Introduction to ICT (CSC101)

Cloud Computing

Cloud Computing

- Cloud computing is a model of computing in which:

  – Computer processing,

  – Storage,

  – Software (Applications),

  – And other services,

  are provided as a shared pool of virtualized resources over a network, primarily the Internet.

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

Cloud Computing Cont..

- The term **Cloud** refers to a Network or Internet
- Clouds can provide services over public or private networks, i.e., WAN, LAN, VPN
- Cloud computing refers to manipulating, configuring and accessing the applications online.
- It offers online data storage, infrastructure and application.

Cloud Computing Cont..

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

- Risks: Organizations become dependent on outside providers

Cloud Computing Architecture
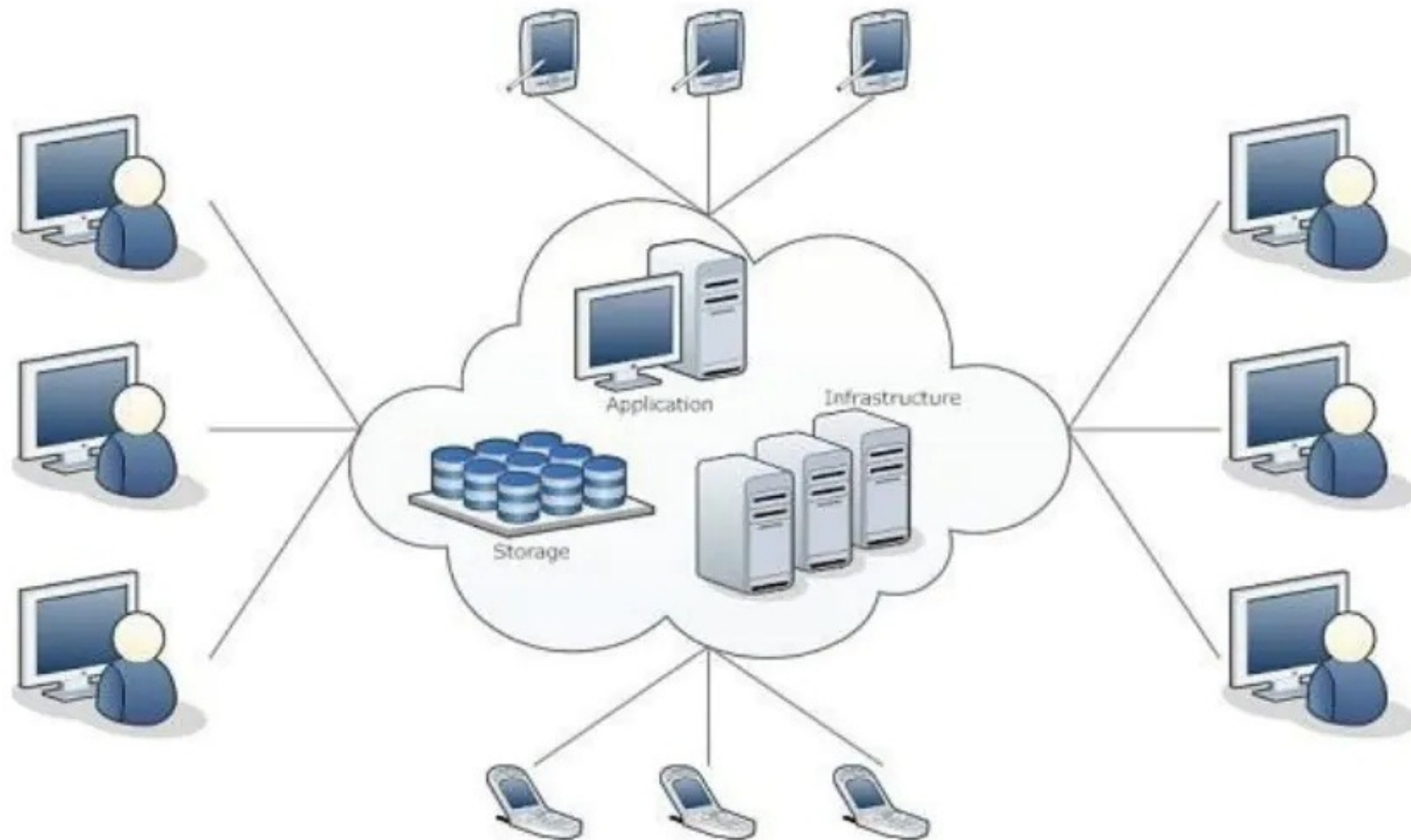
Cloud Computing: Essential Characteristics

- **On-demand self-service:** Consumers can obtain computing capabilities such as server time or network storage as needed automatically on their own.

- **Ubiquitous network access:** Cloud resources can be accessed using standard network and Internet devices, including mobile platforms.

Cloud Computing: Essential Characteristics

- **Location-independent resource pooling**: Computing resources are pooled to serve multiple users, with different virtual resources dynamically assigned according to user demand. The user generally does not know where the computing resources are located.

Cloud Computing: Essential Characteristics

- **Rapid elasticity:** Computing resources can be rapidly provisioned, increased, or decreased to meet changing user demand.

- **Measured service:** Charges for cloud resources are based on amount of resources actually used.

Basic Concepts

- There are certain services and models working behind the scene making cloud computing feasible and accessible to the end user

- Following are the working models for cloud computing:
  - Deployment Models
  - Service 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
  - Community

Public Cloud   Private Cloud

Hybrid Cloud   Community Cloud
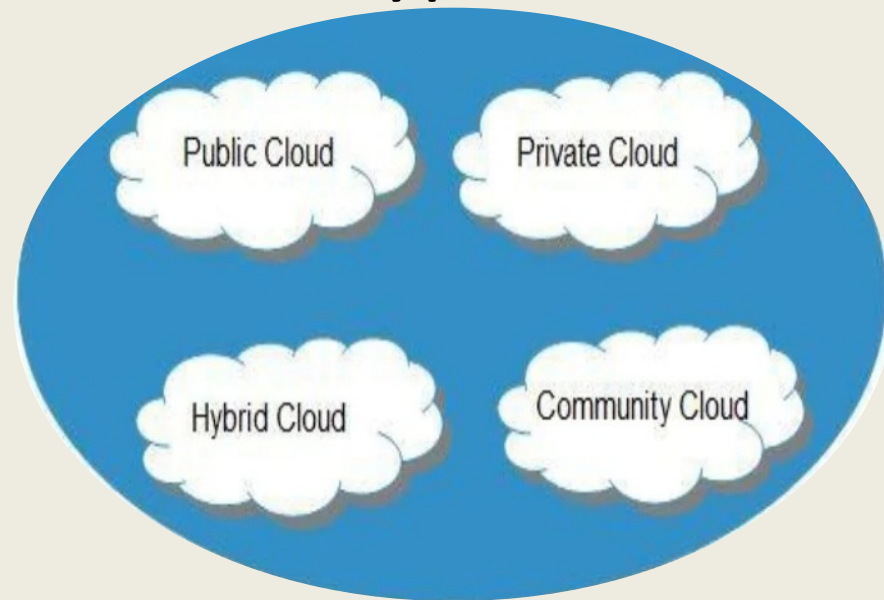
Public Cloud

- Public cloud allows system and services to be easily accessible to the general public.

- Public cloud may be less secure because of its openness, e.g., email

Private Cloud

- Private cloud allows system and services to be accessible within an organization.

- It offers increased security because of its private nature.

Community Cloud

- Community cloud allows system and services to be accessible by group of organizations.

Hybrid Cloud

- Hybrid cloud is mixture of Public and Private cloud.

- The critical activities are performed using private cloud and 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 four service models as listed below:
  - Infrastructure as a Service (IaaS)
  - Platform as a Service (PaaS)
  - Software as a Service (SaaS)
  - Function as a Service (FaaS)

Infrastructure as a Service (IaaS)

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

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

- Usually billed based on usage

- Usually multi tenant virtualized environment

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

- Multi tenant environment

PaaS Examples

Software as a Service (SaaS)

- SaaS model allows to use software applications as a service to the end user

- 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 virtualized environment

SaaS Examples

Function as a service (FaaS):

- FaaS is a category of cloud computing services that provides a platform allowing customers to develop, run, and manage application functionalities without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app

Cloud Computing

Servers

Desktops

Laptops

iPhone

Tablet Computers

Platform Services

Block Storage

Communication Networks

Identity Management

Content Servers

Application Services

Content Management
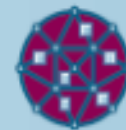
Enterprise Software

Collaboration Environments

Process Management

Infrastructure Services

Computing Resource Management

Network Management

Storage Management

Do you Use the Cloud?

Advantages

– Lower computer costs

– Improved performances

– Reduce software cost

– Instant software updates

– Unlimited storage capacity

– Increased data reliability

– Universal document access

– Latest version availability

– Easier group collaboration

– Device Independence

Disadvantages

- Requires a constant internet connection
- Doesn't work well with low-speed connection
- Can be slow
- Stored data can be lost
- Stored data might not be secure

Edge computing

- Edge computing is a method of optimizing cloud computing systems:
    - Performing some data processing on a set of linked servers at the edge of the network, near the source of the data.
    - This reduces the amount of data flowing back and forth between local computers and other devices and the central cloud data center