

## Experiment 1

Aim: Introduction and overview of cloud computing.

- Q.1 Definition of cloud computing**
- Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configuration computing resources (e.g., networks, servers) that can be rapidly provisioned and released in this provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

- Q.2 Characteristics of cloud computing**

- The essential characteristics of cloud computing are :-
- on-demand self-service**
- A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

## 2) Broad network access

→ Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms.

- For e.g.: mobile phones, tablets, laptops.

## 3) Resource pooling

→ The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.

- There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction.

- For e.g.; storage, processing, memory and network bandwidth.

## 4) Rapid elasticity

→ Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand.

- To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

- ⇒ Measured services
- ⇒ Cloud systems automatically control and optimize resource use by leveraging a metering capability at (some) level of abstraction appropriate to the type of service.
- Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service
- For e.g.; storage, processing, bandwidth,

### Q.3 NSIT cloud computing model

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Essential characteristics	Broad Network Access	Rapid Elasticity	Measured services	On-demand services
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### Resource POOLING

Service Models	Software as a service (SaaS)	Platform as a Service (PaaS)	Infrastructure as a Service (IaaS)
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Deployment Models	Public	Private	Hybrid	Community
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- The service models are :-
  - 1) Software as a Service (SaaS)
  - 2) Platform as a Service (PaaS)
  - 3) Infrastructure as a Service (IaaS)

- Deployment Models are :-

- 1) Private cloud
- 2) Community cloud
- 3) Public cloud
- 4) Hybrid cloud.

## Q.4 Different models of cloud computing

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### • Service Models

#### 1) Software as a Service (SaaS)

⇒ The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure.

- The applications are accessible from various client devices through either a thin client interface, such as a web browser, or program interface.

#### 2) Platform as a Service (PaaS)

⇒ The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services and tools supported by the provider.

- The consumer does not manage or control the underlying cloud infrastructure including networks, servers, operating systems or storage, but has control over the deployed applications and possibly configurations setting for the application hosting environment.

#### 3). Infrastructure as a Service (IaaS)

⇒ The capability provided to the consumer is to provision processing, storage, networks and other fundamental computing resources where the

consumer is to provision processing, storage, networks and other fundamental processing resources where the consumer is able to deploy and run arbitrary software, which can include operating system and applications.

### Deployment Models

#### 1) Private Cloud

- The cloud infrastructure is provided for exclusive use by a specific user by a single organization comprising multiple consumers.
- It may be owned, managed and operated by the organization, a third party, or some combination of them, and it may exist on or off-premises.

#### 2) Community Cloud

- The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns.
- It may be owned, managed and operated by one or more of the organization in the community, a third party or some combination of them, and it may exist on or off-premises.

### 3) public cloud

→ The cloud infrastructure is provision for open use by the general public.

- It may be owned, managed and operated by a business, academic or government organizations or some combination of them.

### 4) Hybrid cloud

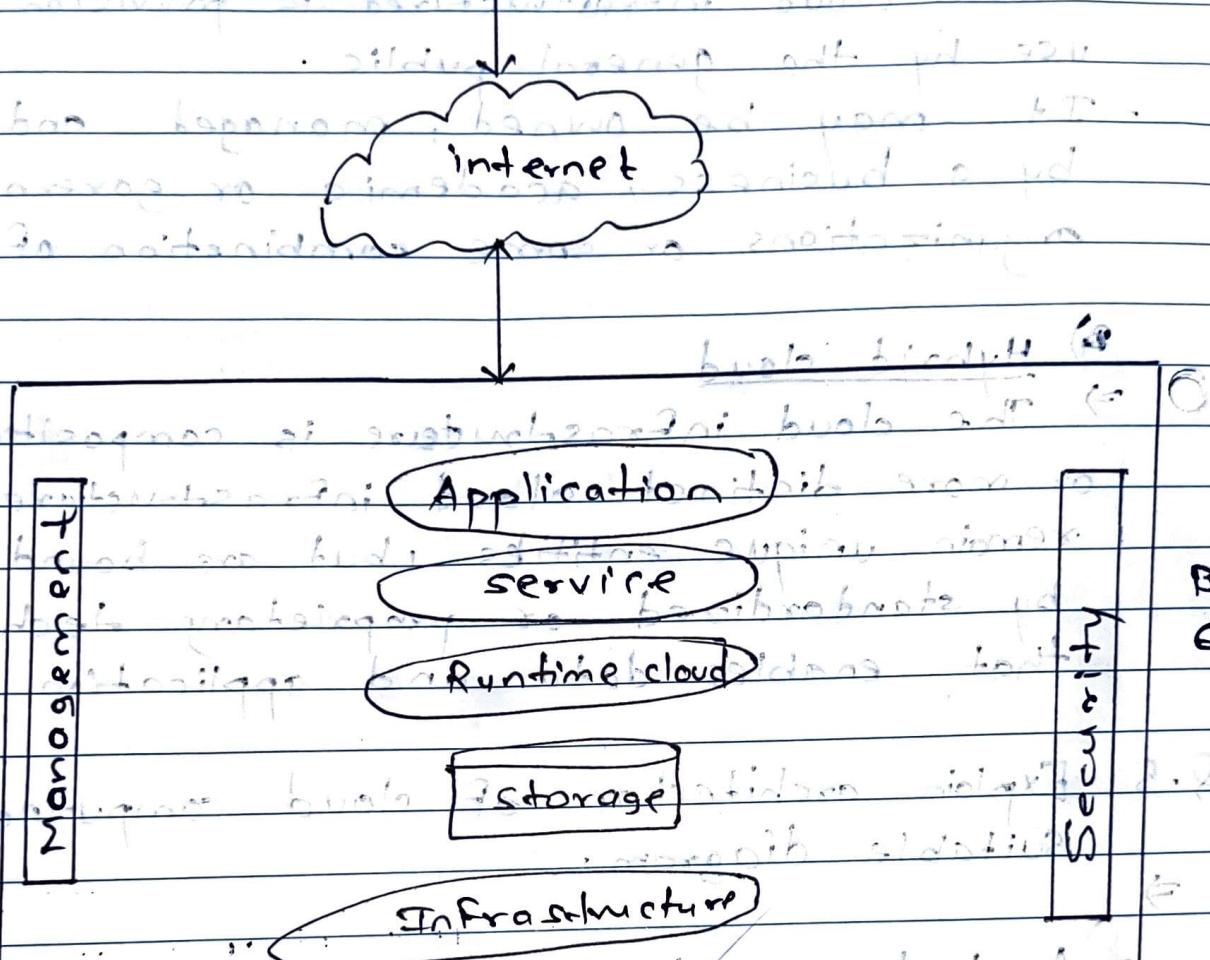
→ The cloud infrastructure is composition of two or more distinct cloud infrastructures that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

Q.5 Explain architecture of cloud computing with suitable diagram.



- A cloud computing is a technology used by both small and large organizations to store the information in cloud and access it from anywhere at anytime using the internet connection.
- Cloud computing architecture is combination of service-oriented architecture and event-driven architecture.
- Cloud computing architecture is divided into the following two parts:
  - 1) Front End
  - 2) Back End

## Client Infrastructure



### 1) 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 platform.
- The front end includes web servers, thin and fat clients, tablets for mobile devices.

⇒ Back End

⇒ The back end is used by the service provider.

- It manages all 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 mechanism, etc.

## Q.6 Benefits and limitations of cloud computing.

⇒ Both maintainance costs & maintenance costs are low.

- Benefits :

- 1) Once the data is stored in the cloud, it is easier to get back-up and restore that data using the cloud.
- 2) Cloud computing reduces both hardware and software maintenance costs for organizations.
- 3) Cloud computing allows us to easily access all cloud data via mobile.
- 4) Cloud computing offers APIs to the users for access services on the cloud and pays the charges as per the usage of services.
- 5) Cloud offers us a huge amount of storing capacity for storing our important data such as documents, images, audio, in one place.

## - Limitations

- Disadvantages of cloud computing:
- 1) Dependence on internet connectivity.
  - 2) Limited control and customization of the technology.
  - 3) Security concerns include the risk of data breaches and loss of sensitive information.
  - 4) Possibility of service disruptions and downtime.
  - 5) Limited compliance with specific regulations, such as HIPAA for healthcare data.