Models of Cloud Computing

Learning Outcomes

At the end of the session you will be able to:

- Comprehend service models of cloud computing

- Describe cloud services provided by SaaS, IaaS, and PaaS

- Describe cloud stack and cloud storage

- Differentiate various deployment models

- List the benefits of service models

Introduction

 The cloud computing system is composed of a set of layers upon which distributed applications are built. These layers include *infrastructure, platform,* and *software*. Based on these three layers, we can devise three cloud computing models are devised.

- **Infrastructure as a Service (IaaS)** model provides infrastructure-related services and is responsible for handling hardware-related issues, power, and cool management in data centers.

- **Platform as a Service (PaaS)** model takes the responsibilities of operating system, database management, server, and programming language.

- **Software as a Service (SaaS)** model handles software-related issues and provides amenities to the cloud users.
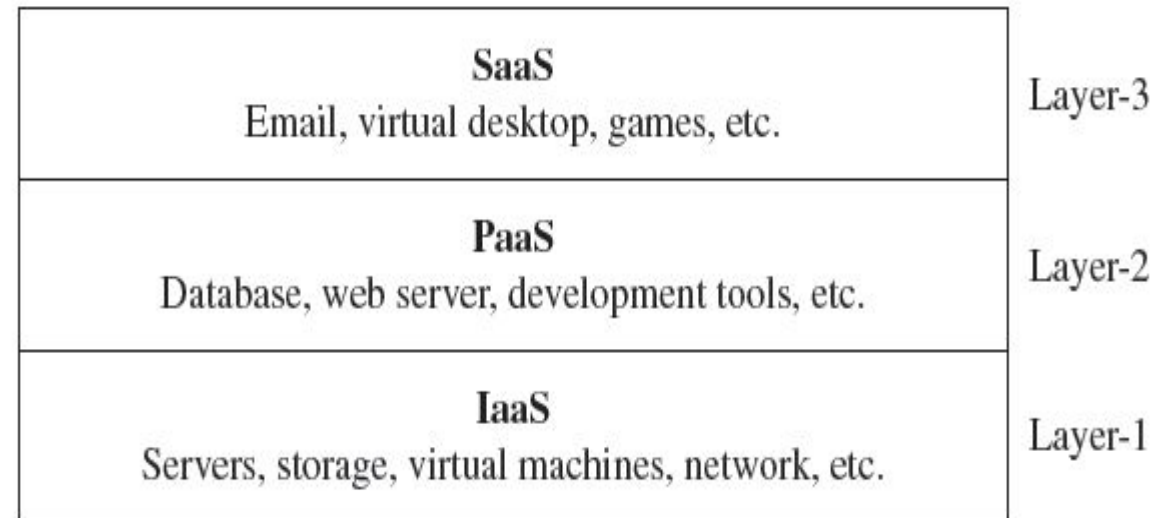
Cloud Service Models

On the basis of allocation of resources, cloud computing offers their services.

1. Bottom layer (layer-1)—IaaS—accommodates memory, CPU, and additional hardware resources

2. Middle layer (layer-2)—PaaS—accommodates diverse settings for consumer-particular services

3. Top layer (layer-3)—SaaS—cloud service accessing occurs via web browsers and web services

SaaS	Layer-3
Email, virtual desktop, games, etc.	
PaaS	Layer-2
Database, web server, development tools, etc.	
IaaS	Layer-1
Servers, storage, virtual machines, network, etc.	

Software as a Service

 Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over the Internet.

 National Institute of Standards and Technologies (NIST) defines cloud SaaS as follows:

"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 (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings".

Software as a Service

Some of the applications of SaaS are:

- Complaint resolution system

- Employee management system

- Attendance resolutions system

- E-police, E-court

- Municipal maintenance

- Water board, billing, payment systems

- District management solutions

- Service desk
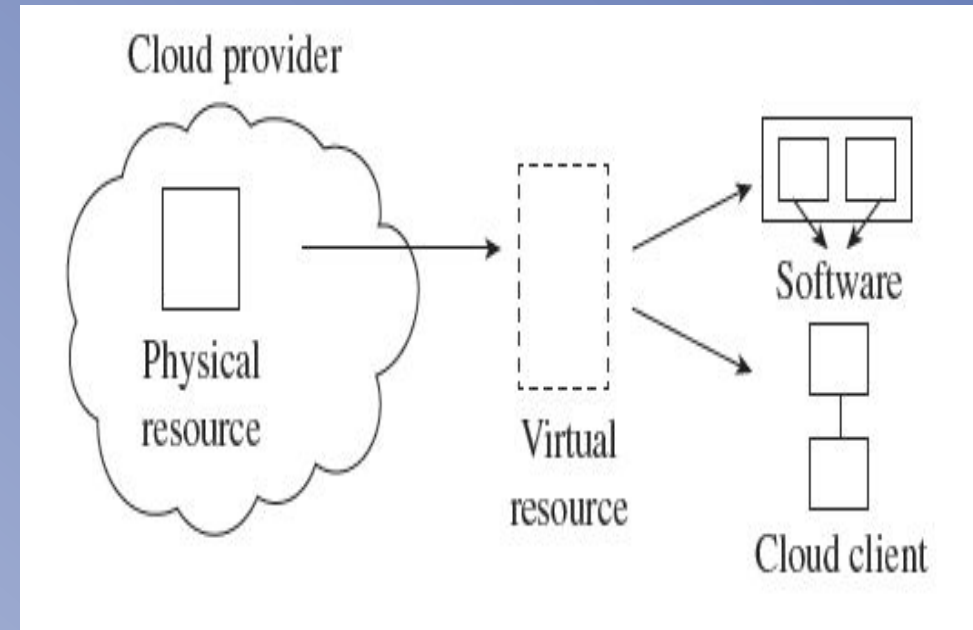
Importance of SaaS

 The following are some of the reasons SaaS services are required:

1. Straightforward expenses are nil.

2. You only need a web browser to access the application. It doesn't require other hardware purchase or software installation.

3. It provides quick operation service.

4. SaaS is extremely scalable.

5. Since the source code is the same for each customer, it is a multi-tenant design that makes it extremely proficient.

6. SaaS can endure every demand, because of easy arrangement; this is usually not simple with conventional applications.

7. Any noble technical modernization is effortlessly incorporated by the supplier that is accessible to all subscribers because, usually, all the consumers use a similar code base.

Platform as a Service

 The Platform as a Service (PaaS) model makes all of the facilities required to support the complete life cycle of building and delivering web applications and services available from the Internet.
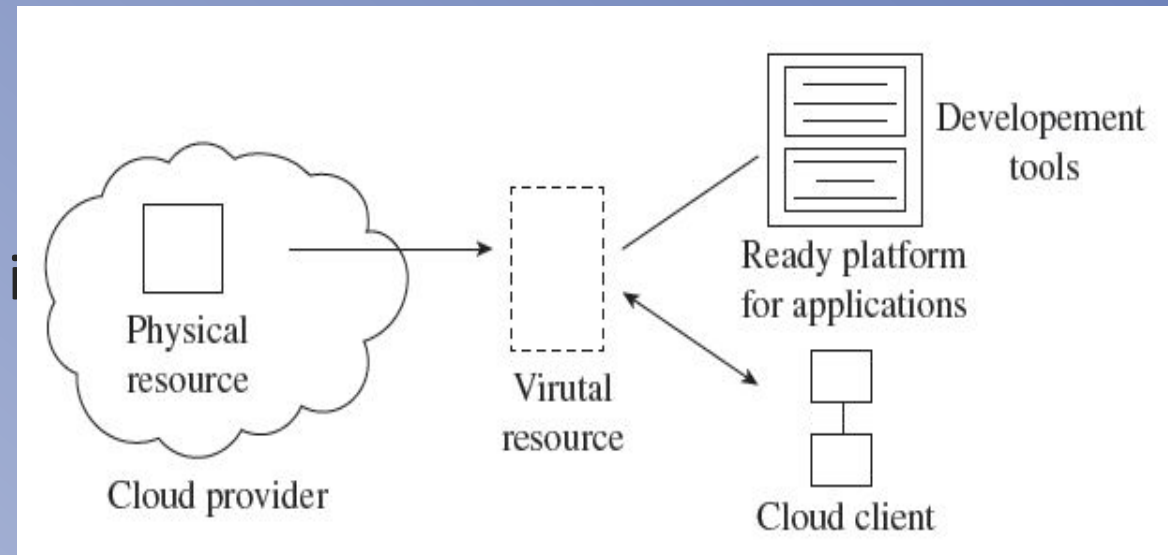
 National Institute of Standards and Technologies (NIST) defines cloud PaaS as follows:

"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 network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment".

Platform as a Service

 The following has to be performed in the PaaS:

- Attain and install the server.
- Organize the operating system, operate time settings, and source manage depository and other middleware to work efficiently.
- Organize the operating system, operating time settings, warehouse, and supplementary middleware.
- Copy data for further reference.
- The best way to comprehend PaaS is to split i separately into its major constituents— service and platform.

Platform as a Service

 Various Service Providers of PaaS

- Terremark

- Engine Yard

- AT & T

- Atlassian

- PivotalLab

- AppScale

- Engine Yard

- Flexiscale

Infrastructure as a Service

 Infrastructure as a Service (IaaS) is the delivery of computer infrastructure as a service.

 National Institute of Standards and Technologies (NIST) defines cloud IaaS as follows:

"The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems

and applications. The consumer does not manage or

control the underlying cloud infrastructure but has

control over operating systems, storage, and

deployed applications; and possibly limited control

of select networking components

(e.g., host firewalls)".
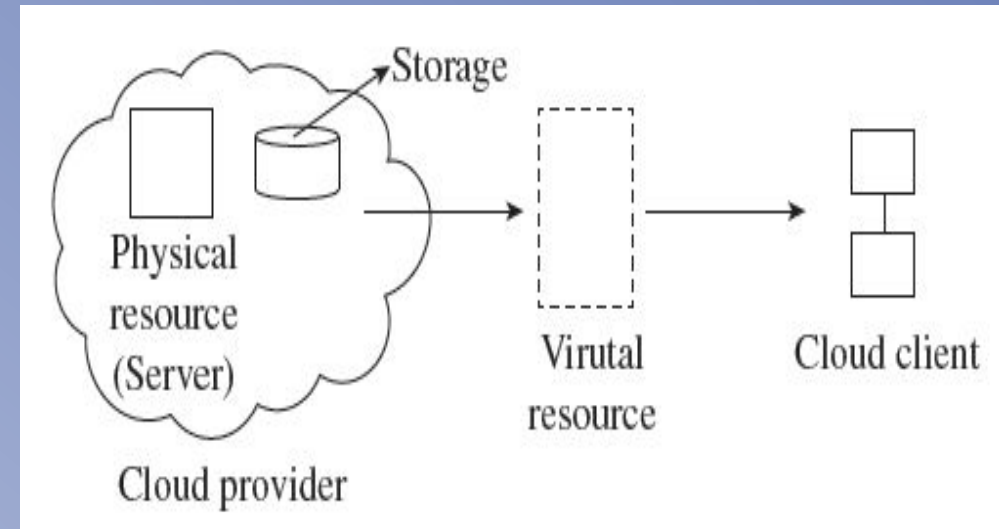
Infrastructure as a Service

 Amazon is the pioneer of IaaS. In India, IaaS providers include NetMagicSolutions and InstaCompute (from Tata Communications). The other leading providers are:

- Rackspace

- Joyent

- Rightscale

- Terremark

- GoGrid

- Elastic Hosts

- Symetriq

Cloud Computing Sub Service Models

 Everything as a Service (XaaS)

 Compliance as a Service

 Identity as a Service (IdaaS)

 IaaS: DataBase as a Service (DBaaS)

 Paas: Storage as a Service (STaaS)

 Communications as a Service (CaaS)

 SaaS: Security as a Service (SECaaS)

 SaaS: Monitoring as a Service (MaaS)

 PaaS: Desktop as a Service (DTaaS)

 IaaS: Compute Capacity as a Service (CCaaS)

Cloud Deployment Models

 The cloud model is invented with four deployment models—public cloud, private cloud, hybrid cloud, and community cloud.)
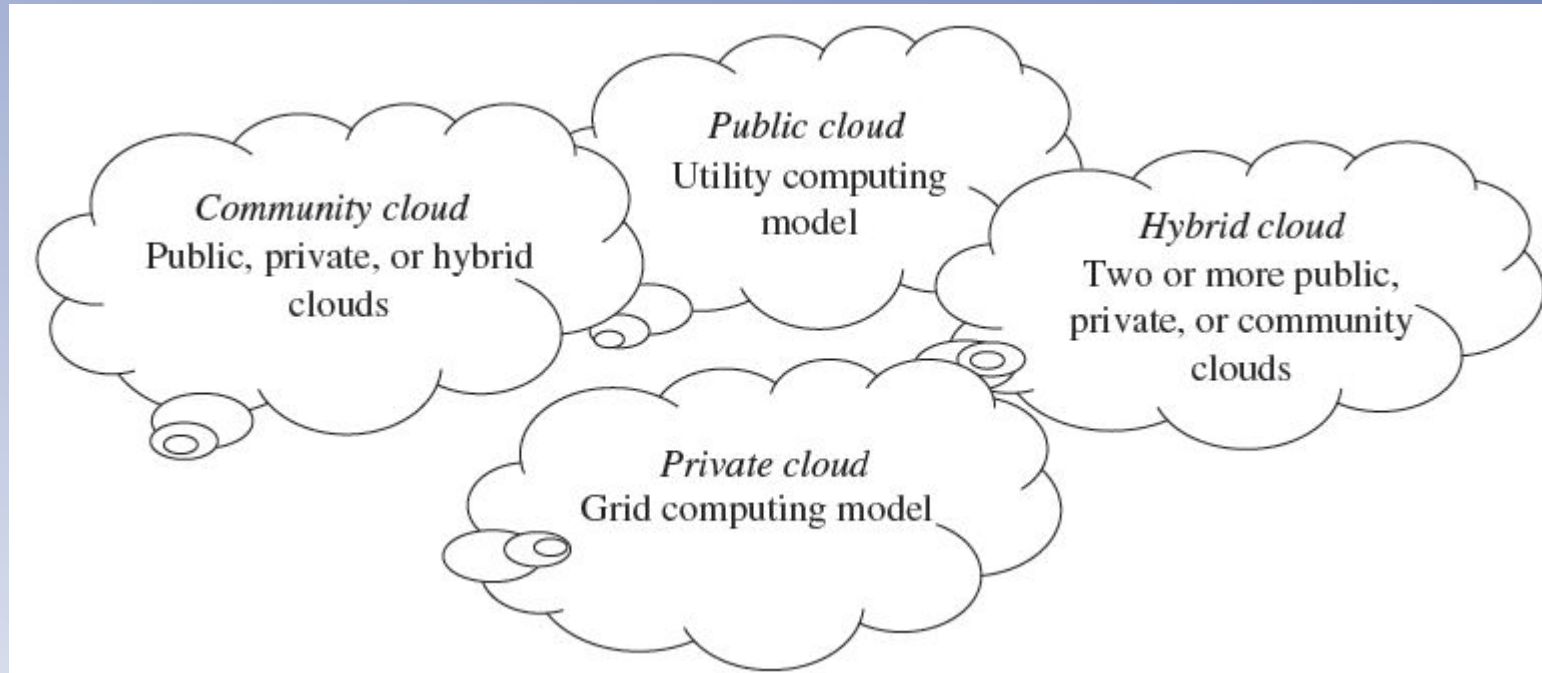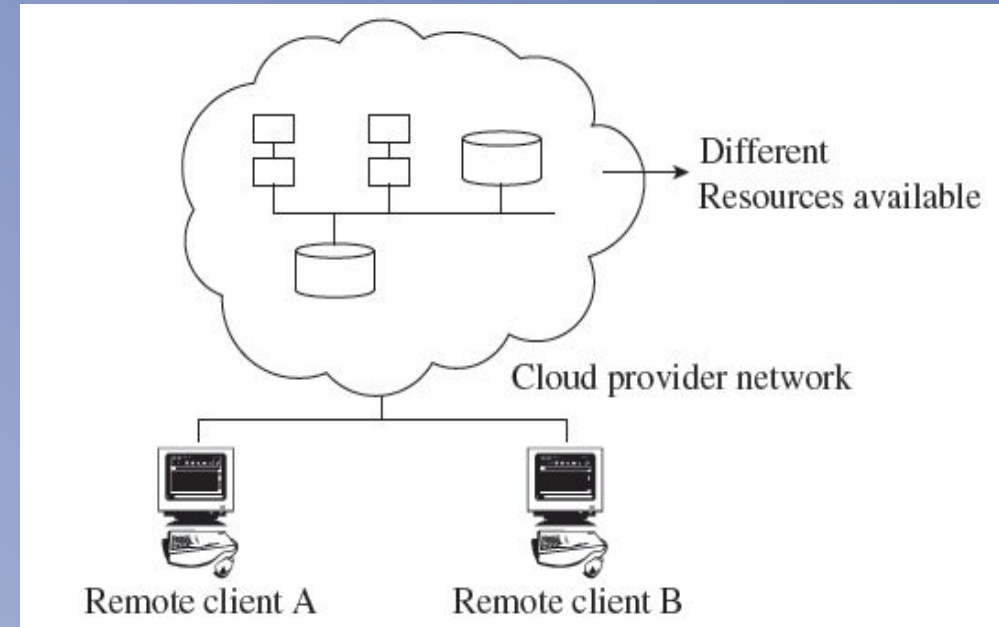
Public Clouds

 The public cloud is the first deployment model. In this model, users have many options to opt for and decide on any service provider as per requirement.

 Examples of public cloud vendors include

 Google, Amazon Elastic Compute Cloud,

 Windows Azure Services Platform,

 Microsoft, etc.

 This model assists in the reduction

 of capital expenses and removes

 equipped IT expenses.
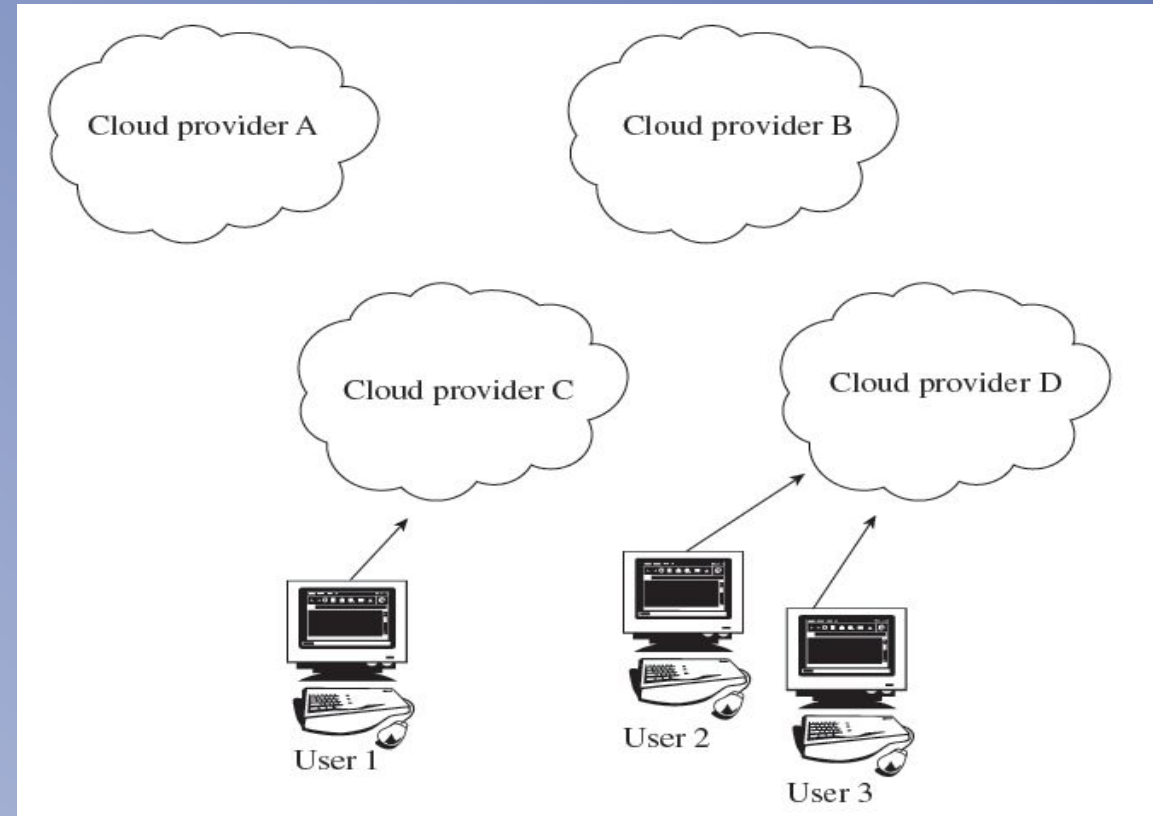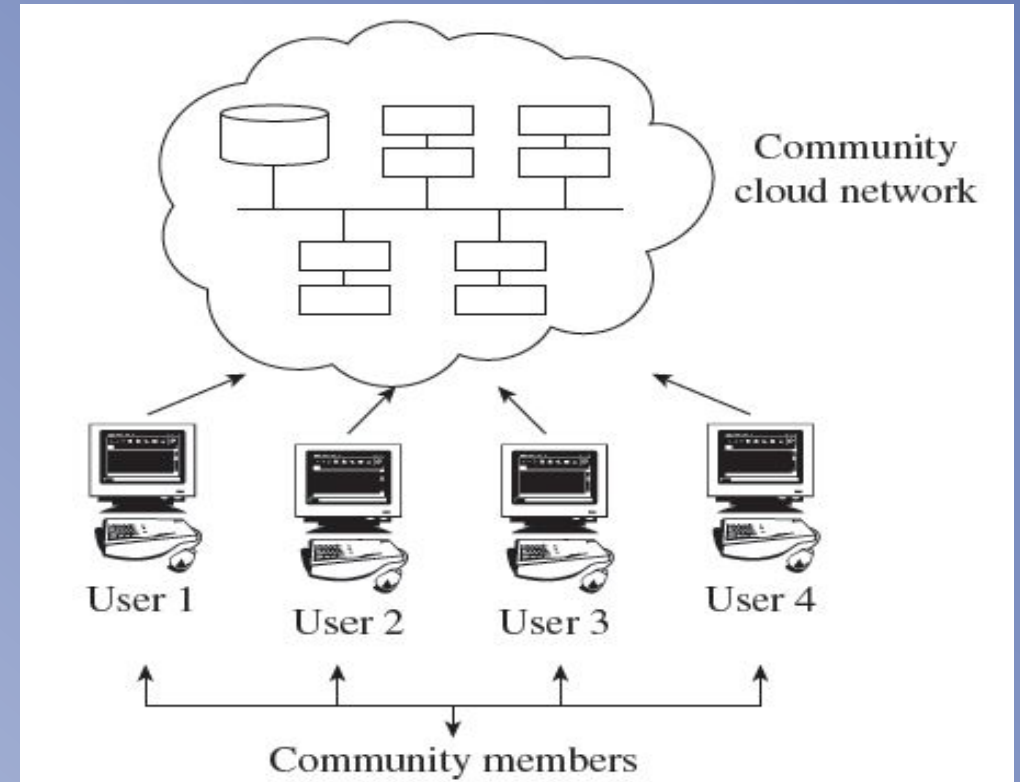
Private Clouds

 The private cloud offers several advantages of an open cloud computing setting that comprises its service support and flexibility.

 Private clouds allow infrastructure to be accessed only by the members of the organization and granted by third parties.

 Examples of private cloud include Eucalyptus

   cloud computing infrastructure with Ubuntu

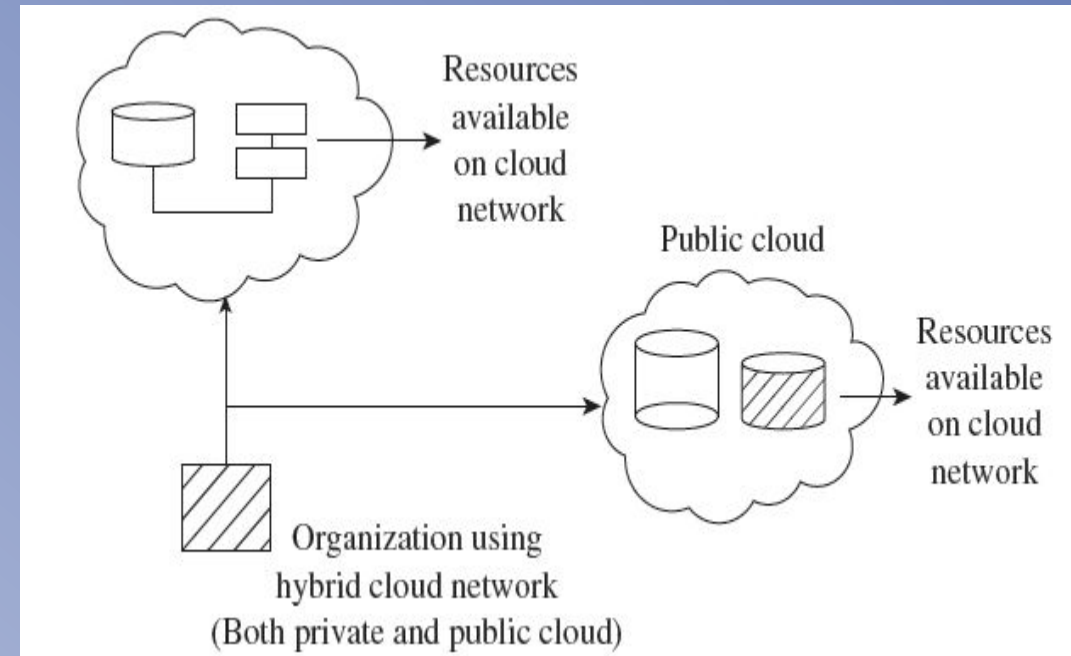   Server, Elastra private-cloud, Vmware,

   Microsoft, etc.

Community Clouds

 A community cloud falls between public and private clouds category.

 The drawback related to a community cloud is that of having costs higher than a public cloud.

 Examples of community cloud include

 Google's 'Gov Cloud', NASA Nebula cloud,

 etc.

Community cloud network

User 1   User 2   User 3   User 4

Community members

Hybrid Clouds

 The hybrid cloud is a combination of a private and public cloud which is mutually dependent on one another.

 In this model, cloud users are supplied with information on the public cloud, in spite of the reality that the cloud supplier

has to maintain the company-significant

services and information in a few

instructions.

Resources available on cloud network

Public cloud

Resources available on cloud network

Organization using hybrid cloud network
(Both private and public cloud)

Alternative Deployment Models

Linthicum Model

- Storage as a Service
- Database as a Service
- Information as a Service
- Process as a Service
- Application as a Service
- Platform as a Service
- Integration as a Service
- Security as a Service
- Management as a Service
- Testing as a Service

Jericho Cloud Cube Model

- Internal or external
- Proprietary or open
- Perimeterized or de-perimeterized architectures
- Outsourced or insourced

CloudStack

 CloudStack is cloud software which assists users to alter the cloud according to their requirements.

 It controls and supports the network, storage, and compute joints in a cloud infrastructure.

 It is used to arrange, control, and systematize situations in cloud computing.

 With CloudStack, you are capable of the following:

1. Establishing an on-command, flexible cloud computing service. Service suppliers may offer self service virtual machines, networking arrangements, and storage sizes over the Internet.

2. CloudStack may be used to construct an on-command cloud computing service along with flexibility. Service supplier provides storage and virtual machines, and much more on the Internet.

3. An organization or worker could establish an on-premise private cloud along with CloudStack.

Cloud Storage

 Cloud storage is a service model wherein data is maintained, controlled, and backed up distantly and made accessible to users over a network (characteristically the Internet).

There are three major cloud storage models which are as follows:

1. Public cloud storage services, like Amazon's Simple Storage Service (S3), offers a multi-occupant storage appropriate for data.

2. Private cloud storage services offer a dedicated storage restricted behind the firewall of a corporation. Private clouds are suitable for users who require customization and more power on their data.

3. Hybrid cloud storage is an amalgamation of the other two models, which comprise no less than a single public cloud and a single private cloud infrastructure. A corporation could, for instance, collect forcefully used and prepared data on a private cloud and sharable data on a public cloud.

Cloud Storage

 Cloud storage is a module of networked online storage in which data is saved in virtualized groups of storage that are normally hosted by third parties.

 Cloud storage services can be accessed via a web service application programming interface (API), or via a web-based user interface.

Thank You!