UNIT 2 / Chapter 1: CLOUD AS A SERVICE

✱ GAMUT OF CLOUD SOLUTIONS:

- There are variety of cloud offerings, common types are:

1) Platform-as-a-Service (PaaS)
2) Software-as-a Service (SaaS)
3) Infrastructure-as-a-Service (IaaS)
4) Storage-as-a-Service (STaaS)
5) Desktop-as--a-service (DaaS)

1. Platform-as-a-Service (PaaS):-

- Public cloud vendors are actually offering an entire platform in the same way the traditional OS do.
- They provide the foundation to build highly scalable and robust web-based applications.
- But the platform is not 'sold' to the customer, its offers its services on the hosting platforms and has more capabilities in self-service model & billing.
- PaaS saves costs by reducing upfront s/w licensing & infrastructure costs as well as operational costs for development, testing & hosting environments.
- It enhances the capability of development platforms.
- It removes the problem of integrating the development s/w and the tools such as OS, database, middleware security mechanisms, frameworks etc.
- PaaS provides same platform for development, testing, QA, staging and thus reducing cycle time of delivery.
- Brings collaboration between the developers & operation teams.
- Achieves bigger goals of proj. mgmt by removing the gaps between the development & operation communities.

- PaaS is meant for the development community to support rapid development, testing and delivery

2] Software - as - a Service (SaaS) :
- SaaS reduces the investment by removing development effort, s/w licenses configuration, installment maintenance, infrastr cost, delivery & release, and reducing operational cost & administration.
- Takes lesser time to build the service, it is also easier as all the tedious work of mgmt, s/w maintenance and support is passed to a vendor.
- This gives customers/users to focus more on the business's value based features.
- It is not well-suited for service-based deployment as it does not go well with complex appl^n's.
- Issues related to SaaS migration: SaaS needs an upgrade in infrastr when moving from ~~one~~ on-premise to publically available n/w infrastr.
- Also needs upgradation of s/w versions and this can be a huge problem for SaaS vendors.

3] Infrastr - as - a - Service (IaaS)
- Uses automation ~~by handling~~ that eliminates the cost of provisioning the process. during peak load
- Helps the server to flex-up and flex-down to meet the demands. Reduces operational cost, optimize support, administration, and maintenance cost.
- IaaS helps to reduce ~~of~~ lengthy infrastr provisioning duration from months to minutes.
- The resources are available on lease on the basis of pay-as-you-go model, typically in terms of days, hours, and even in minutes.

- Appl^{n}s that need 100% availability may not be the perfect suit for these types of services, but these can be managed by using high availability and disaster recovery mechanisms.
- Appl^{n}s with architecture & design that support scaling are recommended.

*** Cloud taxonomy diagram [Text book pg no: 40] ***

* Principal Technologies :-
- The key to provide a dynamic cloud infrastr is the virtualization layer that sits bet^{n} the cloud instances and the physical h/w it runs on.
- Hypervisor - the platform virtualizat^{n} s/w, allows multiple operating system instances to run as guests on the same server.
- Main factors that drive cloud computing are cost, agility and time to market.
- The cloud orchestrator and a provisioning engine sit on top of the virtualization layer working on the n/w, server, and a storage.
- It is a layer of s/w that
  - interacts with multiple servers
  - enables IT depts. to pool resources together across servers.
  - defines standardized tiers of services called virtual compute centers.
- This helps in sharing of infrastr.
- Cloud orchestrator & provisioning engine helps IT depts to define org^{n}s and users can share the underlying cloud infrastr in a secure multi-tenant environment.

- It creates standardized collections of virtual machines (VMs) and set policies on how users can use these VMs.
- Orchestrators also transport with the API, which allows the cloud administrator and users to inter-relate in a systematic way.
- It allows writing workflows to automate the creation of the cloud infrastr.
- Greater savings in agility, IT infrastr, and faster delivery of appl's can be achieved by increasing pool of resources, sharing of resources and self-provisioning.
- Virtualization is foundation for the cloud. It consists of physical h/w with hypervisor layered on the top of it.
- The cloud orchestrator and the provisioning engine consist of one or more calls that communicate with a single database & offer a Web portal.
- IaaS is enabled by using Web portal to create cloud infrastr resources & user's self-provision in a secure multi-tenant fashion.
- Server communicates its (a) own database
  (b) server database
  (c) cloud orchestrator & provisioning engine databases

to associate costs with the cloud and generate usage & billing reports.
- Server needs to integrate with workflow systems, LDAP (Lightweight Directory Access Protocol), approval process to provide the lifecycle management of the cloud environment.

★ CLOUD STRATEGY :-

- Cloud strategy is a concise point of view on the role of cloud within the org.
- It provides high-level guidance to define the cloud strategy and the artefacts that describes the architecture of a cloud-enabled appl.
- These artefacts are meant for the implementation planning phase of the cloud for enabling an appl. Only high-level architecture of the system is captured in these artefacts.
- An appl that is between business strategy def for the adoption of the cloud and the design, development and implementation phases of the appl is enabled in implementat planning phase
- This phase links the business strategy defined for a business and IT requirements for the appl needed to support this strategy.
- The primary input for this phase comes from the cloud strategy for the business.
- The key steps in cloud implementation planning are as follows:
  - Understand the cloud strategy.
  - Define the cloud appl requirements.
  - Assess the cloud readiness.
  - Define high-level cloud architecture.
  - Identify changes in management requirements.
  - Develop a roadmap & implementat plan.
- These artefacts defined relate to the phase of "defining the high-level cloud architecture".

- The roadmap for strategy and planning for cloud deployment helps in :-

1) Justification for adopting the cloud by a business
2) Architectural work of cloud begins!
3) Appl^n readiness and fit/suitable workloads are identified.
4) Steps for migrat^n & workload assessment.
5) Selection of correct sol^n & implementation.
6) Acquiring skills and bridging technology gap.
7) Mgmt of roles, responsibilities & customer-relationship
8) Development of high-level cloud roadmap & value proposition.

- The roadmap has many benefits :-

1) Reduced risk & faster development :-
-It utilizes vendor assests, skills and experience to reduce risks. It accelerates the development & implementation by identifying gaps, activities & risks & defines mitigation.

2) Improved service :-
-Identifies the optimal delivery model, mixes & prioritizes the workloads to migrate to the cloud.

3) Lower cost :
-Identifies the opportunities to reduce capital & operating expenses across the infrastr.

✱ Cloud Design and Implementation Using SOA :

- Service Oriented Architecture (SOA) is very useful architectural style of implementing appl^{n}s in the cloud.
- SOA leverages and consumes the appl^{n} services provided by the cloud.
- A cloud-based appl^{n} may consist many small granular services offered on cloud. These in turn integrate & leverage services & systems from different environments.
- Standardization across different IT environments is not possible, and consists of heterogeneous environments
- Cloud service offerings must be based on open standards that can be consumed & leveraged by this environment.
- SOA removes barrier for cloud clients, it employs mechanisms that allows IT systems to work together cohesively within one enterprise.
- These services also comprise consumable interfaces which may be user interfaces on different devices, Web-service interfaces, feeds or widgets.
- The cloud appl^{n} services should be mapped to the business process that they consist of.
- SOMA (Service-Oriented Modeling and Architecture) is applied with a meet-in-middle approach.
- Business processes, business strategy along with business goals stated are used to arrive at the service portfolio using SOMA.
- A bottom-up approach is also followed, existing assests, existing appl^{n}s, services on public cloud are taken into consideration.

• Architecture Overview :- (doc)

- The purpose of the architecture overview artefact in a cloud-based implementation is to communicate to the sponsor and external stakeholders a conceptual understanding of the architectural goals of the cloud implementation.
- It offers a layered conceptual model of the appl^n services to be cloud-enabled & provides a high-level vision of the cloud architecture.
- This stage enables early recognition & validation of the implications of cloud-based architectural approach; effective communication bet^n different communities.
- Helps in understanding the conceptual points of the cloud implementat^n & its dependencies on internal or external cloud ecosystem.
- This artefact may include cloud/non-cloud infrastrs such as offerings, components, relationships, elements for support systems.
- The artefact is produced after multiple iterations & as the project moves ahead, the conceptual models get clearer & this doc. is kept up-to-date
- An architecture summary depiction represents the governing ideas & building blocks of cloud-based offering and enterprise architecture.
- At enterprise level, arch. summary depiction is produced to give overall IT strategy. It describes the vision of the business & IT capabilities required by an org^n.
- At system-level, component-level, the depiction is developed at very early in the project.

★ CONCEPTUAL CLOUD MODEL :-

- This model gives the structure of offerings in the cloud on the basis of the components of h/w & s/w with their roles, interdependencies & interfaces to provide functionality.
- The highest level of the conceptual model is the set of cloud-based offerings.
- The components of the highest-level are derived on the basis of business intent & functionality.
- Conceptual offerings that provide the cloud-based implementation can be further broken down & presented in a layered composition.
- The foll^{n} elements falls in the next level of conceptual component :
  1) High-level service components that form the services.
  2) Resources that support cloud services.
  3) Technical componants and non-technical needs of the cloud appl^{n}.
  4) External & internal services that are utilized by cloud appl^{n}'s services.
- The high-level component model is the main artifact (doc) that provides an abstract view of the design of a cloud appl^{n} to business stakeholders.
- It describes how business needs are met by the cloud appl^{n} without technical details.

** Cloud model diagram [Txt book pg 46]

- The cloud conceptual model has foll° elements
  - The conceptual strs of the cloud appl°
  - Dynamic interactions & dependencies
  - Components that comprise the cloud services provided by the appl°, which may be made up of sub-components.
- At this level, the conceptual components are not converted to physical components but retained at the conceptual level only.

** Cloud Service Definitions :-

The definitions goes :-

1) Service
2) Service Portfolio
3) Service component
4) Service owner
5) Process
6) Enablers
7) Service-level agreements
8) Service-level management
9) Service-level-management objectives

** Self-study of definitions (Pg 48)
