Introduction to Cloud Computing

Session 1

Objectives

- Describe the evolution of cloud computing.
- Explain the advantages of cloud computing.
- State the characteristics of cloud computing.
- Describe the cloud delivery models.
- Define and describe SaaS, PaaS, and IaaS.
- Describe the cloud deployment models.

Definition of Cloud Computing

Cloud computing is an approach enabling…

… on-demand access through Internet to computing capabilities and resources…

…like networks, servers, applications, and services

Evolution of Cloud Computing 1-5

- **Cloud computing** - an **emerging technology trend** in the development world

- Involves delivery of **software**, **platforms**, and **infrastructure** as services through the Internet or networks

Evolution of Cloud Computing 2-5

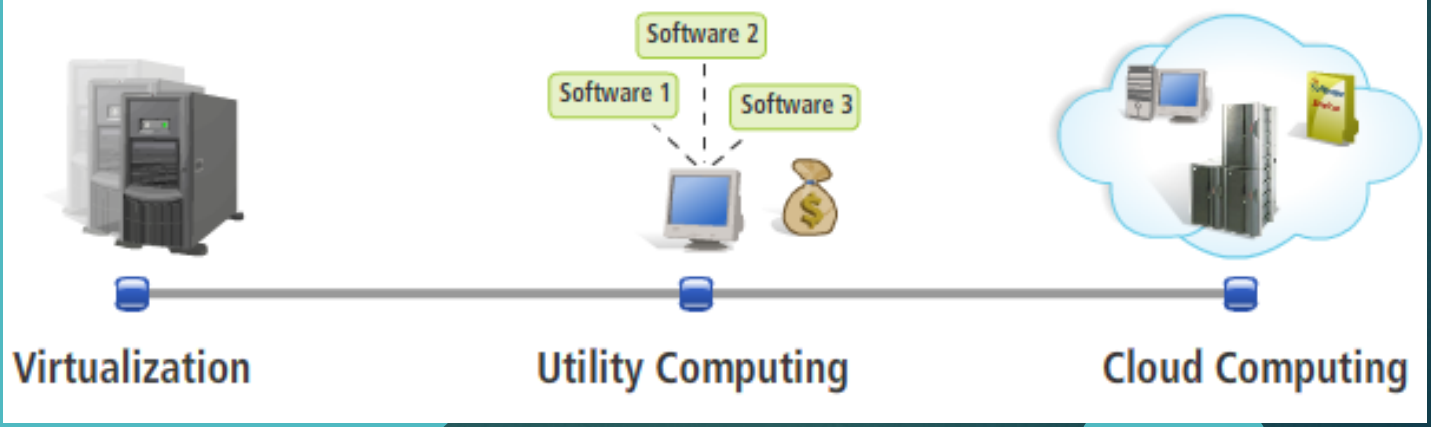
- Main **issues** faced by the computing world today
  - Server and infrastructure costs **increasing** day by day
  - Computing power and resources **under-utilized** in non peak time
  - **Environmental damage** due to **increase in hardware**
- Solution to such issues is **Virtualization**

Evolution of Cloud Computing 3-5

- Virtualization - Process of **creating a virtual version of an Operating System (OS), a server, or network resources**
- Using virtualization, you can host **multiple operating systems** at the same time on a **single machine**
- A virtualized server – **50%-80%** utilization
- Using virtualization - **cut costs** for hardware acquisition, maintenance, energy and cooling system usage
- Virtualization - many benefits, but **not enough**

Evolution of Cloud Computing 4-5

- Virtualization alone could not fulfill the growing demands of businesses
- This led to **Utility computing**
- In utility computing, software is used like utilities, on a **pay and use basis**
- With time, utility computing paved the way for **cloud computing**



Evolution of Cloud Computing 5-5

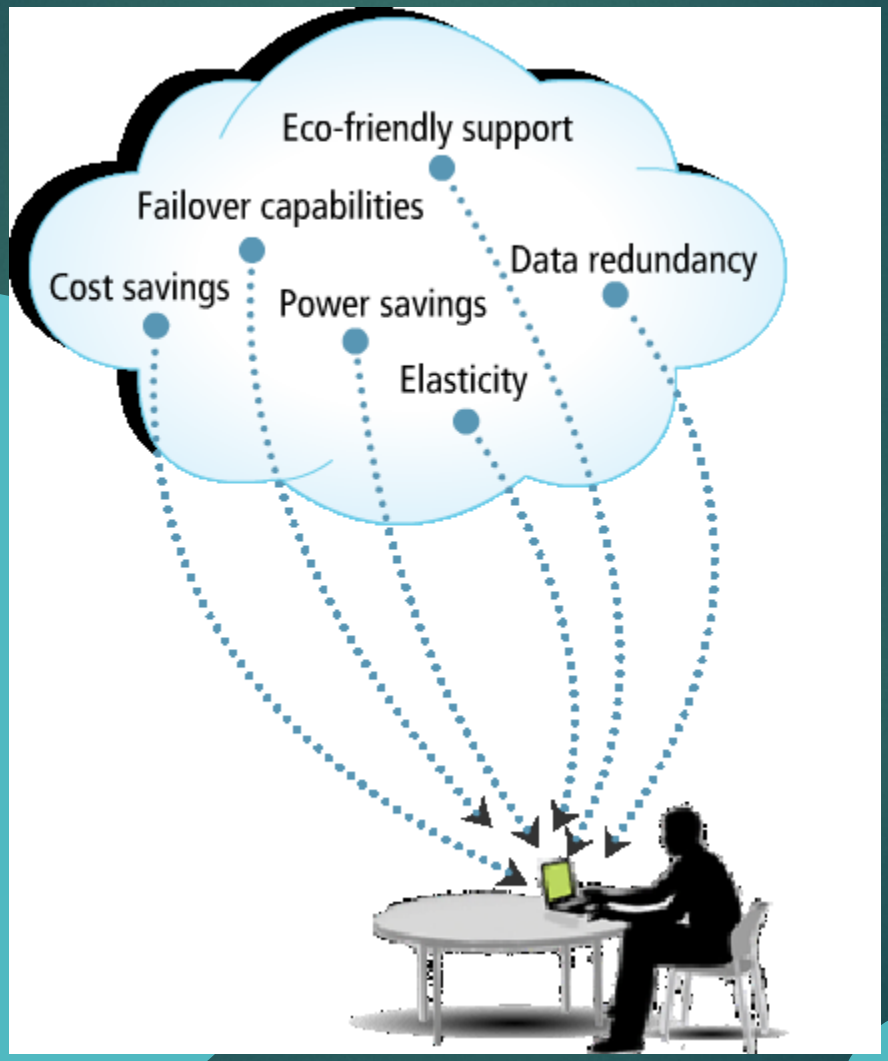
- Today, there are several cloud applications available for consumers such as Gmail and others

Cloud Desktop OS

- Cloud Operating System or Cloud OS
  - **Internet based OS** that can be accessed anytime from any desktop
  - No worries about hard disk space as data will be **stored on the cloud**

- **Google Chrome** and **EyeOS** are examples of such Internet based operating systems

Advantages of Cloud Computing 1-5



Advantages of Cloud Computing 2-5

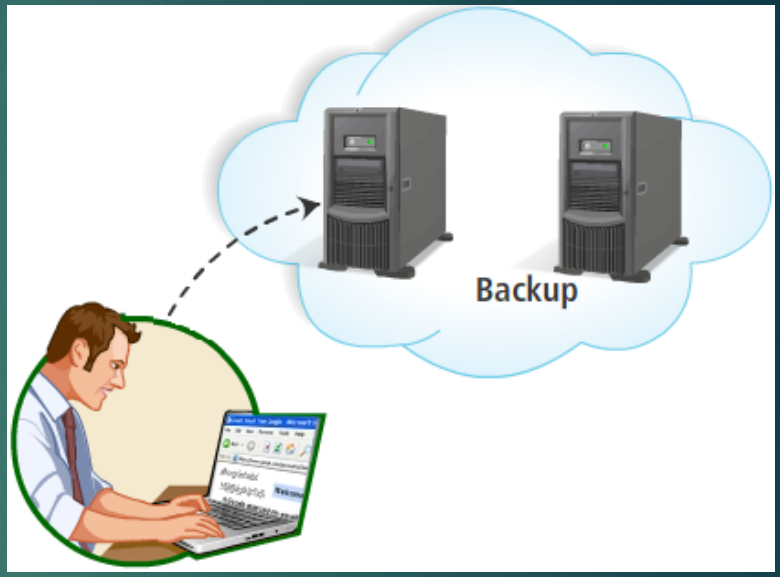
- **Elasticity**
  - Ability to scale the infrastructure **up** or **down** on the fly
    - One of the **biggest advantages** of cloud computing
    - Cloud applications scale horizontally by adding more machines in a cluster

Advantages of Cloud Computing 3-5

- **Failover Capabilities**
  - **Failover** - feature enabling tasks to be delegated to a standby system in case of server failure or pre-planned downtime
  - Cloud computing offers **strong failover capabilities**

Advantages of Cloud Computing 4-5

- **Data Redundancy**
  - Customer data is maintained over **multiple remote data centers in the cloud**
  - Hence, if there is a loss of data at one data center you always have a backup in another data center



Advantages of Cloud Computing 5-5

Cost Savings

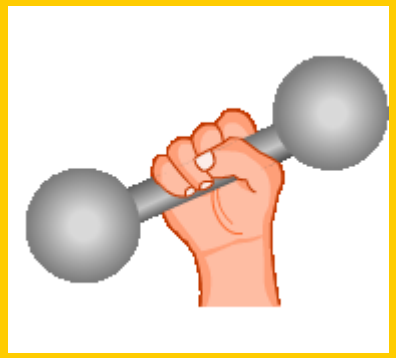
Power Savings

Eco-friendly Support

Characteristics of Cloud Computing

User Centric

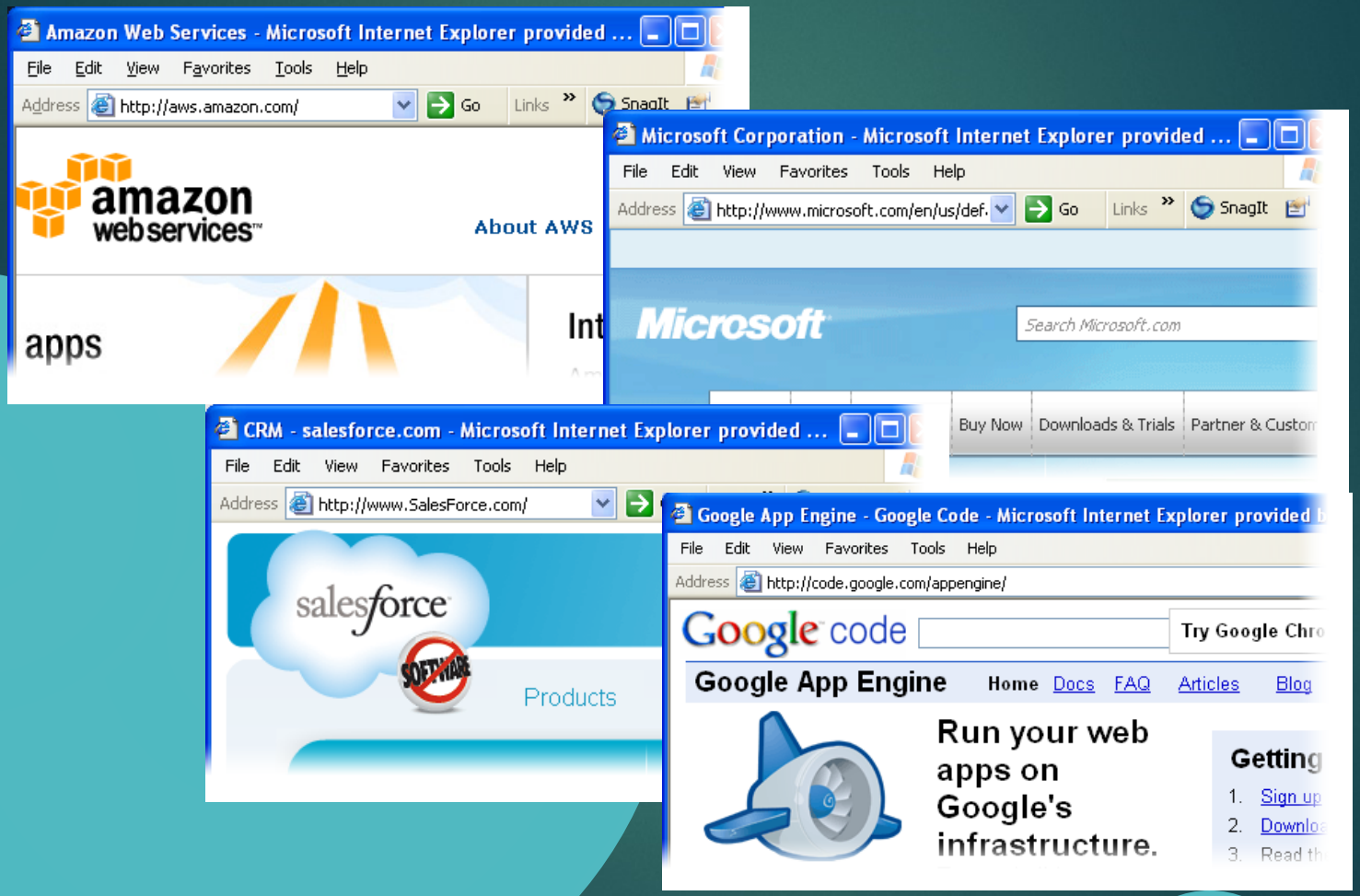
Task Centric



Powerful

Programmable

Key Market Players of Cloud Computing



Amazon 1-5

- Amazon offers many cloud computing products as part of **Amazon Web Services**

- **Amazon Elastic Compute Cloud** also called as **EC2** enables you to create **virtual computers or instances** in the Amazon cloud

Amazon 2-5

- Amazon provides **Simple Storage Service** also called as S3
- **Amazon S3 –** Is a storage service to store files in the cloud
- Mozilla FireFox provides an add-on called **S3 Organizer** to work with Amazon S3

Amazon 3-5

- You can create an instance with Amazon EC2, connect to it, and configure it with a custom environment
- However, when you log off, all your **configuration settings will be lost**
- Each you log in, you have to **recreate** the entire environment settings

Amazon 4-5

- To overcome this problem, a machine image of the server known as **Amazon Machine Image** is saved
- The advantage of this is that we can launch an instance later with the **same environment settings**

Amazon 5-5

- By default, a **Web based interface** is used to create servers or instances in the Amazon cloud

- However, Amazon EC2 also provides us with **command line tools** to perform the same tasks from command prompt

Cloud Delivery Models

Delivery models also called as **layers in the cloud stack** deliver *software*, *application platforms*, and *infrastructure* as **cloud services**

SaaS

Traditionally, organizations followed a standard approach:

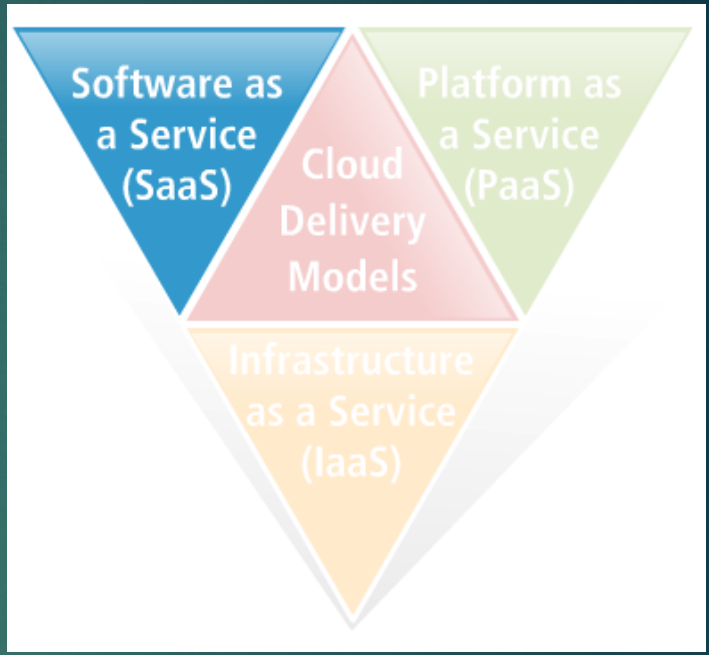
acquire licensed software, install it, and then maintain and upgrade the software when new versions arrive in the market

Organization

Acquire, Install, Upgrade, and Maintain Software

SaaS

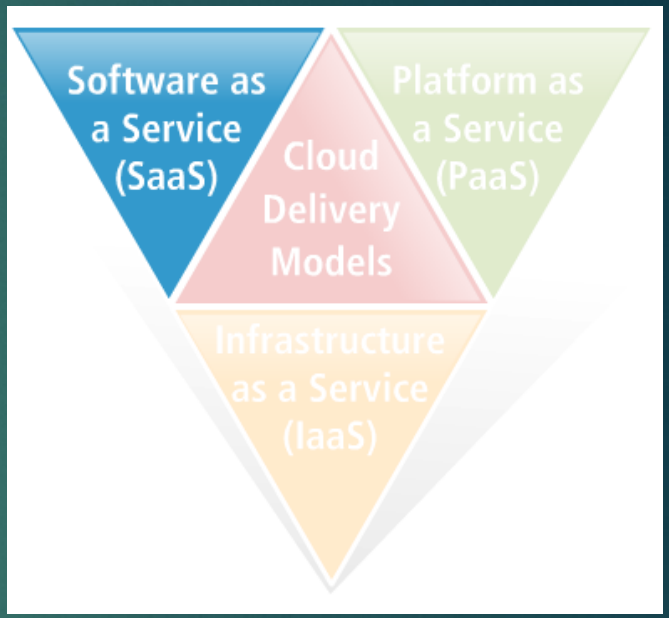
- Software and functionality as a **Web service**
- **Pay-as-you-use** pricing model
- Software present in the cloud can be used when required, without **the need for any local licenses or installation**
- Costs much **lesser than actual licenses**



SaaS

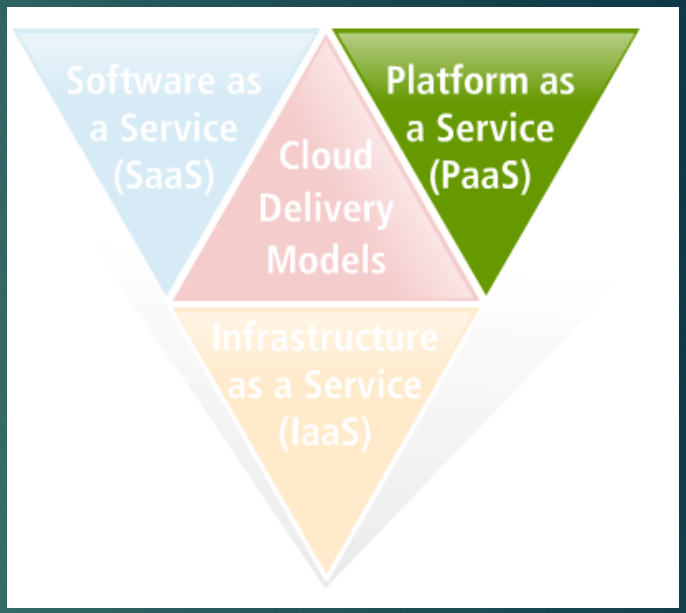
- Cloud computing –
  - Convergence of three major trends
    - Virtualization
    - Utility Computing
    - SaaS
- SaaS examples

  - **Google Docs and Gmail**



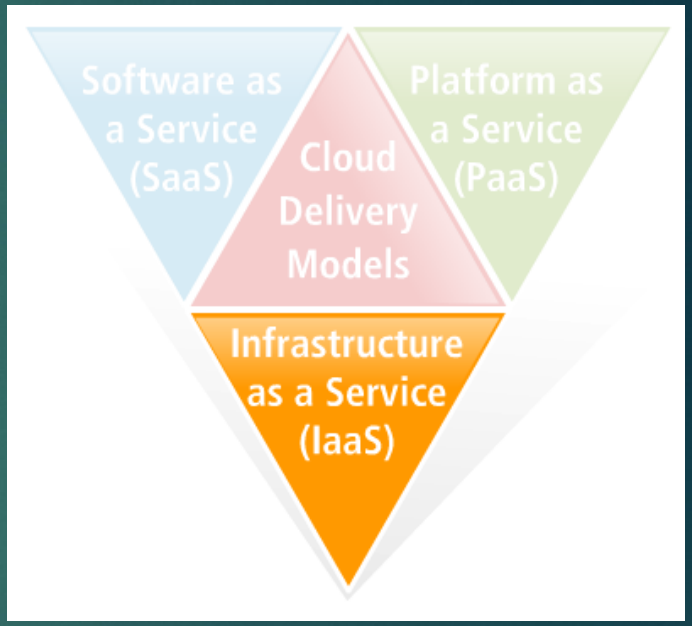
PaaS

- Platform as a Service
- Developer-created applications are **deployed** on the cloud
- **Scaling the platform** or runtime environment
- Similar to SaaS, pricing structure is **pay-as-you-use**
- PaaS example - Microsoft Windows Azure and Google App Engine



IaaS

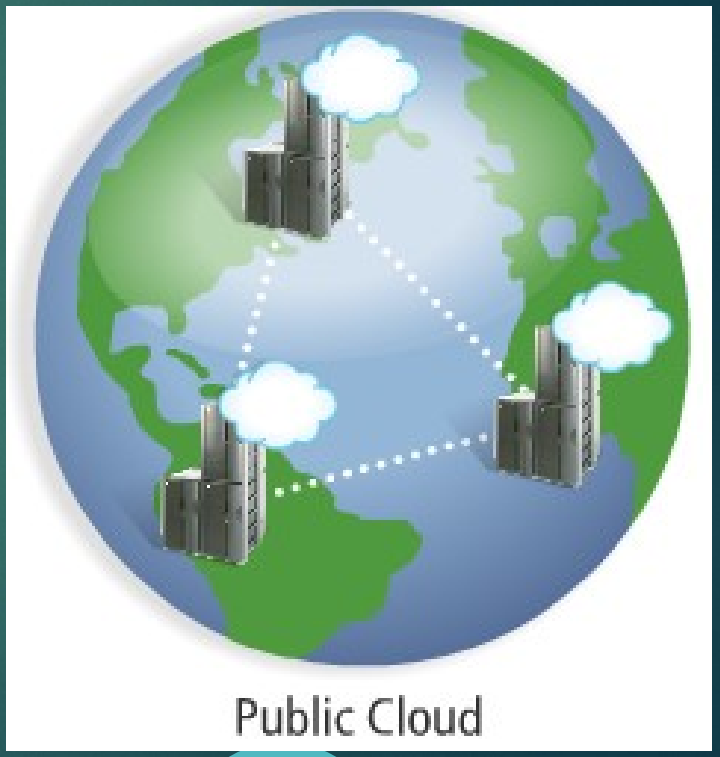
- Infrastructure as a Service
- Provides
  - **Processing capabilities**
  - **Storage**
  - **Networks**
- Is elastic and available on-demand
- Access the remote machines on the cloud through **Amazon Machine Images** (AMIs)
- Similar to SaaS and IaaS- pricing structure is **pay-as-you-use**
- IaaS example - **Amazon EC2 and Amazon S3**



Cloud Deployment Models

Determines how the cloud computing environment **will be deployed**

Private Cloud



Public Cloud

Private Cloud

- Cloud infrastructure is **private** to an organization
- **Enterprise-owned or leased**
- May be **hosted**, **managed by an organization**

Public Cloud

- Visible to the **public** or large enterprises

- Available to clients from a **third party service provider** through the Internet

Summary

- Cloud Computing enables on-demand access through Internet or a network to computing capabilities and resources.
- SaaS, PaaS, and IaaS are three models to deliver cloud services, application platforms, or infrastructure.
- There are two cloud deployment models namely private and public.