

# UNIT:2

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Cloud Computing refers to manipulating, configuring and accessing the application over the internet.

## \* Cloud Services Models

Most cloud computing services falls into five broad category-

- i) Software as a Service (SaaS).
- ii) Platform as a Service (PaaS).
- iii) Infrastructure as a Service (IaaS).
- iv) Anything as a Service (XaaS).
- v) Function as a Service (FaaS).

### 1) SaaS : Software as a Service

SaaS is a way of delivering services and applications over the internet. The service provider are providing a complete software or an application in form of service.

Application	Web-base Application		Web Portal	
	General APP.	Business APP	Scientific App	Government APP
	Commercial Platform	Open Source Platform	Others	

- SaaS Providers : Google Apps, Salesforce.com, Microsoft Office 365

### \* Advantages:

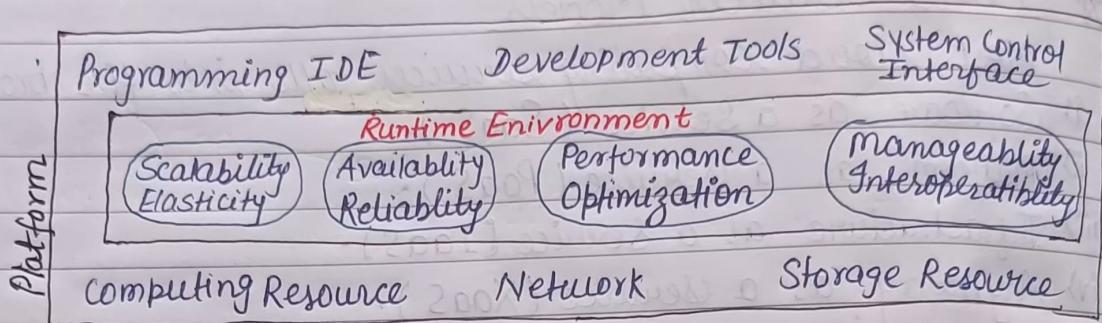
- i) SaaS is easy to buy.
- ii) On-demand service.
- iii) Less hardware required.
- iv) Low maintenance required.
- v) No-client side installation.

### Disadvantages

- i) Security.
- ii) Total Dependency on internet.
- iii) Latency issues.
- iv) Switching b/w vendors is difficult.

## 2.) PaaS: Platform as a Service

PaaS provides a platform and environment to allow developers to build applications and services over internet.



Examples: Google App Engine, Azure

### \* Advantages

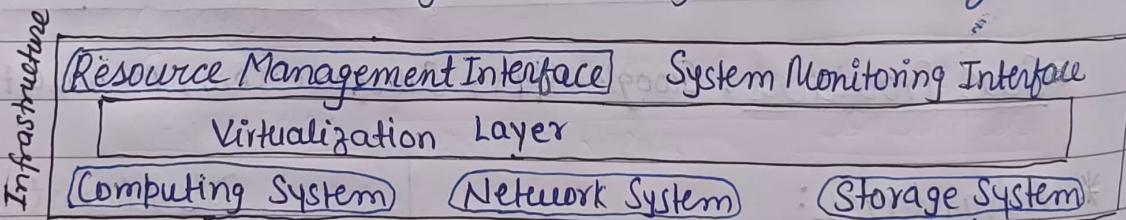
- i) Simplified Development
- ii) Lower risk
- iii) Scalability

### Disadvantages

- Vendor lock-in
- Data Privacy
- Integration with Syst. App

## 3.) IaaS: Infrastructure as a Service

IaaS provides on-demand access to computing resources such as servers, storage, networking and virtualization.



• Benefits: Economical, Efficient, Reliable, Scalable.

### \* Advantages

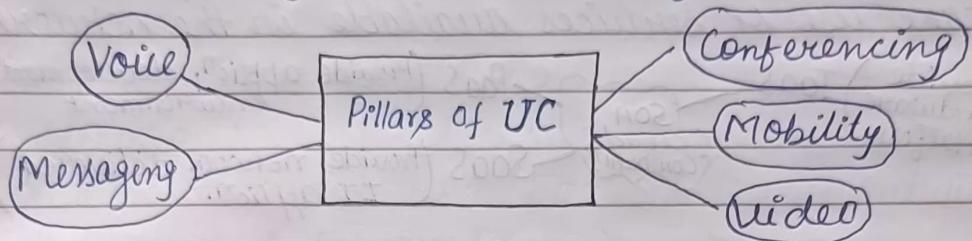
- i) Cost Saving.
- ii) Reliability.
- iii) High Scalability
- iv) Low latency

### Disadvantages

- Limited Control over infrastructure.
- Security concern.
- Limited access.

#### 4) Ucaas / FaaS: Unified Communication as a Service.

Ucaas is a cloud delivery model that brings unified communications (UC)-like chat, file sharing, telephony and video conferencing tools- into a single interface or platform.



#### \* Essential function of Ucaas:

- Chat
- Voice
- Video
- Collaboration: file sharing, calenders,

#### \* Features / Advantages

- i) Reduced Cost
- ii) Scalability, Flexibility.
- iii) Improved Productivity
- iv) Support, Security

#### Disadvantages

- Dependency on internet.
- Limited emergency calling.
- Cost structure
- Loss of control.

#### \* IAAS

- i) Infrastructure as a Service
  - ii) used by network architects.
  - iii) It is highly scalable, and flexible.
  - iv) Provides only Infrastructure.
  - v) It provides access to resources such as VM, V-Storage, etc.
- Cloud Service

#### PAAS

- Platform as a Service
- Used by Developers
- Highly scalable to suit diff. businesses.
- Provide Infrastructure + Platform
- It provides Runtime environment and deployment tools.

#### SAAS

- Software as a Service
- Used by end user.
- Highly scalable to suit the small, mid businesses.
- Provide Infrastructure + Platform + Software.
- It provides software as a service to end-user.
- MS office web, facebook, Google Apps.

(SOA) is a method of software development that uses software components called services to create business applications

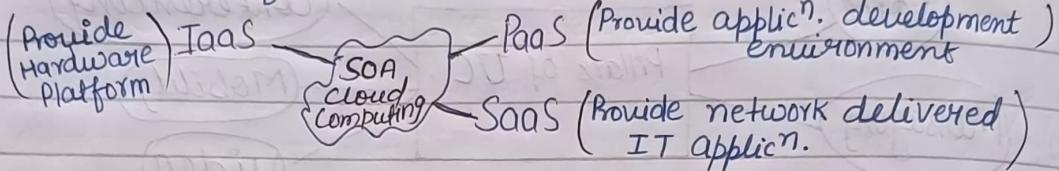
Developers use SOA to reuse services in different systems or combine several independent services to perform complex tasks.

For example, multiple business processes in an organization require the user authentication functionality. Instead of rewriting the authentication code for all business processes, you can create a single authentication service and reuse it for all applications

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## \* Service Oriented Architecture (SOA) :

SOA is a stage in the evolution of Application development and/or integration. SOA is an architectural approach in which application make use of services available in the network.

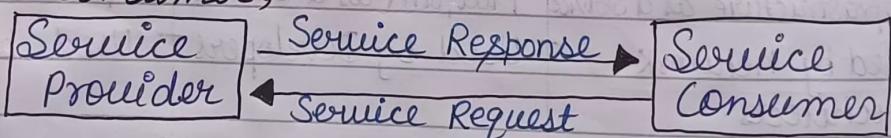


### \* Characteristic of SOA:

- Provide interoperability between services.
- Provide methods for Service encapsulation.
- Facilitates QoS (Quality of Services)
- Provide loosely coupled services.
- Ease of maintenance.

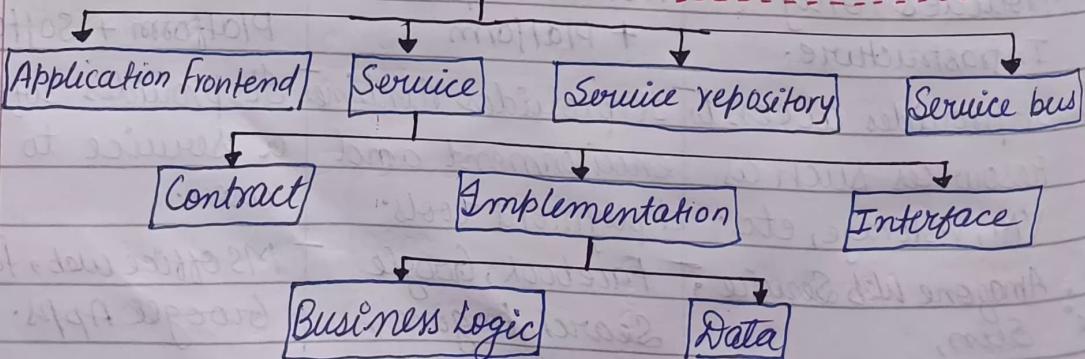
### \* Two major roles within SOA:-

- Service provider, is the maintainer of the service and organization that make service available to others.
- Service consumer,



### \* Components of SOA

#### Service - Oriented architecture



## \* Guiding Principles of SOA:

1. Standardized Service Contract : Specified through service desc. document.
2. Loose Coupling : Services are self-contained component.
3. Abstraction : They hide their logic, encapsulated within implementation.
4. Autonomy
5. Reusability
6. Discoverability
7. Composability

## \* Application :

- i) SOA infrastructure is used by many armies and air-forces.
- ii) SOA is used to improve healthcare delivery.
- iii) SOA helps maintain museums a virtualized pool for their info.

## \* Advantages

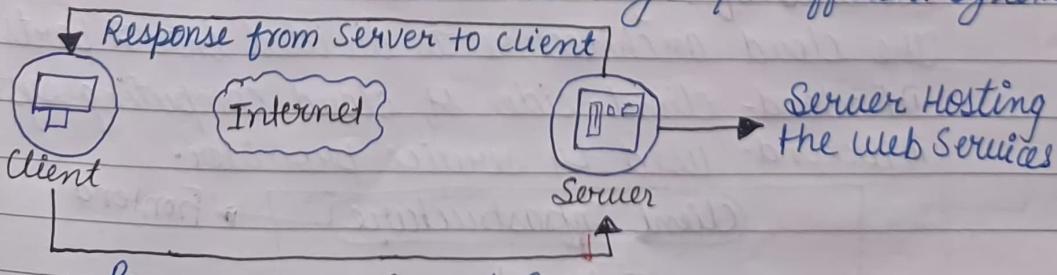
- i) Service Reusability
- ii) Easy maintenance
- iii) Platform independent
- iv) Availability ; Reliability ; Scalability

## Disadvantages

- Complex Service management.
- High Investment.
- High Overhead.

## \* Web Services

A Webservice is a standardized method for propagating message between client and server application on the World Wide Web. It is a set of open protocols and standards that allow data exchange b/w different systems.



- XML and HTTP is the most fundamental web service platform.

## \* Web Service Components

- 1) SOAP (Simple Object Access Protocol)  
It is a transport-independent messaging protocol. It is built on sending XML data in the form of SOAP msg.
- 2) UDDI (Universal Description, Search and Integration)  
UDDI is a standard for specifying, publishing and searching online service providers. It provides specification that helps in hosting data through web services.
- 3) WSDL (Web Service Description Language)  
The client implementing the web service must be aware of the location of the web services.

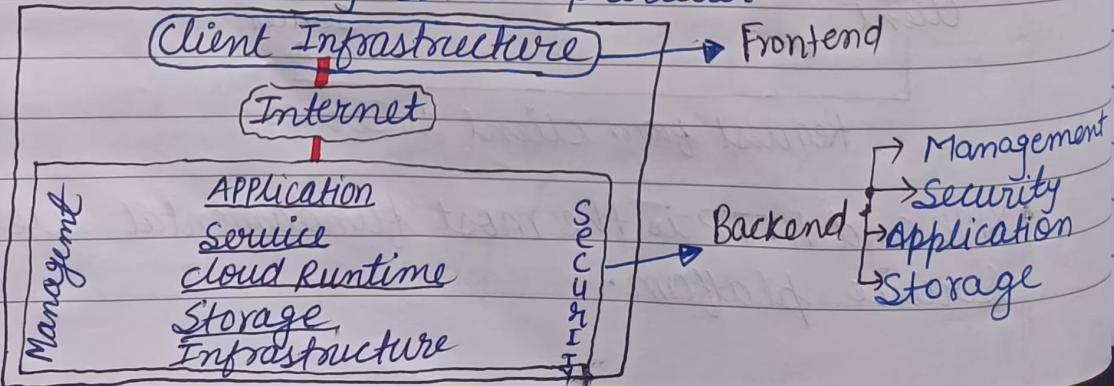
## \* Features of Web Services:

- XML based: A webservice info. record transport layer employ XML.
- Loosely Coupled:
- Ability to be Synchronous or asynchronous: Synchronicity refers to client's connection.
- Coarse Grain: Object-oriented system, make service available differently.
- Support remote-procedural calls.

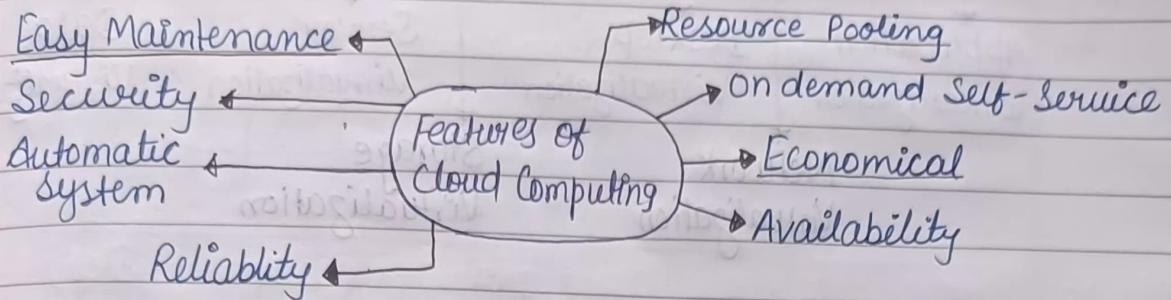
## \* Cloud Computing Architecture

The cloud architecture is divided into 2 parts i.e.

- i) Frontend - Client-side of cloud computing system.
- ii) Backend - used by service provider.



## \* Features of Cloud Computing Architecture

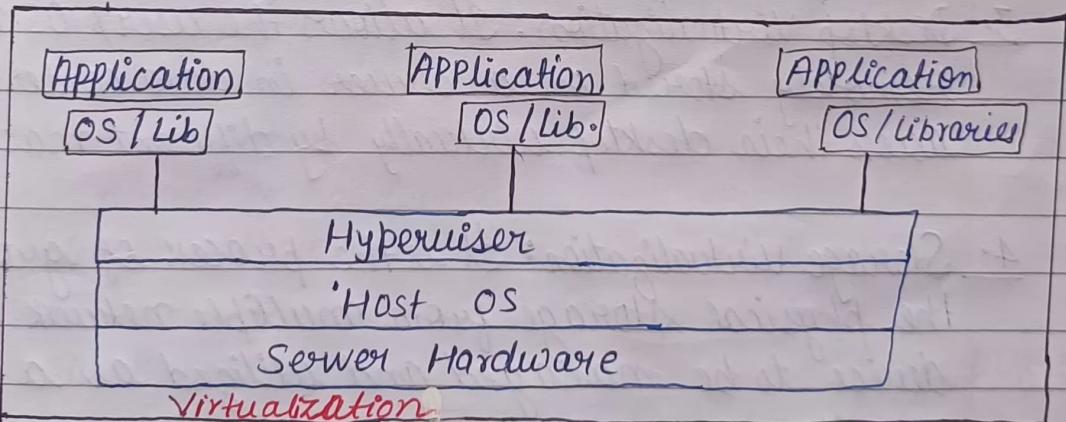


- Make overall cloud computing system simpler
- Improve data processing requirements

## \* Virtualization in Cloud Computing

Virtualization is the "creation of a virtual" version of server, desktop, a storage device, an OS, etc.

The machine on which virtual machine is going to create is known as Host machine and that virtual machine is referred as a Guest machine.

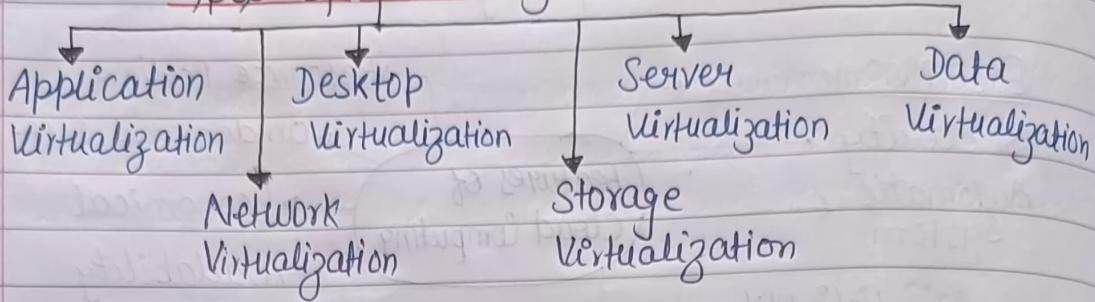


## \* Key Characteristics :

- Resource Provisioning
- Scalability and Flexibility
- Resource Pooling
- Cost Efficiency
- Service models - IaaS, PaaS, SaaS
- Global Accessibility

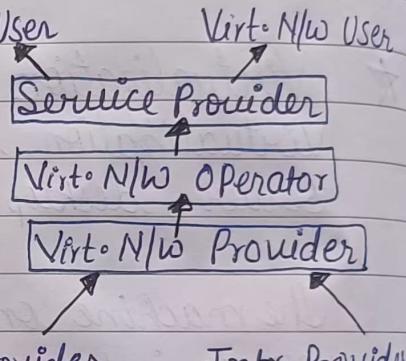


## Types of Virtualization



1. Application Virtualization: It helps a user to have remote access to an application from a server. The server stores all the personal info and other charact. of the applic.

2. Network Virtualization: Virtual N/w User  
The ability to run multiple virtual networks with each having a separate control and data plan. It co-exist together on top of one physical network.



3. Desktop Virtualization: It allows the user's OS to be remotely stored on a server in data center. The user access their desktop virtually by different machine.

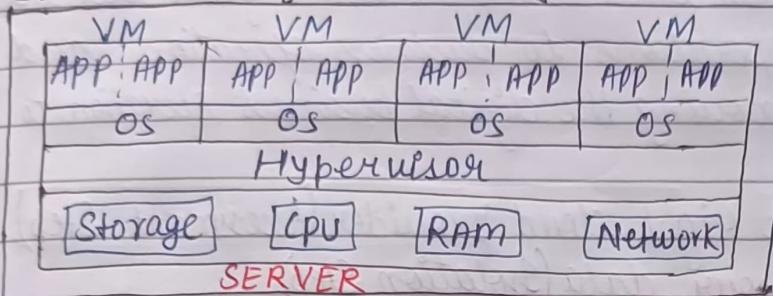
process of abstracting physical storage resources and presenting them in a virtualized manner to users or applications

4. Storage Virtualization: It is the process of grouping the physical storage from multiple network storage device to be managed and utilized as a single repository.

5. Server Virtualization: This is a kind of virtualization in which masking of server resources take place. Central Server (Physical) is divided into

multiple different virtual servers.

### Server Virtualization



6. Data Virtualization: In this, data is collected from various sources and managed at a single place.

### \* Uses of Virtualization:

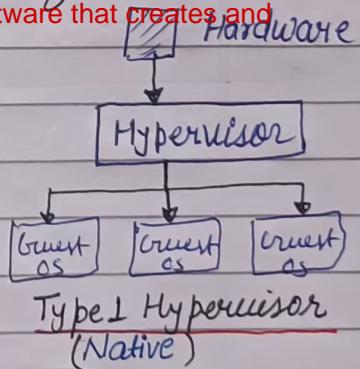
- i) Data - Integration
- ii) Business - integration
- iii) SOA data - service
- iv) Searching organizational data.

### \* Tools and Products available for virtualization:

A hypervisor, also known as a virtual machine monitor or VMM, is software that creates and runs virtual machines (VMs)

\* Hypervisor is a form of virtualization software used in cloud hosting to divide and allocate the resource on various pieces of hardware.

Eg:- VMware vSphere, Xen, KVM,



• Desktop Virtualization :- VMware Workstation, Oracle Virt. Box.

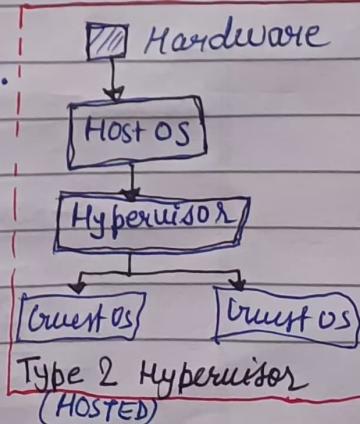
• Application :- Docker, Podman.

• Network :- Cisco ACI, Open vSwitch.

• Storage :- DataCore SAN symphony.

• Cloud management :- OpenStack.

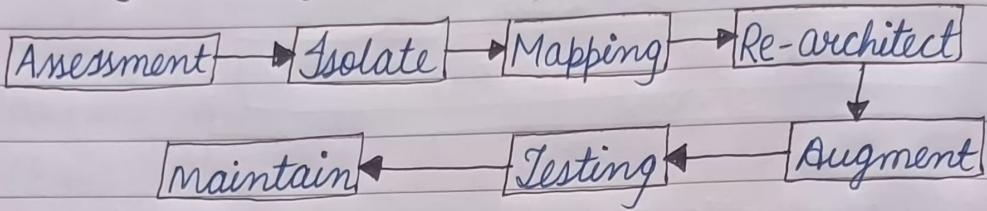
• Backup & Recovery :- Unitrends





## Seven Step model of migration into a cloud

Cloud migration is a transformation from old traditional business operations to business operation and process refers to moving the digital business operation to cloud.



Step 1: Choose the right cloud provider (Assessment step)

Step 2: Prepare your data (Isolation step)

Step 3: Choose your cloud storage (mapping step)

Step 4: Set up your cloud computing resource and deploy your model (Re-architect step)

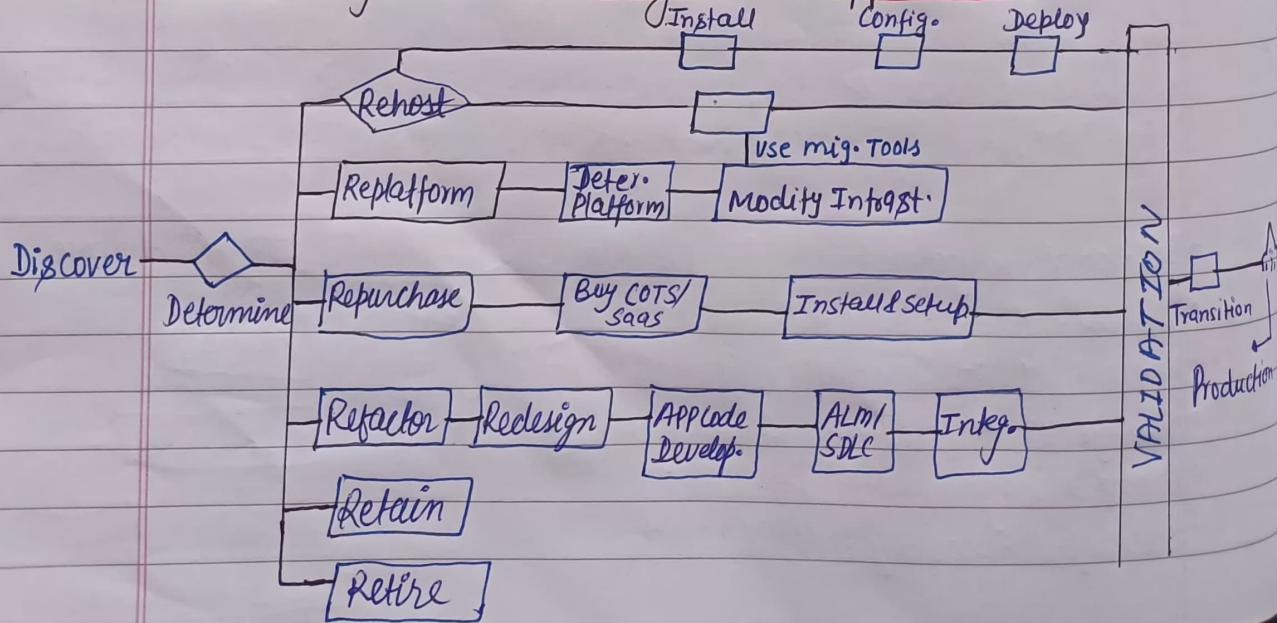
Step 5: Leverage cloud Functionalities & Features (Augmentation step)

Step 6: Test your model

Step 7: Iterate and Optimize ; monitor and maintain your Model



## Cloud Migration Strategies or Approaches :



1. Re-hosting: Also known as "lift and shift". Redeploy existing data and application on the cloud server as-is.
2. Re-platform: Also known as "lift, modify and shift", the application will be tweaked and optimized for the cloud.
3. Revise: More changes are required to the architecture and codebase while moving to cloud.
4. Rebuild: It is considered when the existing application do not meet their current business model.
5. Replace: Replacing involves migration to a third-party, pre-built application.
6. Retire: Application no longer be helpful to business are retired by simply turning them off.
7. Retain: Retain the applic? as-is and can revisit for cloud migration.

### \* Benefits of Cloud migration

Scalability, Reliability, Flexibility, Profitability, Performance, Productivity, Reduced cost, Security.

### \* Challenges:

- Moving a database is difficult.
- Interoperability becomes a problem.
- Security concern.

## \* Enterprise Cloud

An enterprise cloud is a unified operating environment that melds private cloud, public and distributed cloud, providing a single point of control for infra. and application in any cloud. It is ideal for large organization with diverse cloud workloads.

### \* Advantages

- i) Cost Saving
- ii) Security
- iii) Flexibility & Innovation
- iv) Disaster Recovery/Business Resiliency

### \* Types of Enterprise Cloud Architecture

There are four common models for enterprise cloud-

1. Public cloud :- A public cloud is cloud computing in which the infrastructure and services are owned and operated by a third-party provider and made available to public over internet. AWS, Microsoft Azure,
2. Private cloud :- A private cloud is a cloud computing environment in which infra. and services are owned and operated by a single organization
3. Hybrid cloud :- A hybrid environment include a mix of private and public cloud services.
4. Multi-Cloud :- A multi-cloud architecture combine services from more than one cloud provider.

### \* Who uses an enterprise cloud ?

- i) Healthcare
- ii) Retail
- iii) Financial Organisation
- iv) Manufacturing
- v) Federal Agencies

### \* Components of enterprise cloud management :

- Unified Governance model.
- Full-stack infrastructure and platform service.
- Zero-click operation and machine intelligence.
- Integrated security and governance.
- Application-centric mobility.

### \* Benefits of utilizing an enterprise cloud strategy:

- Focus on the end user.
- Faster response from IT.