

Cloud Computing

Common Use Cases for Infrastructure



- Web site / Application hosting
- Mobile and Social Applications
- Internal IT application hosting
- Content delivery and media distribution
- High performance computing, batch data processing, and large scale analytics
- Storage, backup, and disaster recovery
- Development and test environments

Data Center





Virtualization Concept

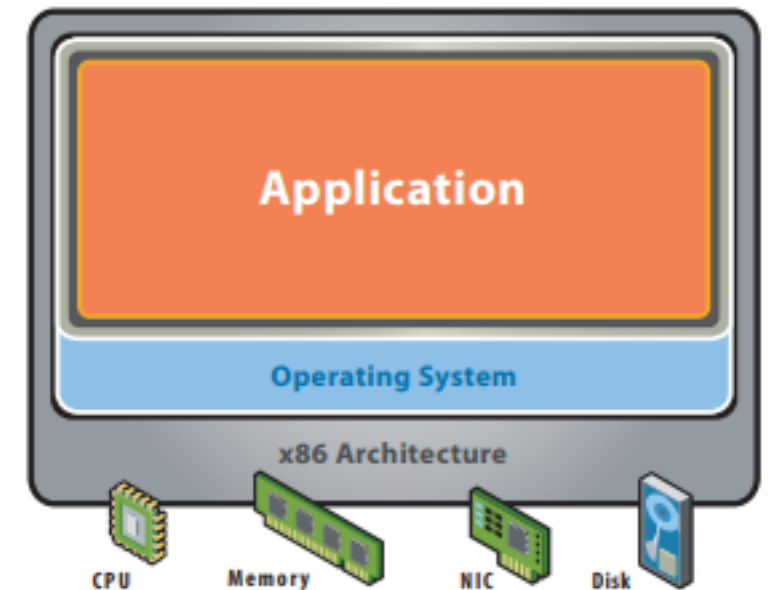


- Creating a virtual machine over existing operating system and hardware is referred as **Virtualization**.
- Virtual Machines provide an environment that is **logically** separated from the underlying hardware.
- The machine on which the virtual machine is created is known as **host machine** and **virtual machine** is referred as a **guest machine**.
- This virtual machine is managed by a software or firmware which is known as **hypervisor**.

Before Virtualization



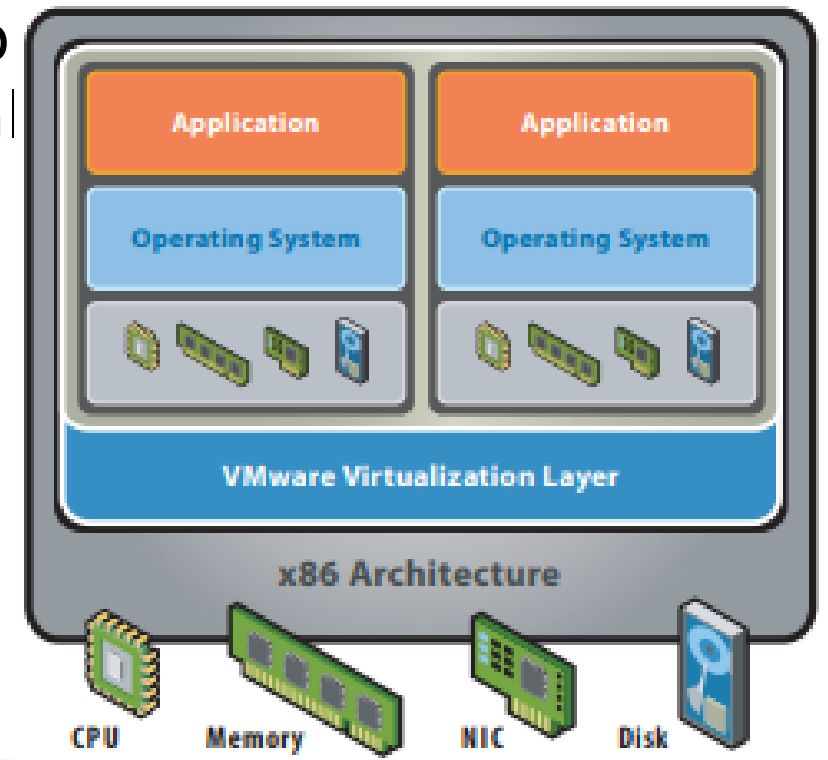
- Single OS image per machine
- Software and hardware tightly coupled
- Running multiple applications on same machine often creates conflict
- Underutilized resources
- Inflexible and costly infrastructure



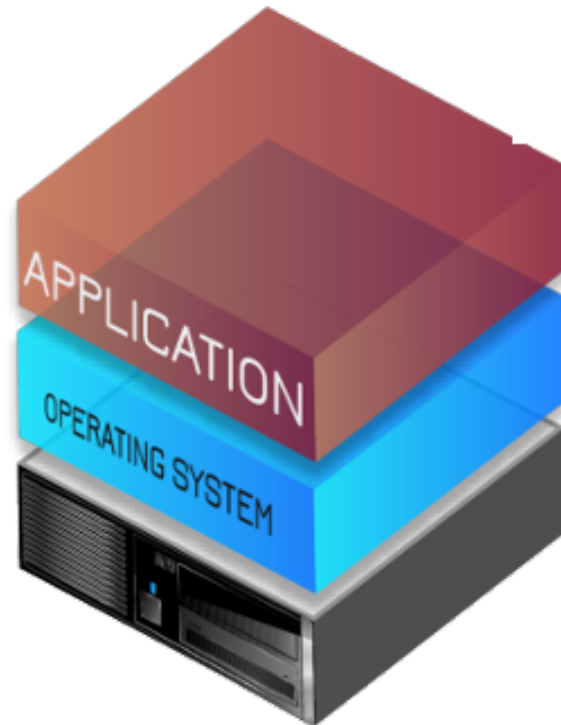
After Virtualization



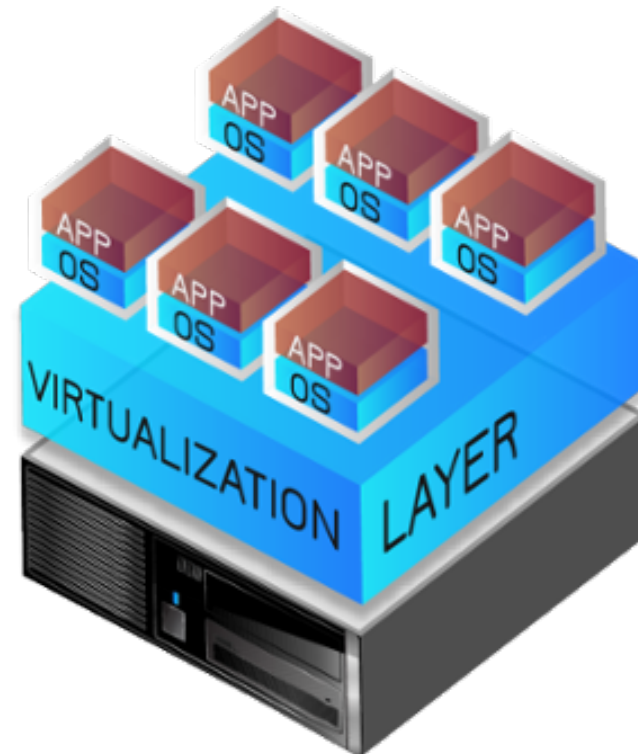
- Hardware-independence of operating system and applications
- Virtual machines can be provisioned to any system
- Can manage OS and application encapsulating them into virtual



Virtualization



**Traditional Server
Architecture**



**Virtualized Server
Architecture**

Virtualization Approaches



- **Hosted Architecture**

Installs and runs as an application

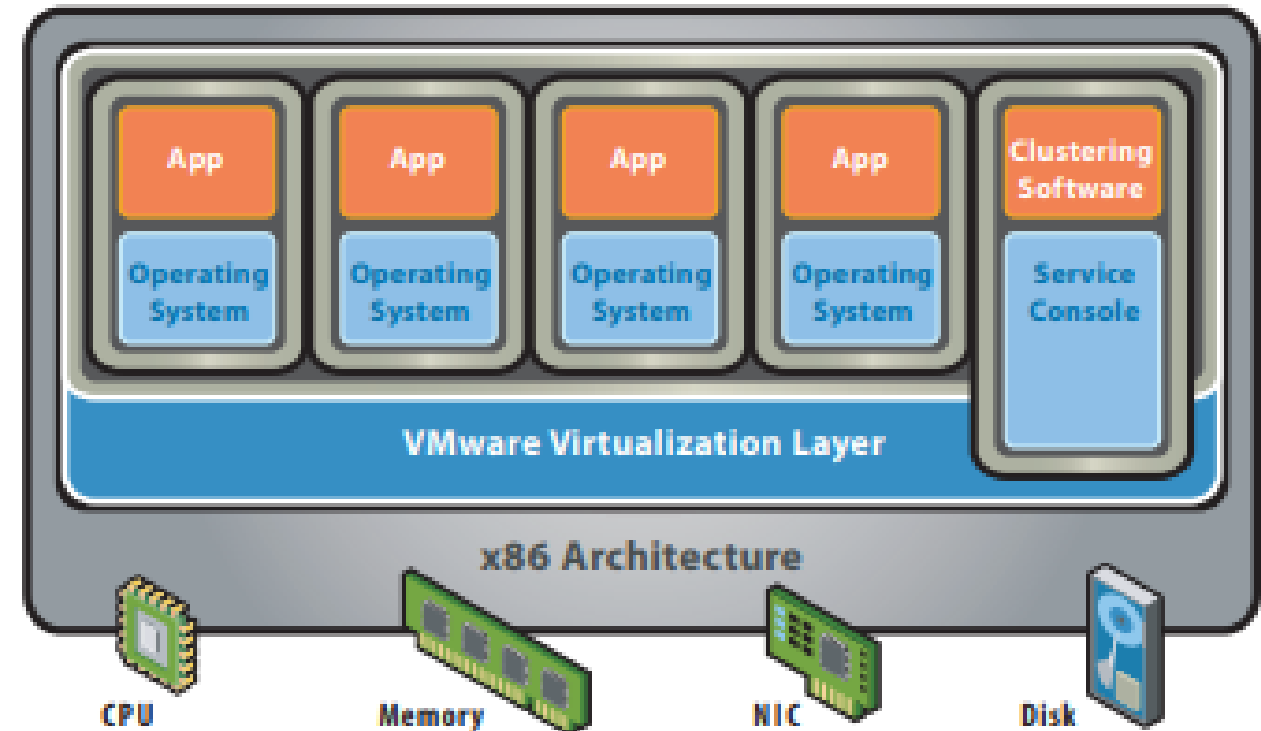
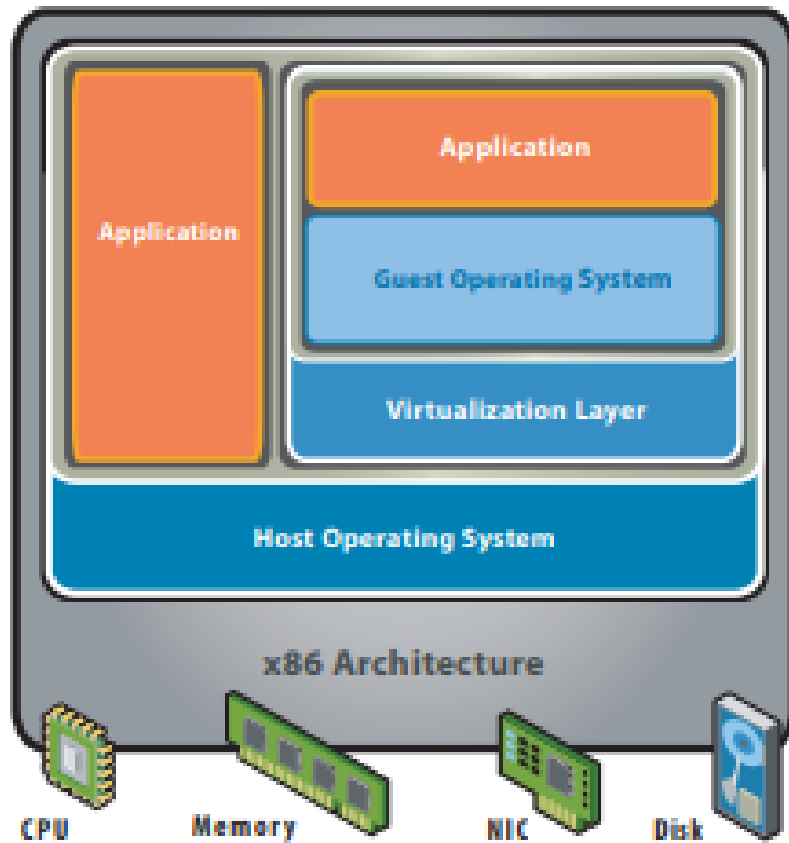
Relies on host OS for device support and physical resource management

- **Bare Metal (Hypervisor) Architecture**

A bare-metal virtualization hypervisor does not require admins to install a server operating system first.

Bare-metal virtualization means the hypervisor has direct access to hardware resources, which results in better performance, scalability and stability

Virtualization Approaches







Where is the CLOUD ?



Cloud computing is currently the buzzword in IT industry, and many are curious to know what cloud computing is and how it works.

More so because the term CLOUD is intriguing and some people even wonder how do clouds that rain can even remotely be used in Computing.

Cloud is like this? 🌴



What is Cloud ?

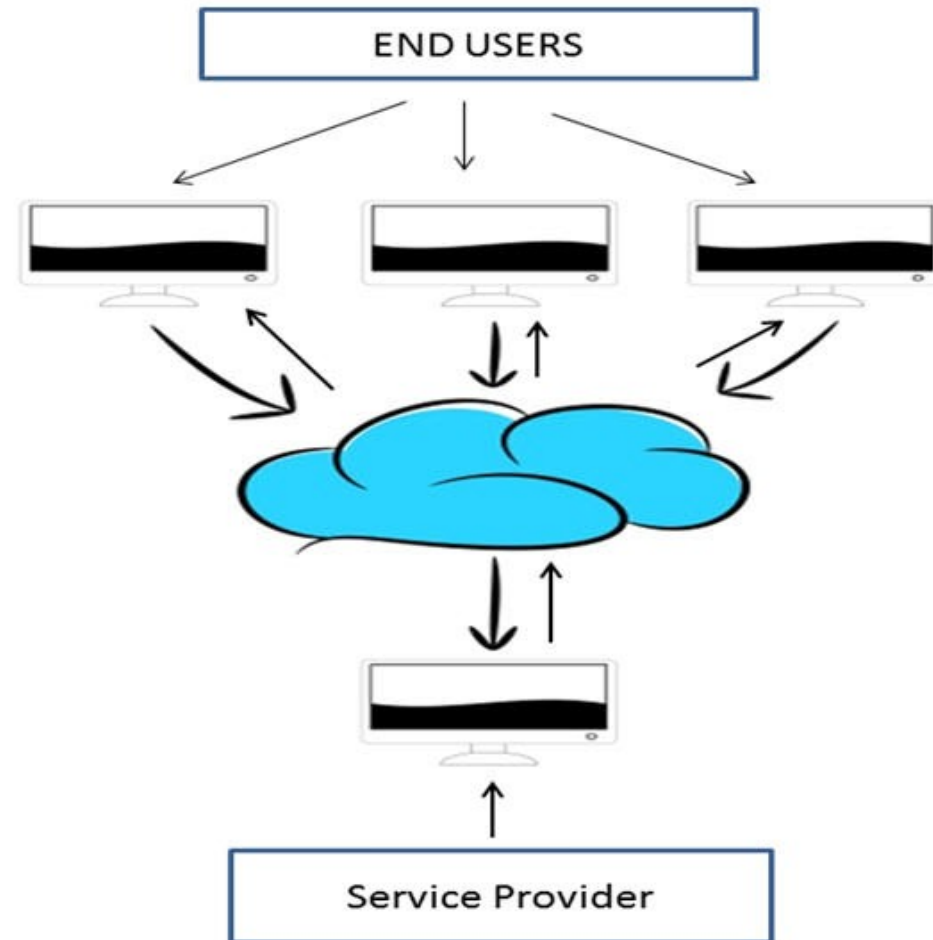


The term **Cloud** refers to a **Network** or **Internet**. In other words, we can say that Cloud is something, which is **present at remote location**.

Cloud can provide services over public and private networks

Cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive.

Why the Name Cloud ?





What is Cloud Computing ?



Cloud Computing is simply – the ability to use network of remote servers to store , manage and process the data.

Cloud computing is the delivery of shared computing resources, software or data — as a service and on-demand through the internet.

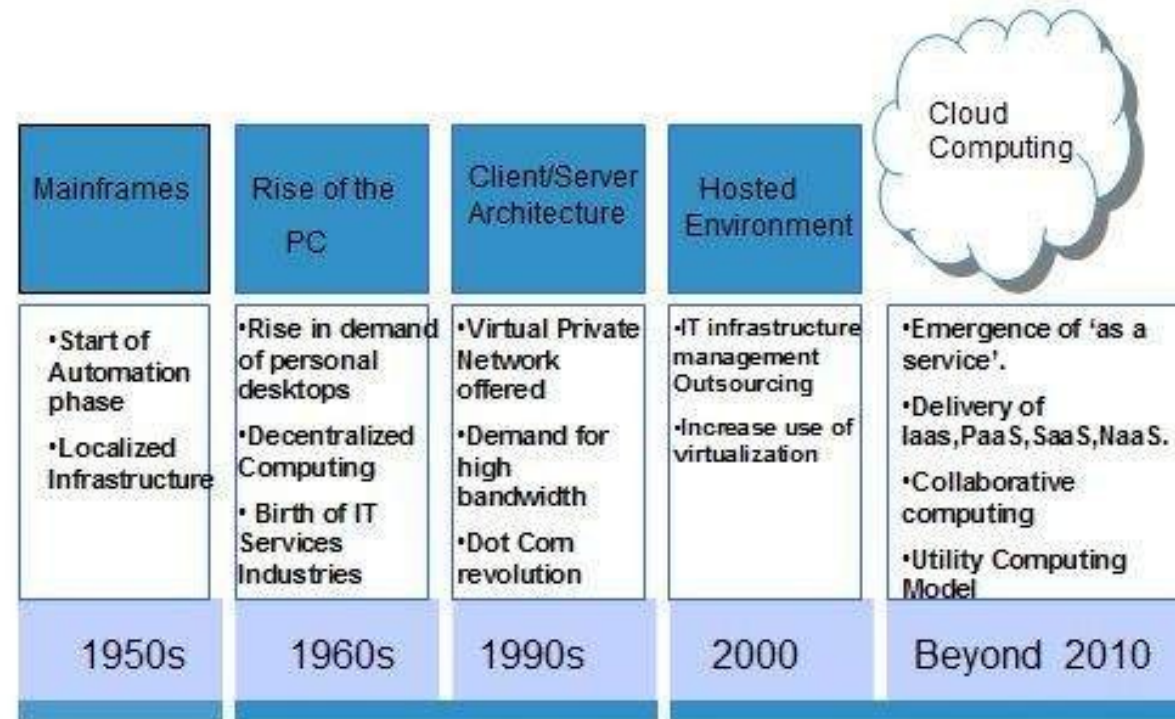
Cloud Computing refers to manipulating, configuring, and accessing the hardware and software resources remotely. It offers online data storage, infrastructure, and application.

- Example: AWS, Azure, Google Cloud

What is Cloud Computing ?



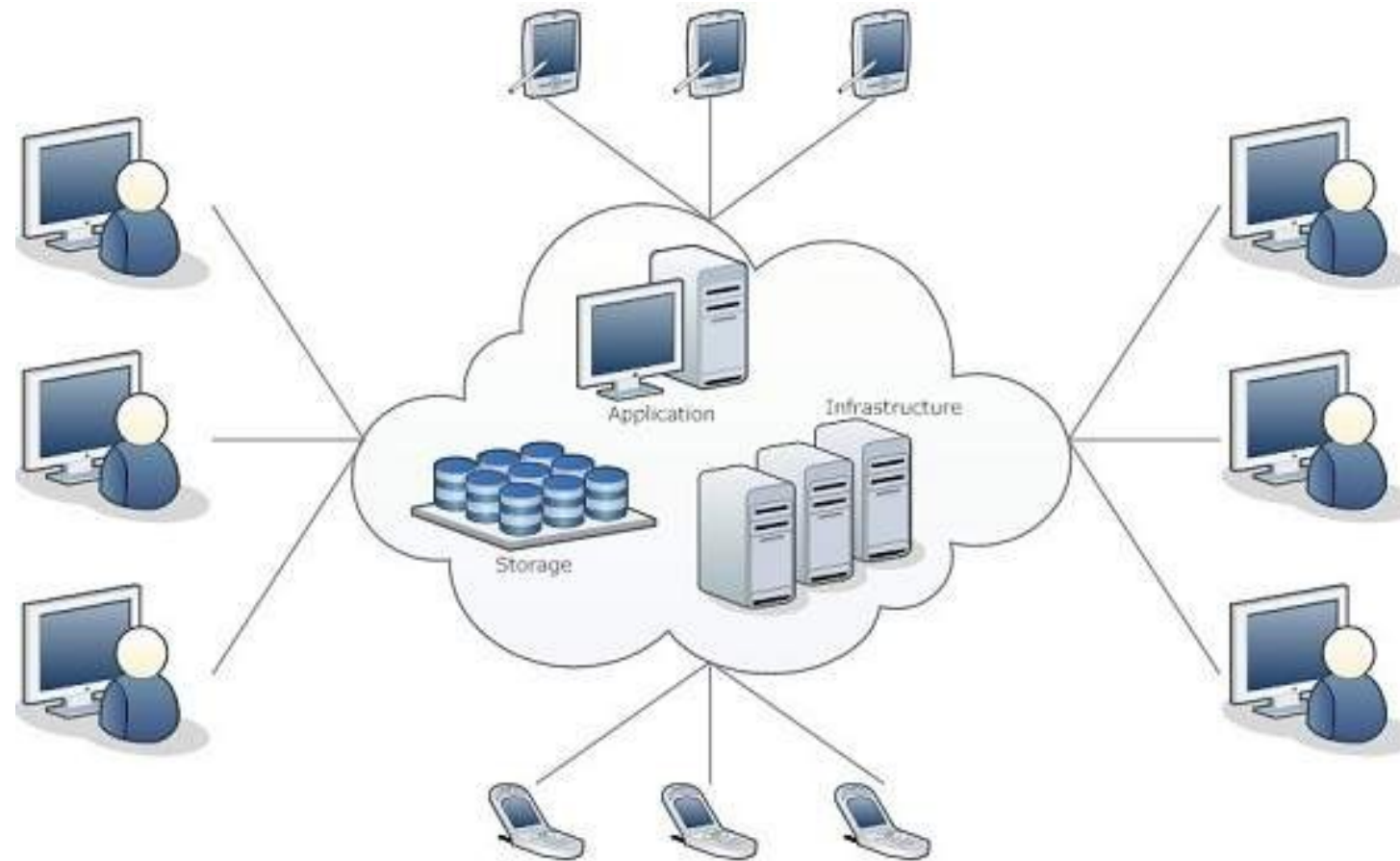
- The concept of **Cloud Computing** came into existence in the year 1950 with implementation of mainframe computers, accessible via **thin clients**. Since then, cloud computing has been evolved from thin clients to dynamic ones and from software to services. The following diagram explains the evolution



Areil view of Cloud Computing



Conceptual view of Cloud Computing



Basic Concepts of Cloud



There are certain **services** and **models** working behind the scene making the cloud computing feasible and accessible to end users. Following are the **working models** for cloud computing:

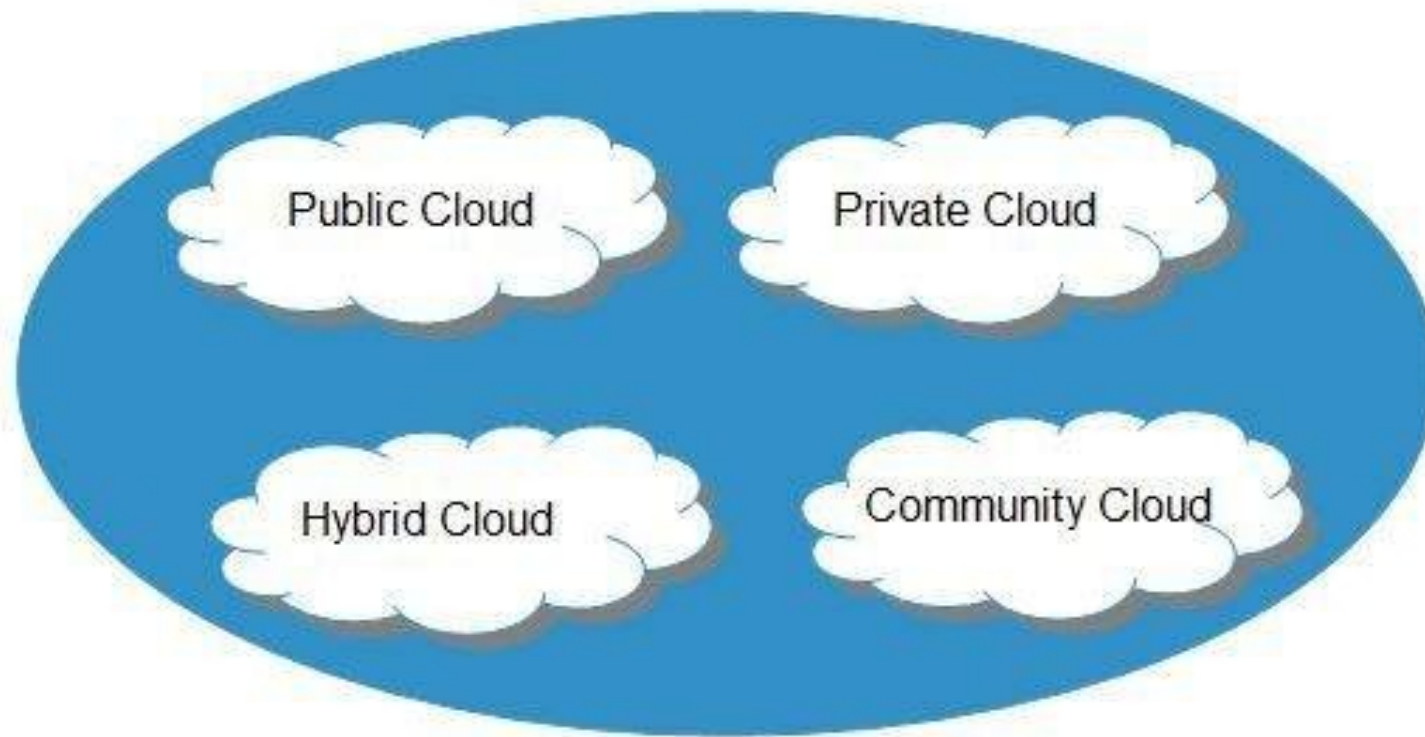
- **Deployment Models**

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

- **Service Models**

- IAAS
- PAAS
- SAAS
- Anything-as-a-Service (XaaS) is yet another service model, which includes Network-as-a-Service, Business-as-a-Service, Identity-as-a-Service, Database-as-a-Service or Strategy-as-a-Service.

Types of Cloud



Deployment Models



- **PUBLIC CLOUD**

The **public cloud** allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness.

- **PRIVATE CLOUD**

The **private cloud** allows systems and services to be accessible within an organization. It is more secured because of its private nature.

- **COMMUNITY CLOUD**

The **community cloud** allows systems and services to be accessible by a group of organizations.

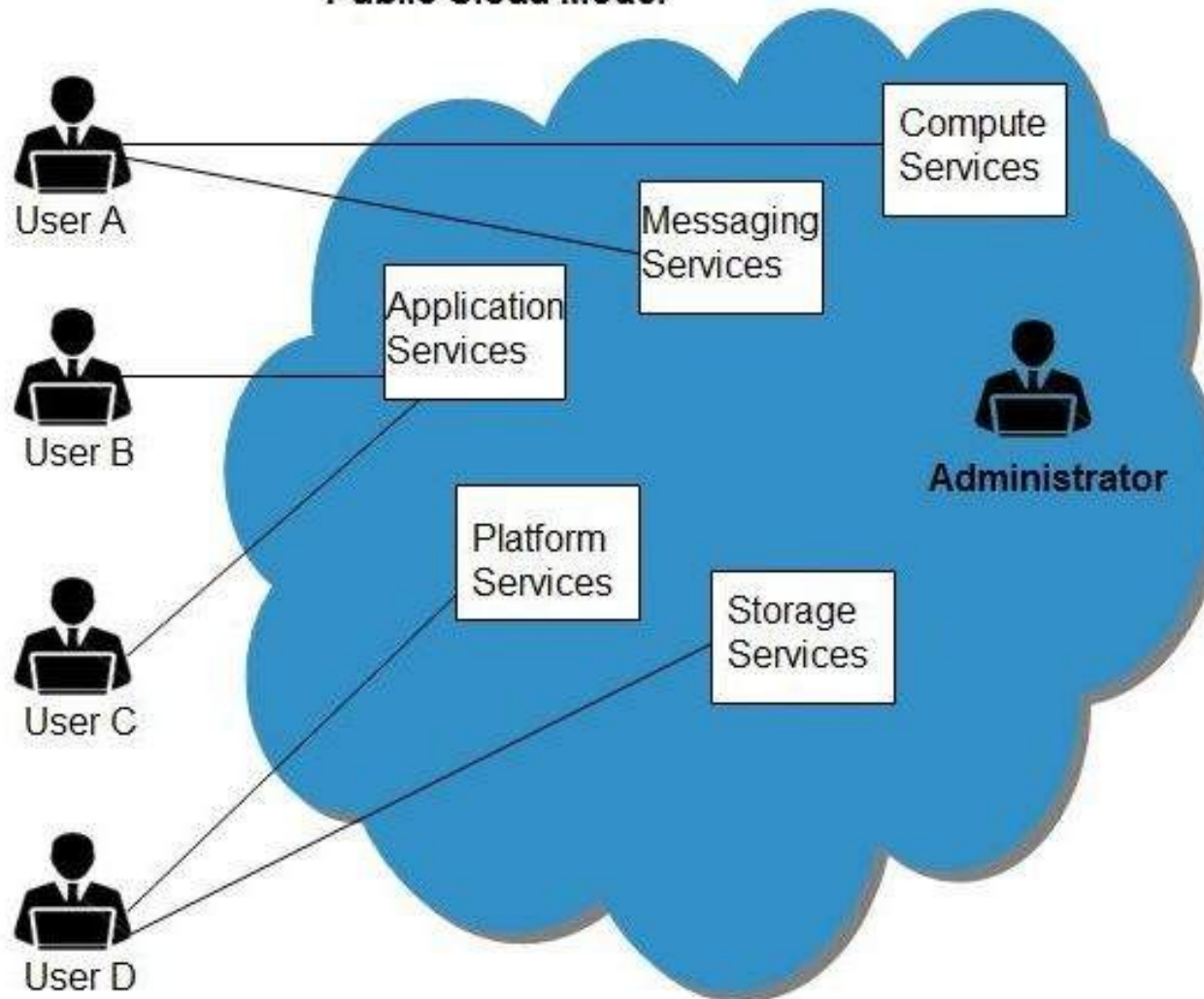
- **HYBRID CLOUD**

The **hybrid cloud** is a mixture of public and private cloud, in which the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

Types of Cloud



Public Cloud Model



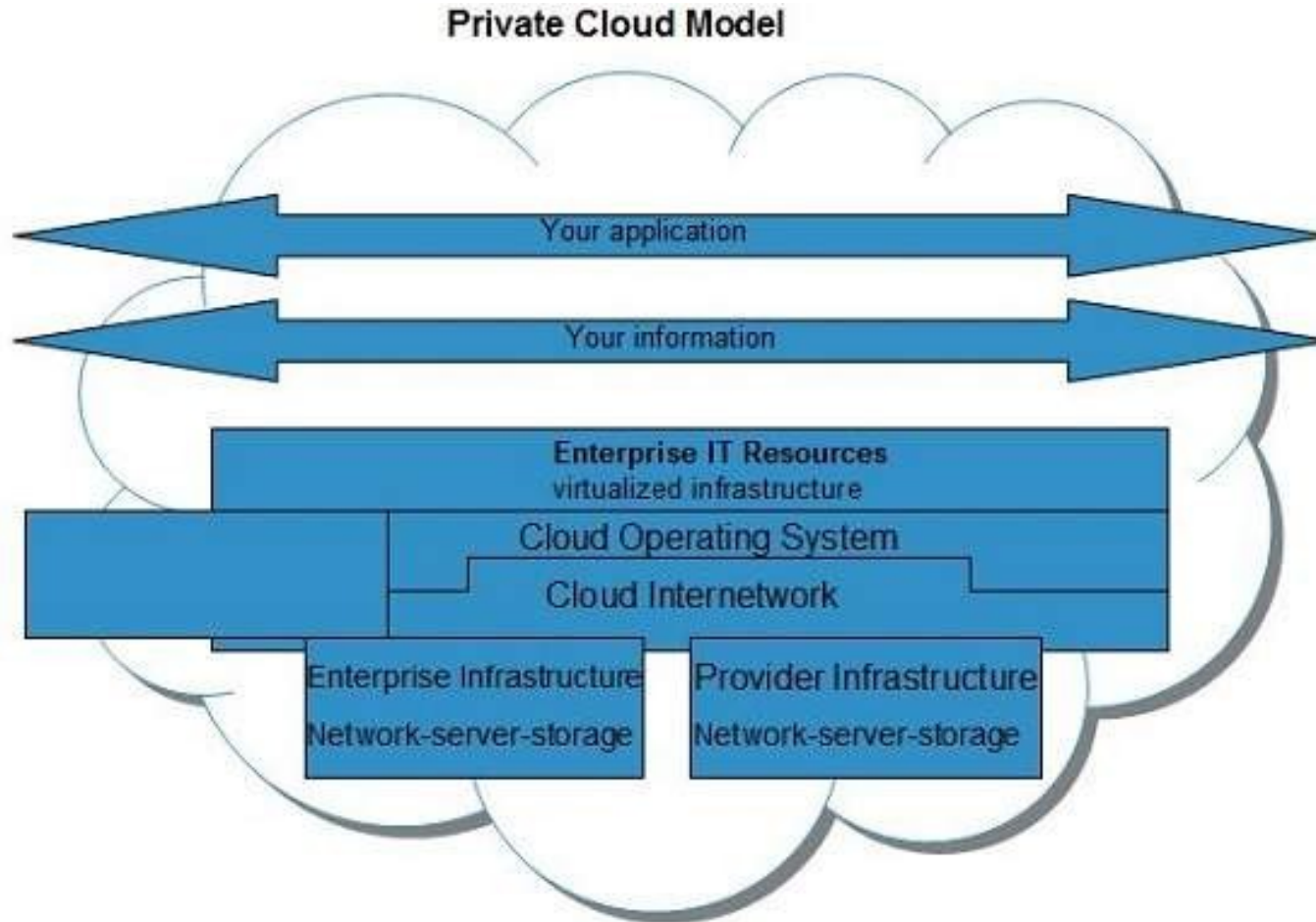
BENEFITS

- Cost Effective
- Reliability
- Flexibility
- Location Independence
- Utility Style Costing
- High Scalability

DISADVANTAGES

- Low Security
- Less customizable

Types of Cloud



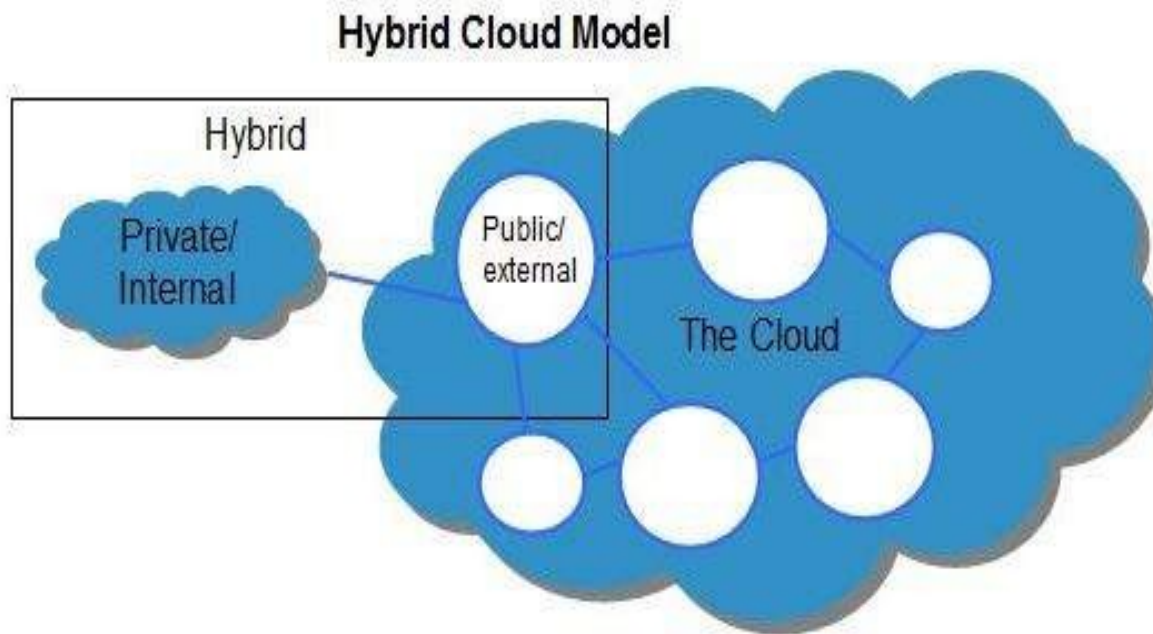
BENEFITS

- Higher Security and Privacy
- More Control
- Cost and energy efficiency

DISADVANTAGES

- Restricted Area
- Inflexible Pricing
- Limited Scalability
- Additional Skills

Types of Cloud



BENEFITS

- Higher Security and Privacy
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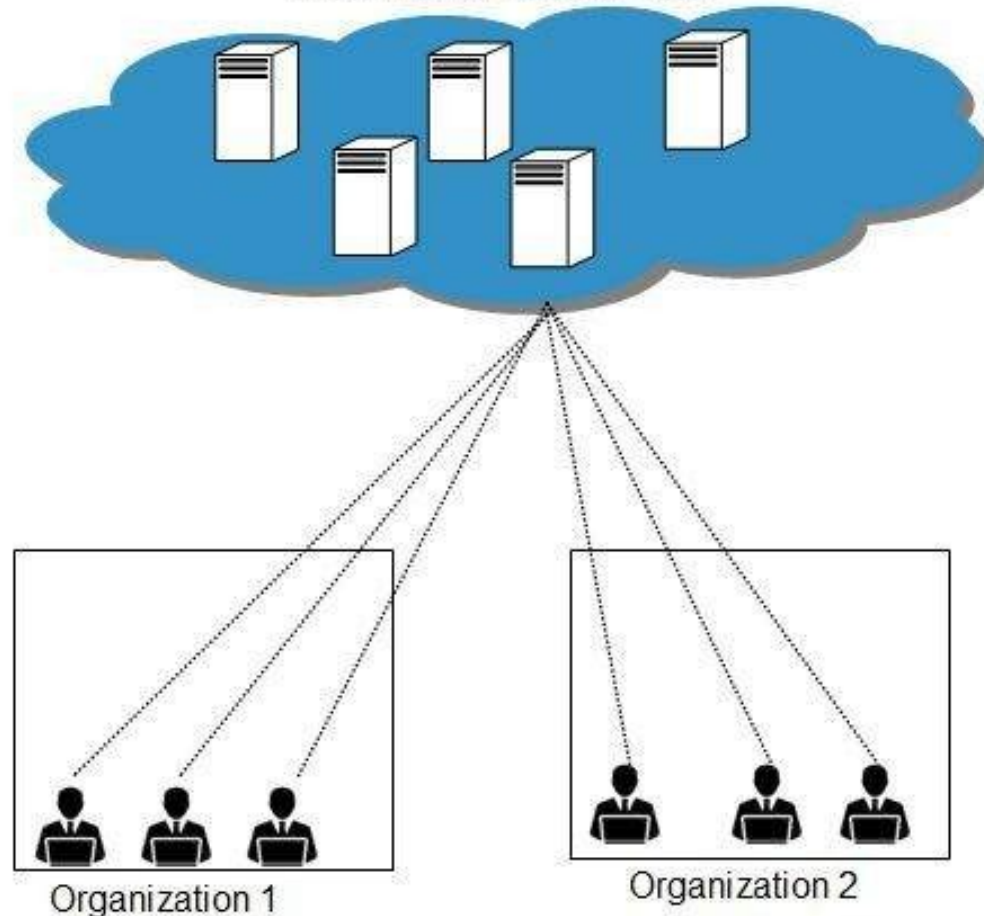
DISADVANTAGES

- Restricted Area
- Inflexible Pricing
- Limited Scalability
- Additional Skills

Types of Cloud



Community Cloud Model



BENEFITS

- Cost effective
- Sharing Between Organizations
- Security

ISSUES

- Since all data is housed at one location, therefore one must be careful in storing data in community cloud because it might be accessible by others.
- It is also challenging to allocate responsibilities of governance, security and cost.

Service Models



- **INFRASTRUCTURE-AS-A-SERVICE (IAAS)**

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

- **PLATFORM-AS-A-SERVICE (PAAS)**

Deploy application without managing virtual servers (Google App Engine, , AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com)

- **SOFTWARE-AS-A-SERVICE (SAAS)**

Ready to use software applications (Gmail, Office365, Google Apps, Dropbox, Salesforce, Cisco WebEx, Concur, GoToMeeting)

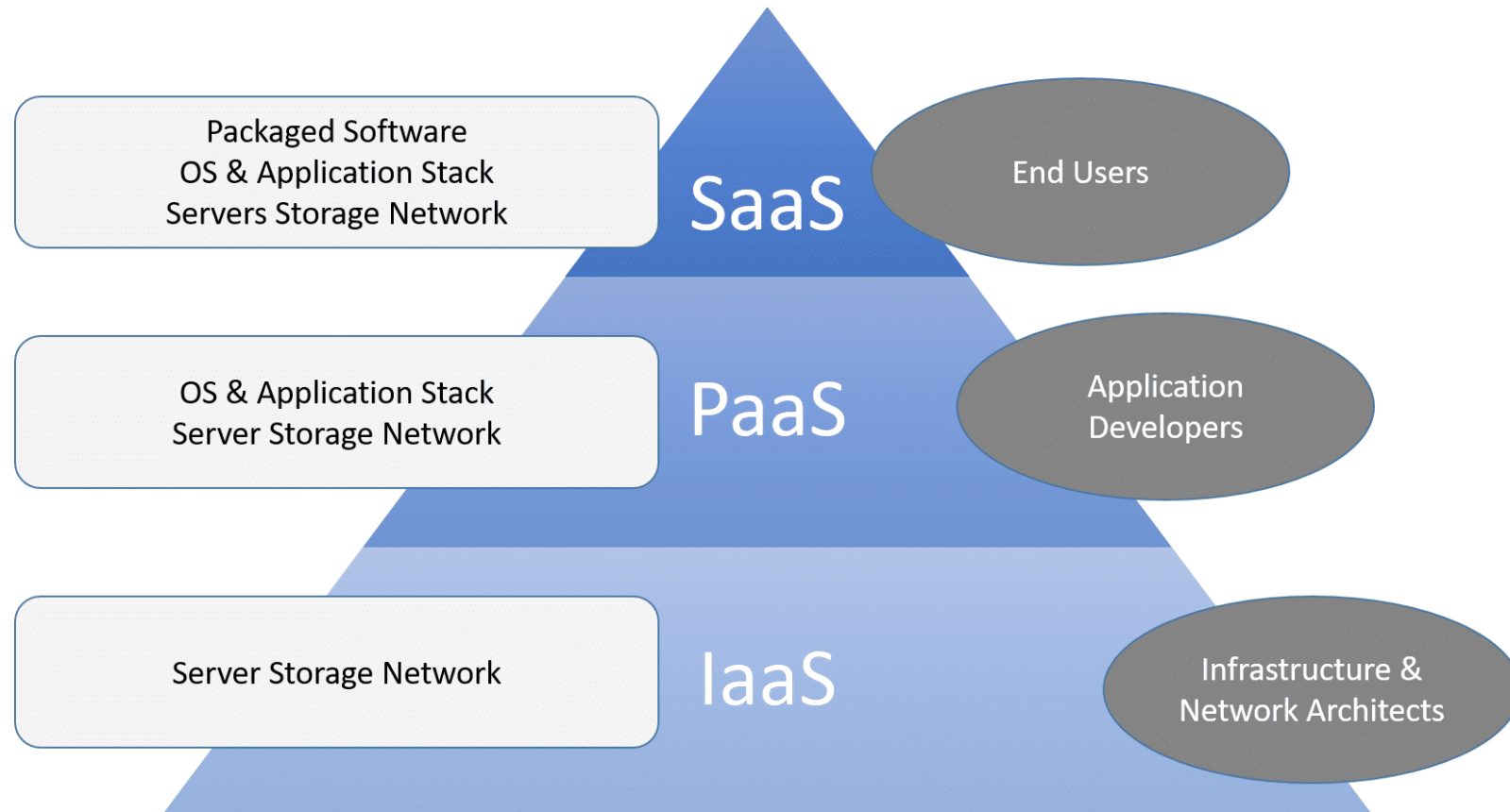


Cloud Computing

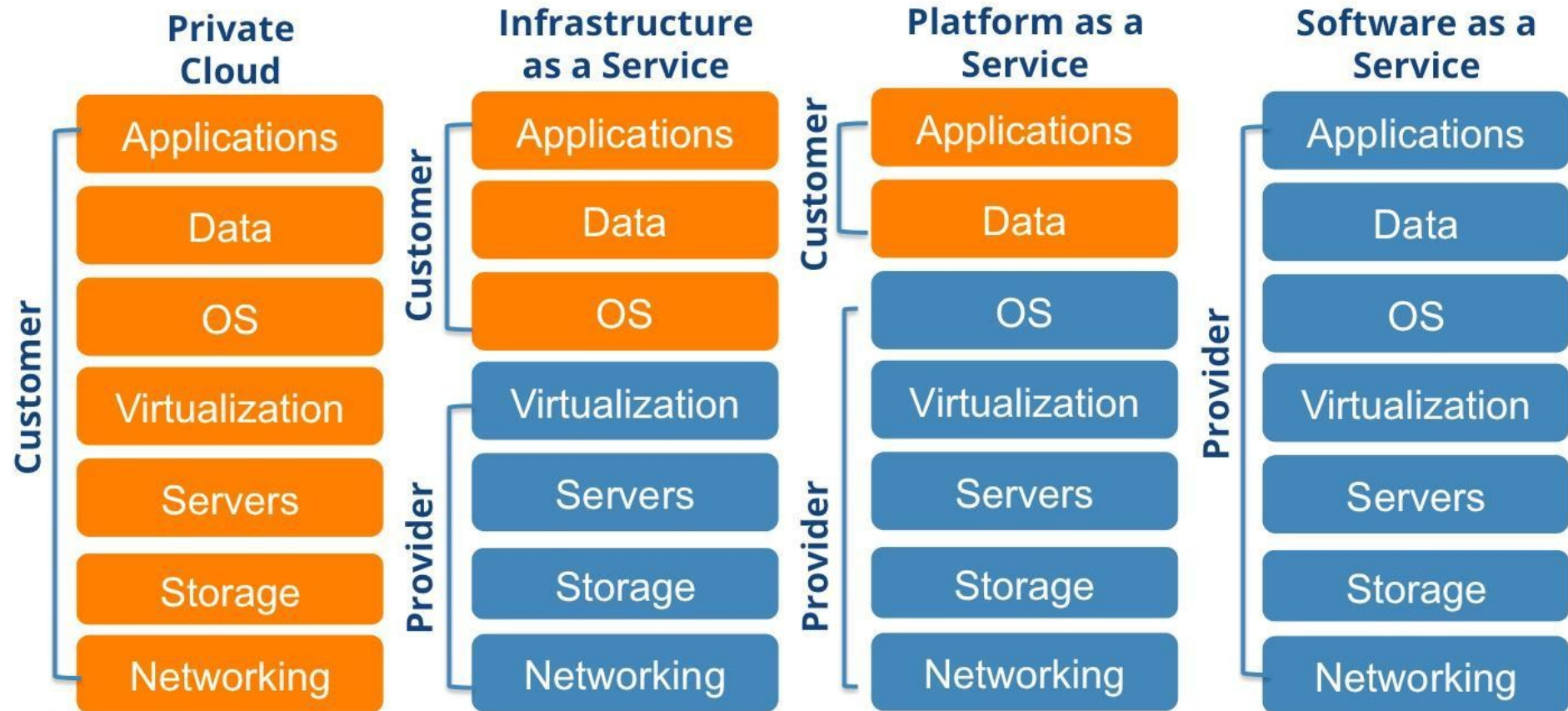




Cloud Service Models



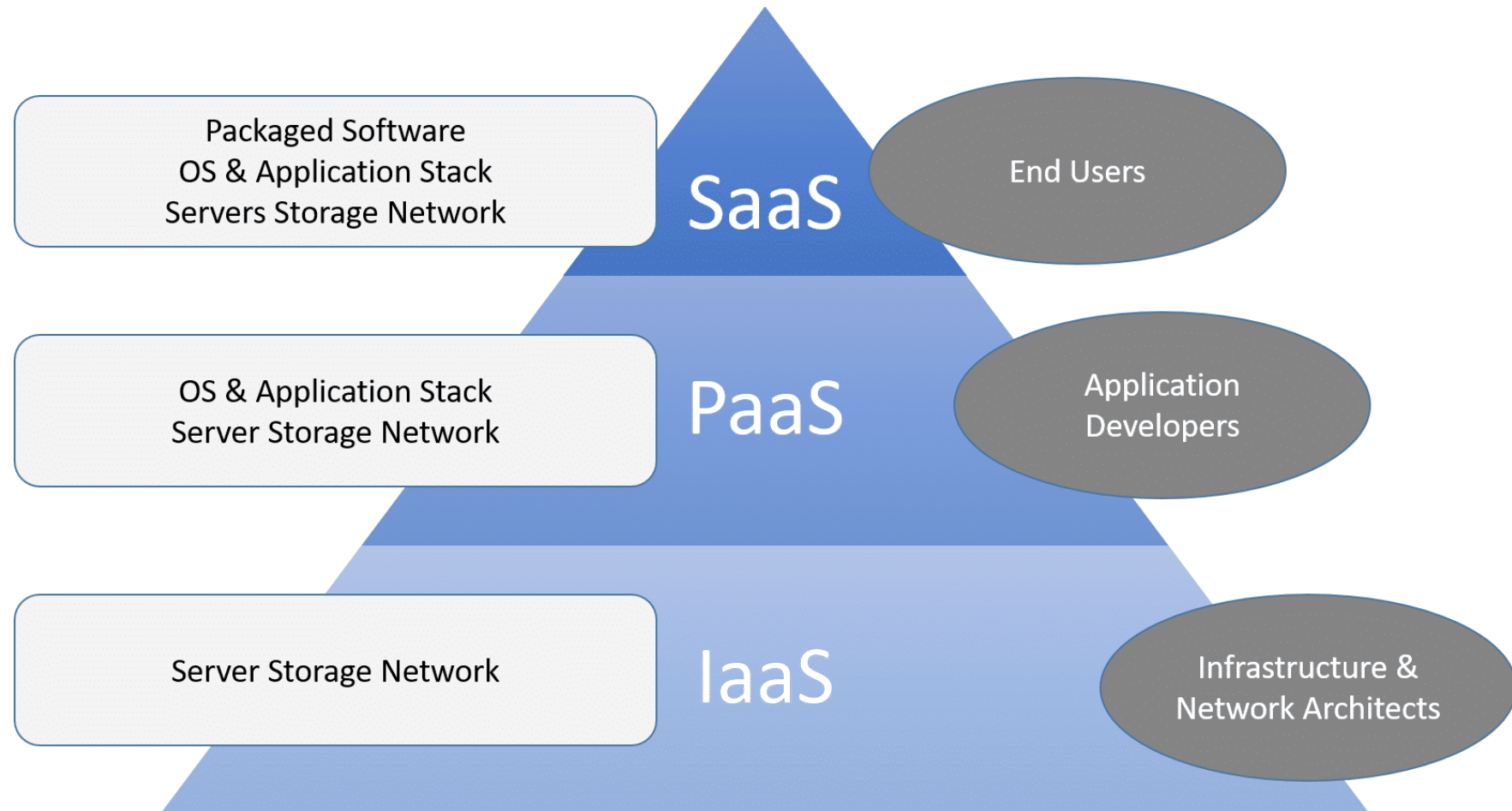
Shared Model



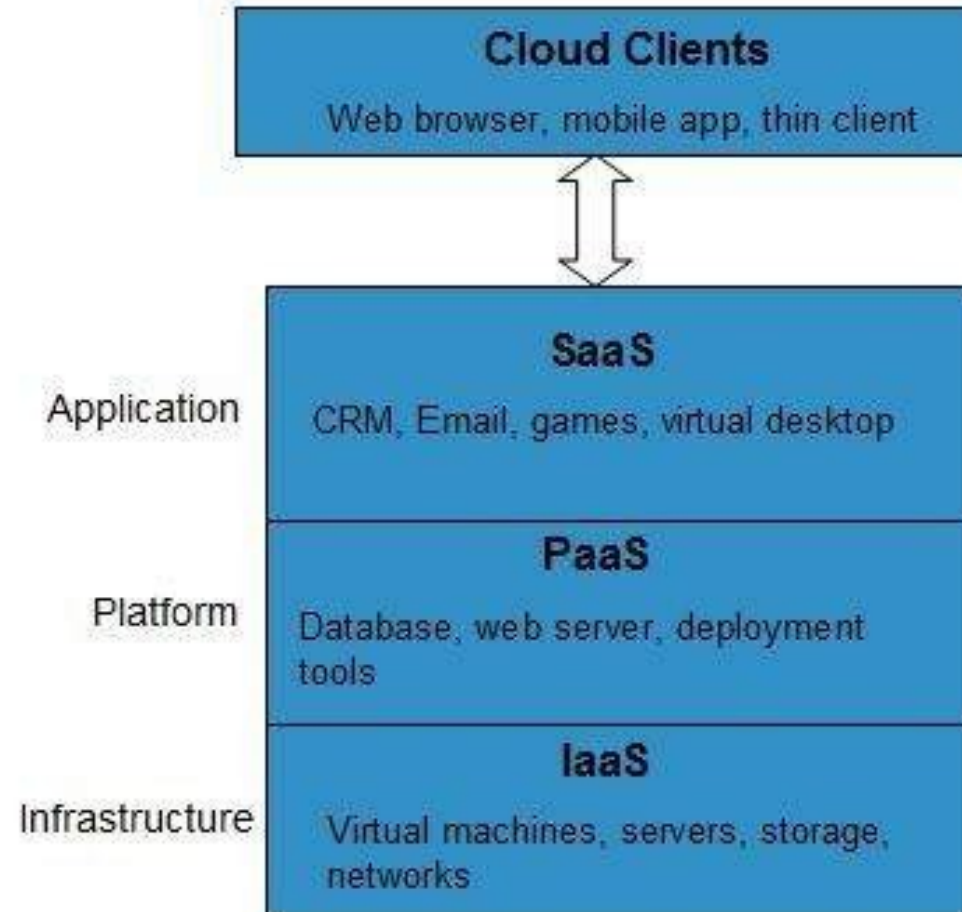
Service Models



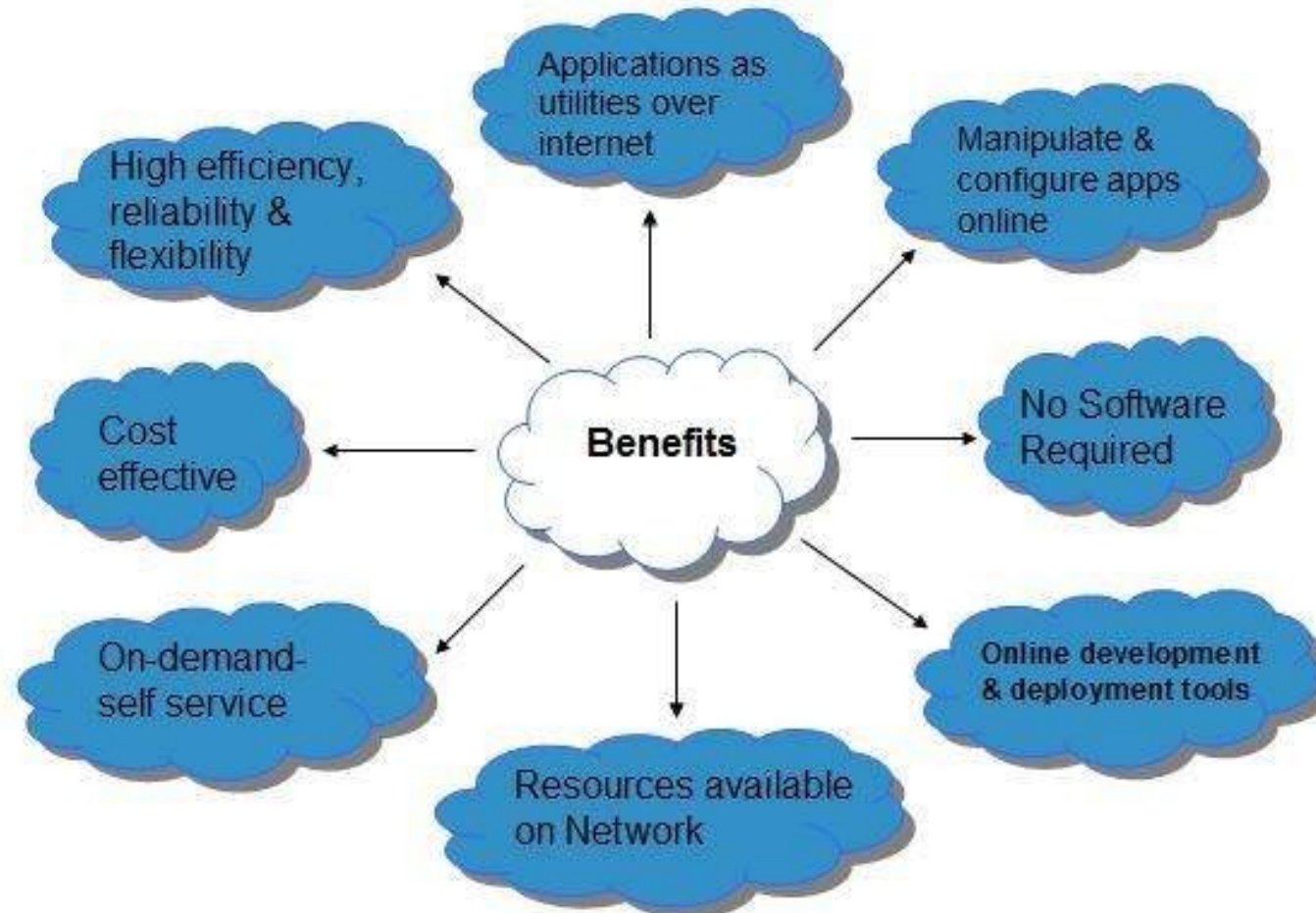
Cloud Service Models



Service Models



Benifits



Benefits of Cloud Computing



Cloud Computing has numerous advantages. Some of them are listed below -

- One can access applications as utilities, over the Internet.
- One can manipulate and configure the applications online at any time.
- It does not require to install a software to access or manipulate cloud application.
- Cloud Computing offers online development and deployment tools, programming runtime environment through **PaaS model**.
- Cloud resources are available over the network in a manner that provide platform independent access to any type of clients.
- Cloud Computing offers **on-demand self-service**. The resources can be used without interaction with cloud service provider.
- Cloud Computing is highly cost effective because it operates at high efficiency with optimum utilization. It just requires an Internet connection
- Cloud Computing offers load balancing that makes it more reliable.

Benefits of Cloud Computing



The potential for cost saving is the major reason of cloud services adoption by many organizations. Cloud computing gives the freedom to use services as per the requirement and pay only for what you use. Due to cloud computing it has become possible to run IT operations as a outsourced unit without much in-house resources.

- Lower IT infrastructure and computer costs for users
- Improved performance
- Fewer Maintenance issues
- Instant software updates
- Improved compatibility between Operating systems
- Backup and recovery
- Performance and Scalability
- Increased storage capacity
- Increase data safety

Risks related to Cloud Computing



Although cloud Computing is a promising innovation with various benefits in the world of computing, it comes with risks. Some of them are discussed below:

- **Security and Privacy**

It is the biggest concern about cloud computing. Since data management and infrastructure management in cloud is provided by third-party, it is always a risk to handover the sensitive information to cloud service providers.

Although the cloud computing vendors ensure highly secured password protected accounts, any sign of security breach may result in loss of customers and businesses.

- **Lock In**

It is very difficult for the customers to switch from one **Cloud Service Provider (CSP)** to another. It results in dependency on a particular CSP for service.

- **Isolation Failure**

This risk involves the failure of isolation mechanism that separates storage, memory, and routing between the different tenants.

- **Management Interface Compromise**

In case of public cloud provider, the customer management interfaces are accessible through the Internet.

- **Insecure or Incomplete Data Deletion**

It is possible that the data requested for deletion may not get deleted. It happens because either of the following

Cloud Basic Concepts



- **High Availability** In computing, the term availability is used to describe the period of time when a service is available or continuously operational without failure for a long time
- **Fault Tolerant:** refers to the ability of a system to continue working without loss of service in the event of an unexpected error or problem.
- **Scalability:** "Increasing" the capacity to meet the "increasing" workload.

Or ability of a system to increase the workload on its current hardware resources (scale up or vertical scaling) / adding new servers with more capacity.
- **Elasticity:** "Increasing or reducing" the capacity to meet the "increasing or reducing" workload.

ELASTICITY - ability of a system to increase the workload on its current **and** additional (dynamically added on demand) hardware resources (scale

Cloud Basic Concepts



- **Redundancy**

In computing, redundancy means that there are **multiple components** that can perform the **same task**. This eliminates the single point of failure problem by allowing a second server to take over a task if the first one goes down.

- **Monitoring**

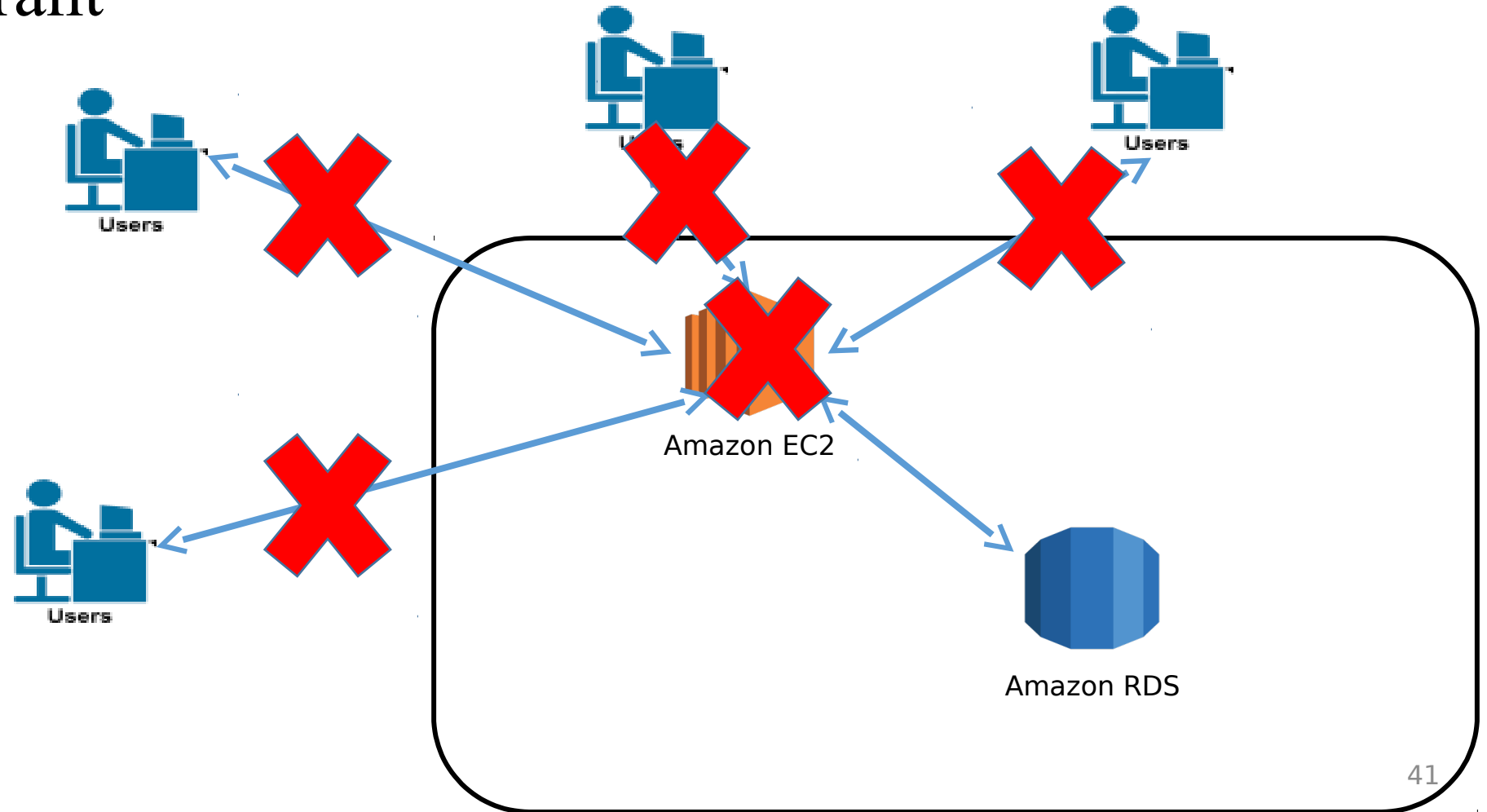
In a highly available setup, the system needs to be able to monitor itself for failure. This means that there are regular checks to ensure that all components are working properly

- **Failover**

Failover is the process by which one node takes over the job of another in the event that one becomes disabled or when the server gets terminated without a warning..

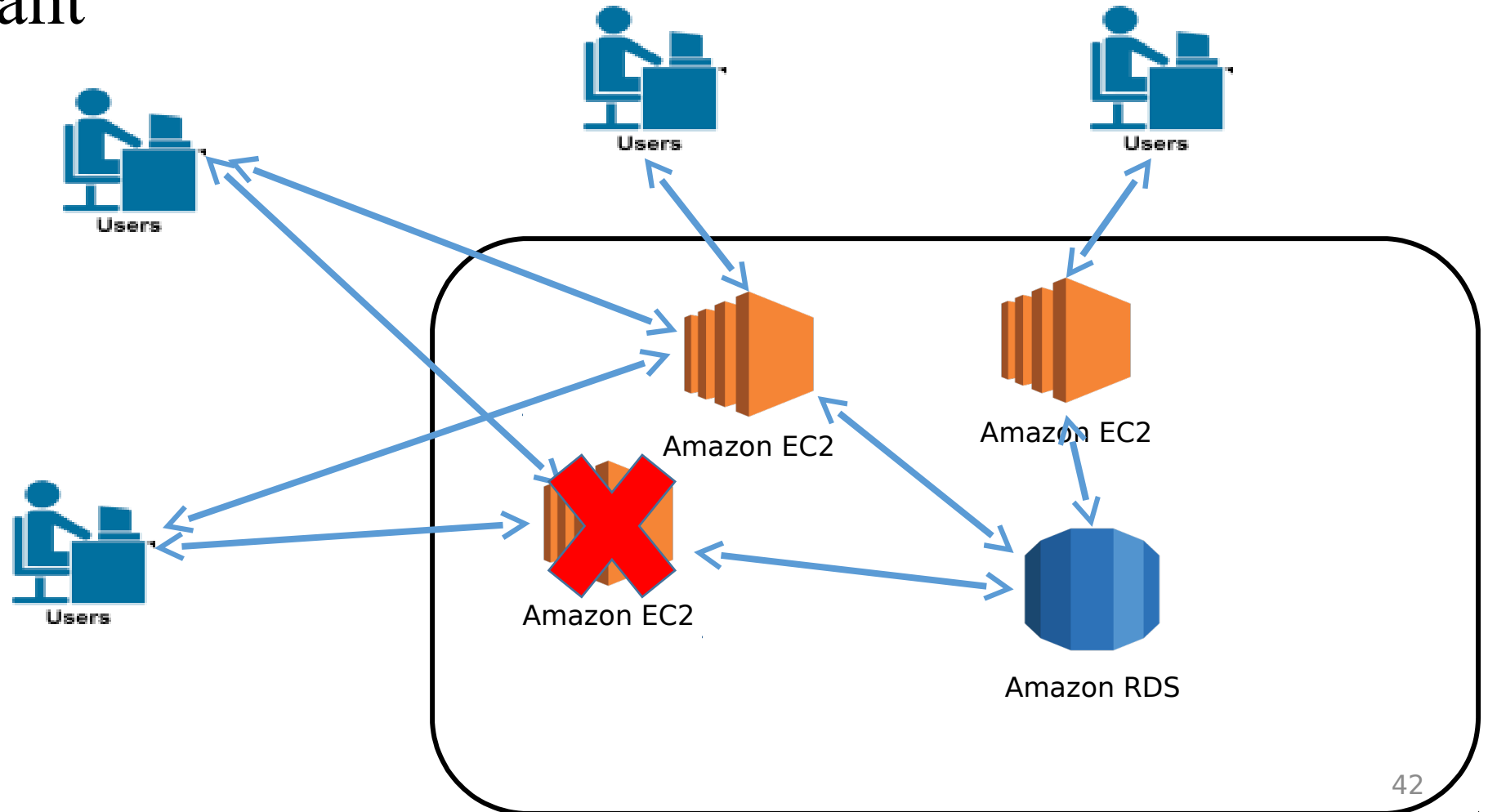
Cloud Terminology:

- High Availability
- Fault Tolerant



Cloud Terminology:

- High Availability
- Fault Tolerant



The Cloud Scales: Customers in 190 Countries



Summary



- **Common use cases of Infrastructure**
- **Virtualization**
- **Before & after Virtualization**
- **Virtualization approaches(Host & Bare metal Architecture)**
- **What is Cloud & Cloud Computing**
- **History of Cloud Computing**
- **Cloud Computing Architecture**
- **Deployment Models(Public, Private, Hybrid & Community Clouds)**
- **Service Models(IaaS, PaaS, SaaS & XaaS)**
- **Benefits of Cloud Computing**
- **Risks of Cloud Computing**
- **High Availability, Fault Tolerance, Scalability & Elasticity**



relax / it's done

