computing. It provides a huge amount of storage capacity in the cloud to store and manage data.

6. Infrastructure: It provides services on the host level, application level, and network level. Cloud infrastructure includes hardware and software components such as servers, storage, network devices, virtualization software, and other storage resources that are needed to support the cloud computing model.

7. Management: Management is used to manage components such as application, service, runtime cloud, storage, infrastructure, and other security issues in the backend and establish coordination between them.

8. Security: Security is an in-built back end component of cloud computing. It implements a security mechanism in the back end.

9. Internet: The Internet is a medium through which front end and back end can interact and communicate with each other.

Five Characteristics of Cloud Computing

1. On-demand self-service
2. Broad network access
3. Resource pooling
4. Rapid elasticity
5. Measured service

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

1. Deployment Models
2. Service Models

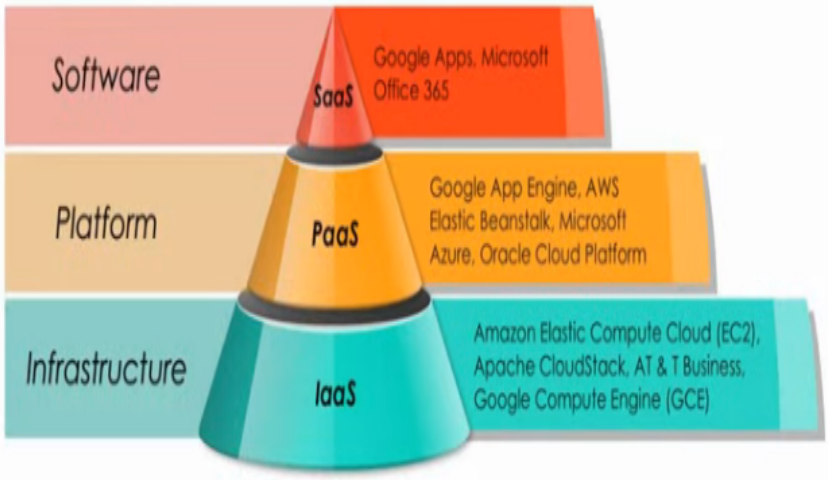
1. **Deployment Models**

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**: 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**: The Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature
- **Hybrid**: The Hybrid Cloud is a mixture of public and private cloud. However, the critical activities are performed using a private cloud while the non-critical activities are performed using a public cloud.
- **Community**: The Community Cloud allows systems and services to be accessible by a group of organizations.

2. **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):** 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 a multi-tenant virtualized environment. Can be coupled with Managed Services for OS and application support
2. **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
3. **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

Advantages:

1. Lower computer costs
2. Improved performance
3. Reduced software costs
4. Instant software updates
5. Improved document format compatibility
6. Unlimited storage capacity
7. Increased data reliability
8. Universal document access
9. Latest version availability
10. Easier group collaboration

Disadvantages:

1. Requires a constant Internet connection
2. Does not work well with low-speed connections
3. Features might be limited
4. Can be slow
5. Stored data can be lost
6. Stored data might not be secure

Conclusion: Thus we have studied and overviewed the concepts of cloud computing.