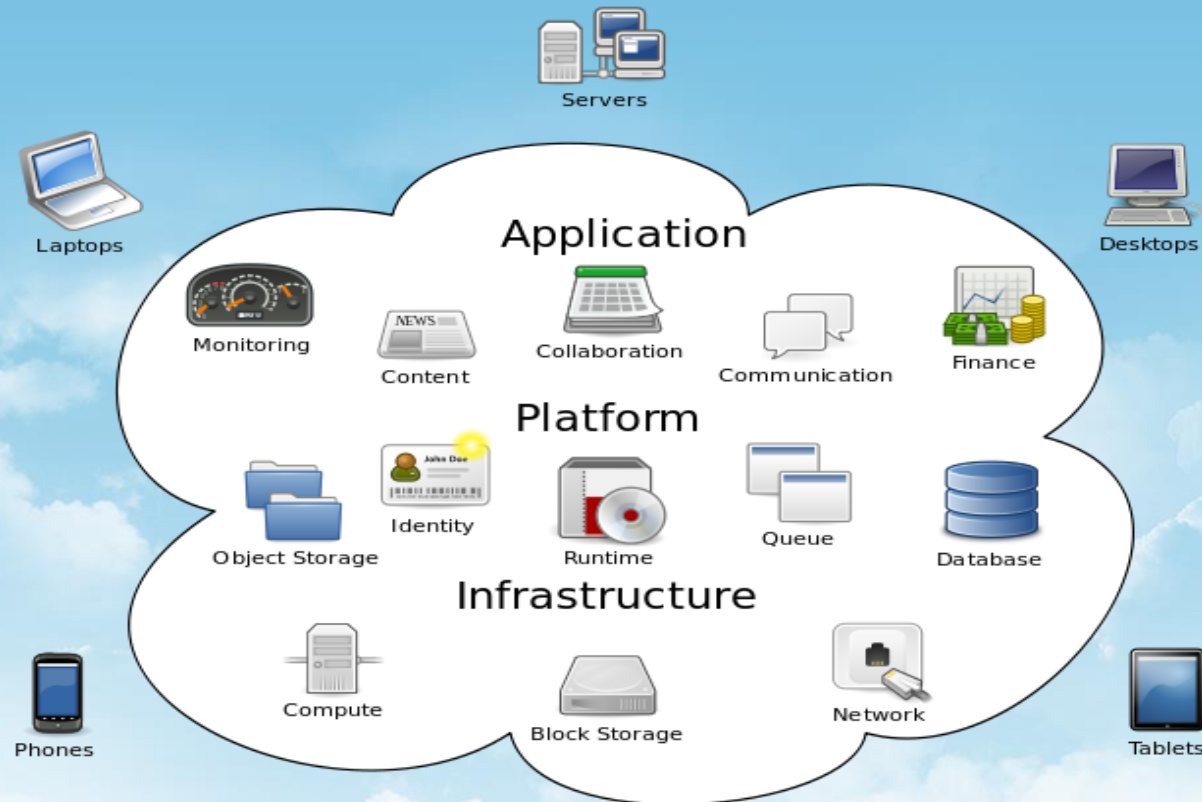


Cloud Computing

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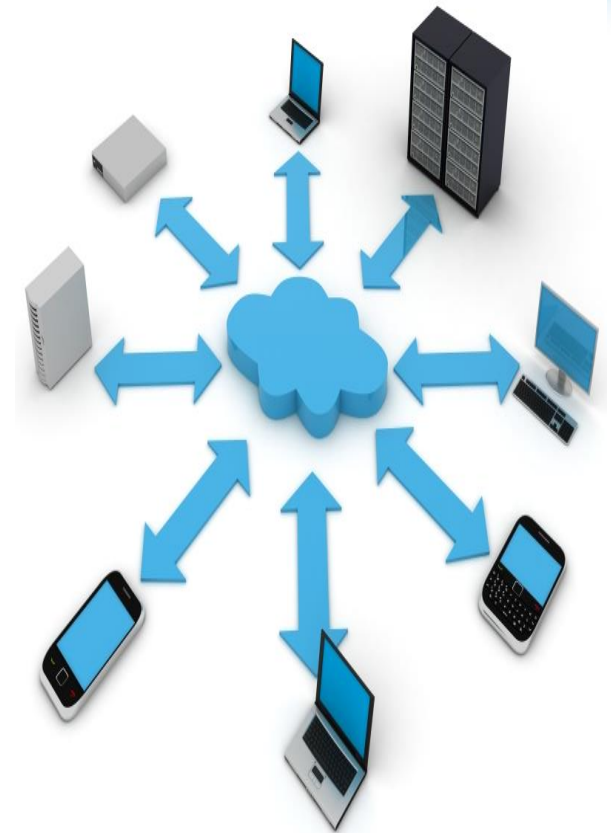


Cloud Computing

Cloud Computing

Outline

1. Introduction to distributed systems.
2. Overview of Cloud Computing; Advantages.
3. History.
4. Characteristics.
5. Service and Deployment Models.
6. Concepts of cloud computing services
 - such as Infrastructure as a Service (IaaS) Platform as a Service (PaaS) and Software as a Service (SaaS).
 - Virtualization Concepts.
 - Migration Approaches.
 - Resource.



What is Cloud Computing?



Computing and software resources that are delivered on demand, as service.

What is Cloud Computing?

- There is no unique and standard definition out there.
- However, it is generally accepted that CC refers to a new IT paradigm for users.
- “Cloud Computing is a general term used to describe a new class of network based computing that takes place over the Internet” .
- Platforms : a collection of integrated and networked hardware, software and Internet infrastructure.
- Communication and transport.
- Networking services to clients.

What is Cloud Computing?



- In addition, the platform provides on demand services, that are always on, anywhere, anytime and any place.
- Pay for use and as needed, elastic: scale up and down in capacity and functionalities.
- The hardware and software services are available to
 - general public, enterprises, corporations and businesses markets



More about cloud



- It is simply plug and play mechanism of computing.
- The word “cloud computing” is not associated with any specific technology or protocol.
- The name cloud computing was inspired by the cloud symbol that’s often used to represent the Internet in flowchart and Diagrams.
- Previous computing trends were limited to specific user but Cloud computing aims to be global, it provides services anywhere and provides IT infrastructure to external datacenter.
- Computing capabilities are provided in virtual environment.



Cloud Computing – NIST Definition:

Cloud Computing – NIST Definition:

“A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction”

What is
Cloud
Computing?

What is Cloud Computing?

facebook



Google docs



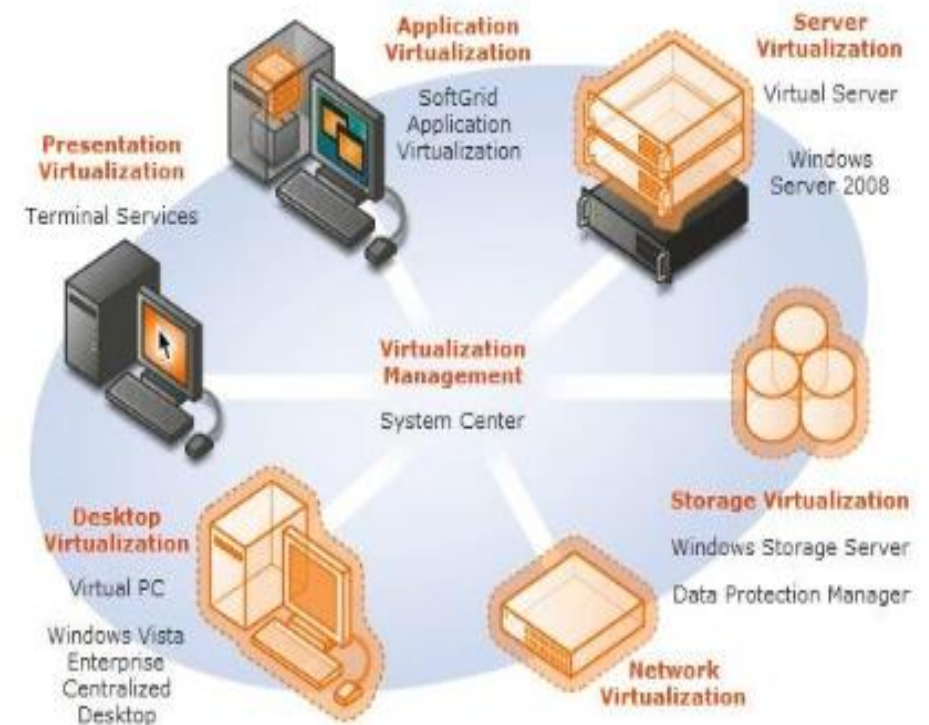
YouTube



computing ?

Common Attributes of Cloud Computing

- Pooled computing – advanced virtualization
- Delivered over the Internet
- Elastic scaling
- Flexible pricing – pay only for they use
- Provide resources as a service



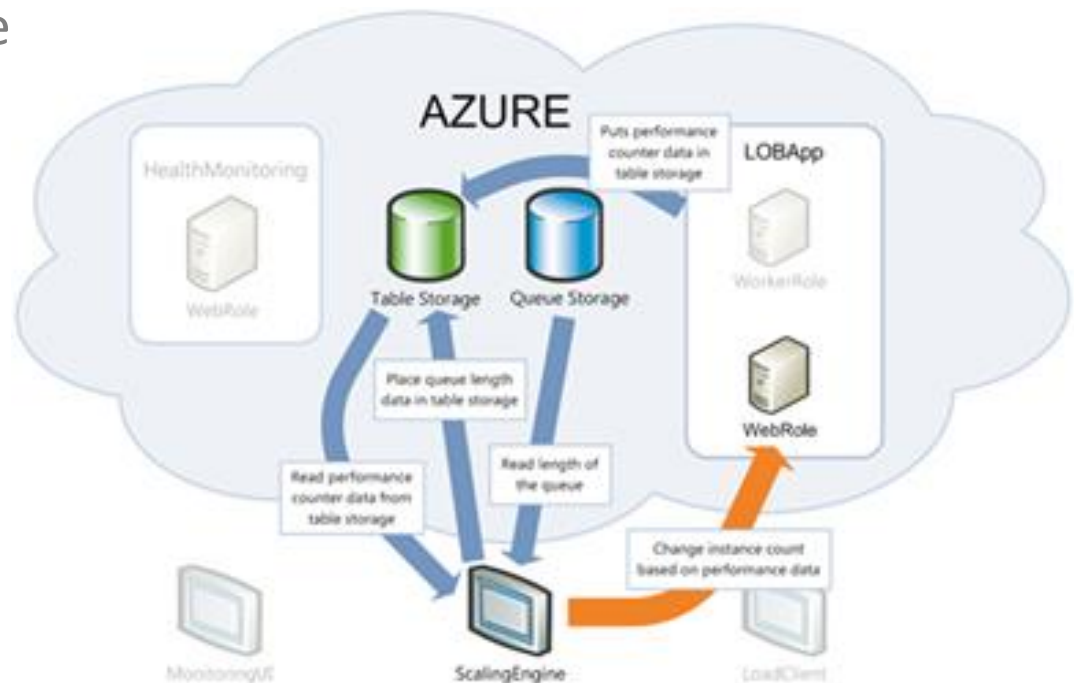
Common Attributes of Cloud Computing

- Pooled computing – advanced virtualization
- **Delivered over the Network**
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Common Attributes of Cloud Computing

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Common Attributes of Cloud Computing

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TYPES OF CLOUDS

CLOUDS:

- ❖ Private Cloud
- ❖ Public Cloud
- ❖ Community Cloud
- ❖ Hybrid Cloud

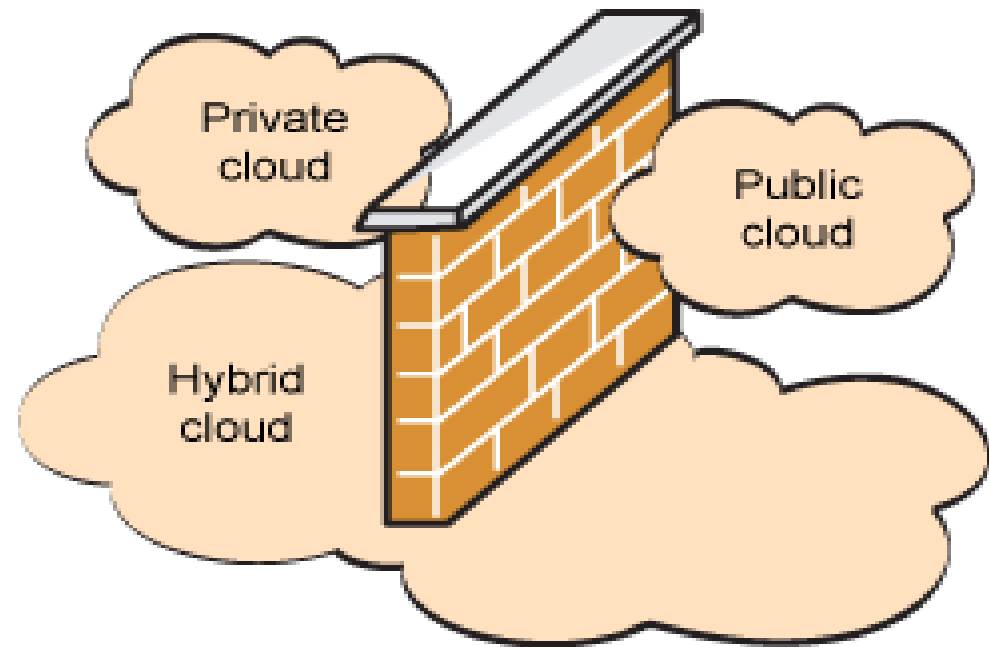
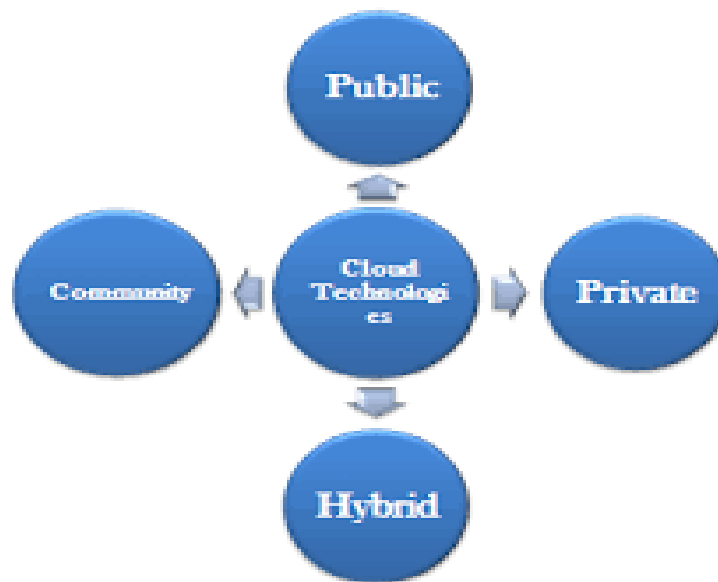


Private Cloud



Public Cloud

Enterprise firewall



Private cloud

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



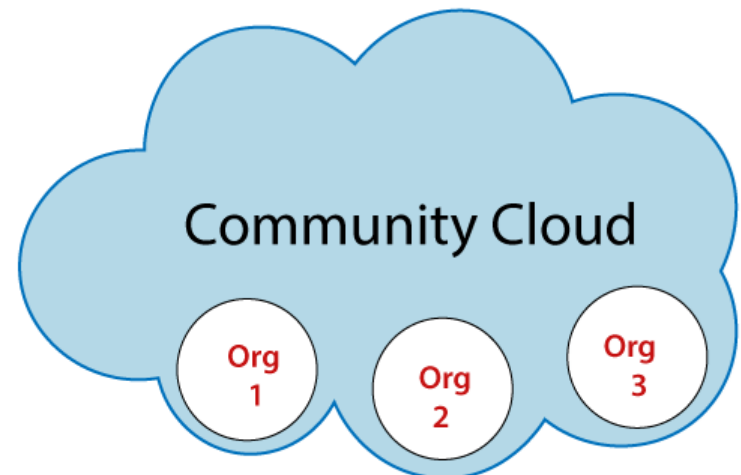
Public cloud

- **Visible to the public or large enterprises**
- **Available to clients from a third-party service provider through the Internet**



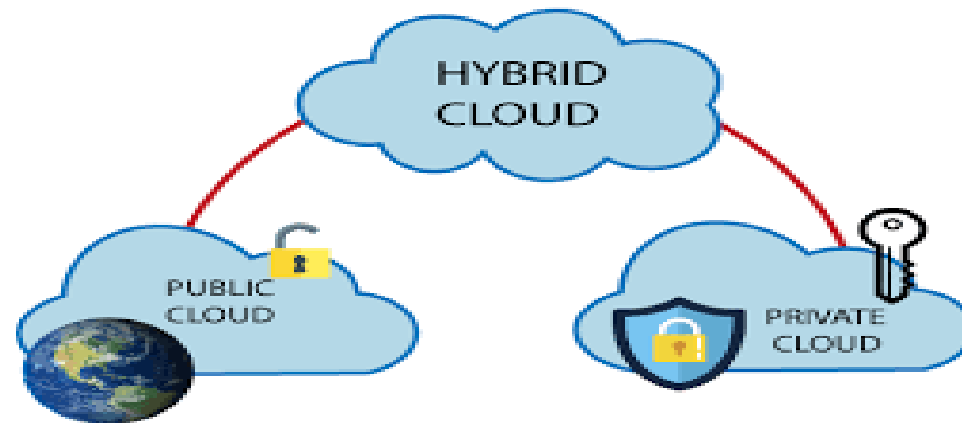
Community cloud

- Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.),
- The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.



Hybrid cloud

- Hybrid cloud is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models.
- By utilizing "hybrid cloud" architecture, companies and individuals are able to obtain degrees of fault tolerance combined with locally immediate usability without dependency on internet connectivity.



Purpose and Benefits

- Cloud computing enables companies and applications, which are system infrastructure dependent, to be infrastructure-less.
- By using the Cloud infrastructure on “pay as used and on demand”, all of us can save in capital and operational investment!
- Clients can:
 - Put their data on the platform instead of on their own desktop PCs and/or on their own servers.
 - They can put their applications on the cloud and use the servers within the cloud to do processing and data manipulations etc.

Disadvantages of Cloud Computing



- Requires a constant Internet connection:
 - Cloud computing is impossible if you cannot connect to the Internet.
- Does not work well with low-speed connections:
 - Similarly, a low-speed Internet connection, such as that found with dial-up services, makes cloud computing painful at best and often impossible.
- Stored data can be lost:
 - Theoretically, data stored in the cloud is safe, replicated across multiple machines.
 - But on the off chance that your data goes missing, you have no physical or local backup.
 - Put simply, relying on the cloud puts you at risk if the cloud lets you down.



Cloud Delivery Models

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

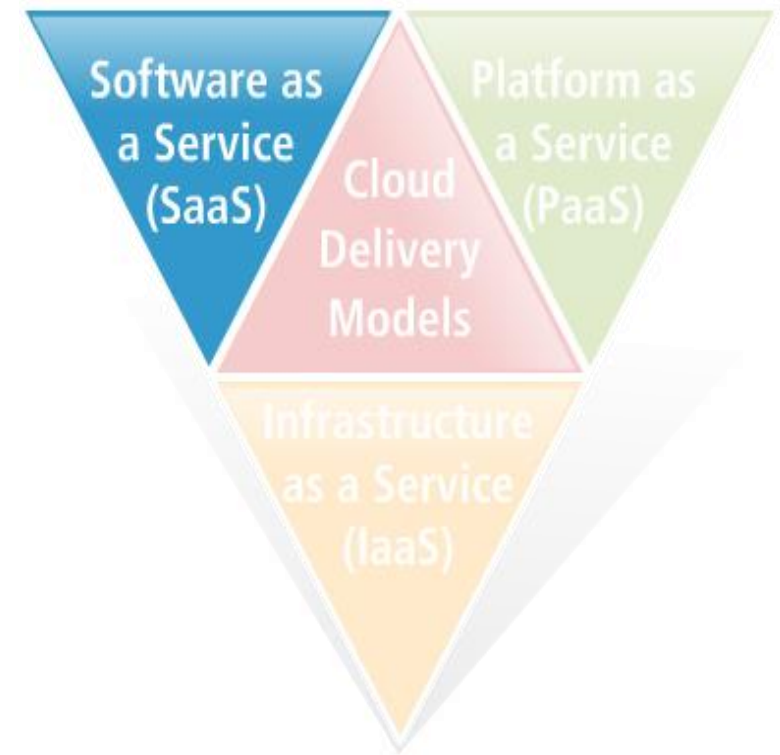
Software as a Service (SaaS)

Platform as a Service (PaaS)

Infrastructure as a Service (IaaS)

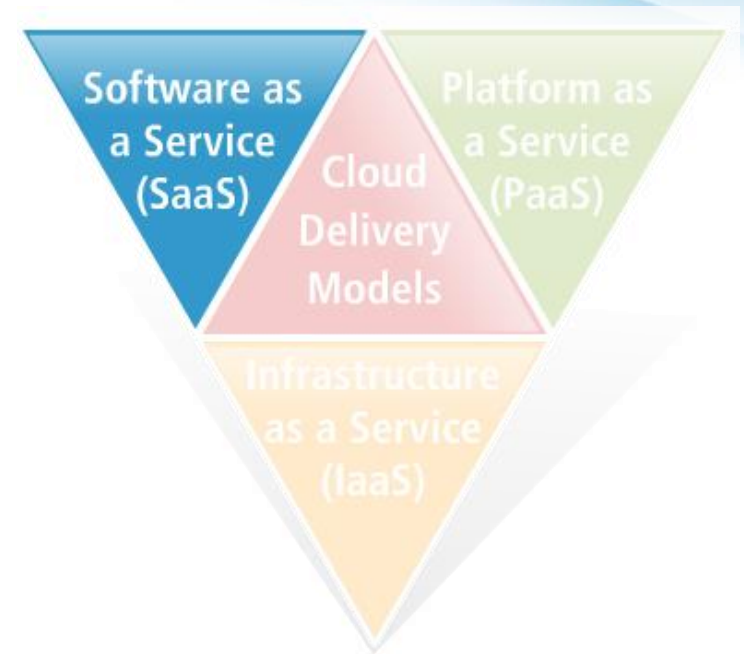
Software as a service (SaaS)

- 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**



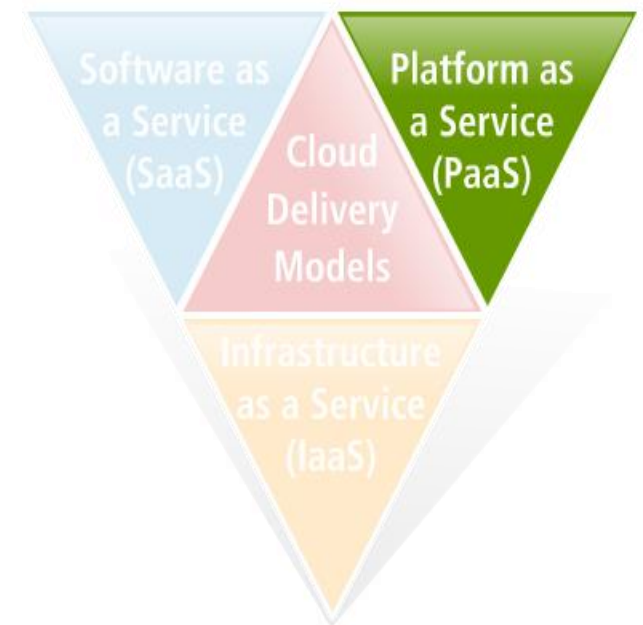
Software as a service (SaaS)

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



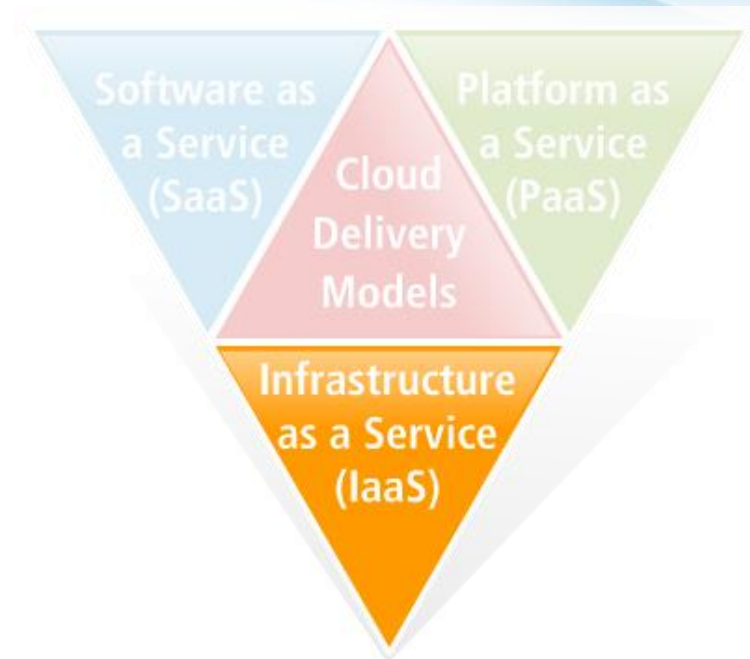
Platform as a service (PaaS)

- Platform as a Service
- Developer-created applications are **deployed** on the cloud
- **Scaling the platform** or runtime environment
- Customers do not manage their virtual machines.
- Similar to SaaS, pricing structure is **pay-as-you-use**
- PaaS example - Microsoft Windows Azure and Google App Engine









Infrastructure as a service (IaaS)

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

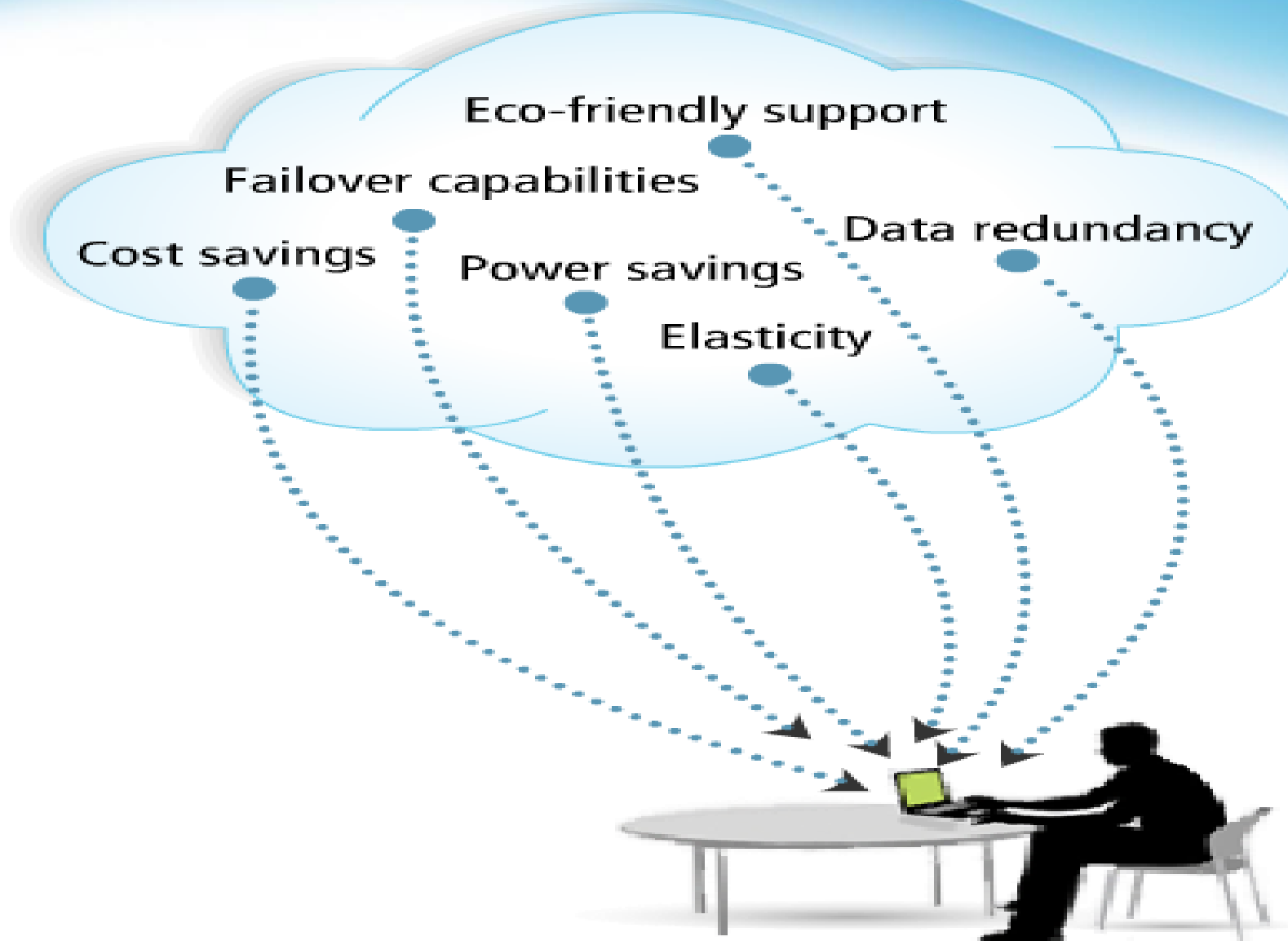


Service Delivery Model Examples

	Amazon	Google	Microsoft	Salesforce
SaaS				
PaaS				
IaaS				

Products and companies shown for illustrative purposes only and should not be construed as an endorsement

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



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

Cloud Advantages & Disadvantages



Advantages

- Reduced Hardware equipment for end users
- Improved Performance
- Lower Hardware and Software Maintenance
- Instant Software Updates
- Accessibility
- Pay for what we use

Disadvantages

- Security Issues
- Internet connection
- Features may be limited
- Location of Servers
- Speed



Key Characteristics

- On demand service
 - Shared resources
 - Measured services
 - Flexibility
 - Pay as you go
 - Simple to use
 - virtualization
- Pooled computing – advanced virtualization
 - Delivered over the Internet
 - Elastic scaling
 - Flexible pricing – pay only for they use
 - **Provide resources as a service**

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 main cloud deployment models namely private and public.

Measured service

- The amount of cloud resources used by a consumer can be Monitored and billed automatically for usage of that particular session.
- Resource usage can be monitored, controlled, and reported by providing transparency for both the provider and consumer of the utilized service

Virtualization

- The ability to run multiple operating systems on a single physical system and share the underlying hardware resources. This features reduce the hardware and human resource cost .
- Applications are decoupled from the underlying hardware. Multiple applications can run on one computer (virtualization a la VMWare) or multiple computers can be used to run one application (grid computing).



How does it works?

- Nothing is local
- Data is uploaded
- Stored in data centers or data farms
- Data is copied several times over
- Very difficult to lose