

Q1

Cloud computing

It is on-demand delivery of IT resources over the internet pay as you go pricing instead of buying owning and maintaining physical data centers and servers we can access technology service such as computing power storage and databases on as needed basis from a cloud provider like

AWS (Amazon web service)

GCP (Google cloud platform)

Cloud architecture

It is the way that various components of cloud computing including databases, applications, software capabilities, middle ware and on-premise resources are organized to provide cloud service. common cloud architecture includes public cloud architecture and cloud private cloud architecture and cloud multi-layered architecture.

A multi-layered architecture typically includes more than one public or private clouds that may or may not be networked together while hybrid cloud architecture comprises multiple cloud environments

with some degree of management.

A cloud architecture often comes down to the benefits associated with on-premise vs cloud infrastructure. Public clouds offer elastic capacity, high availability and access to next-generation applications while private clouds offer benefits related to security, data and low latency.

Layers in cloud computing

Following are the layers in cloud

i) Infrastructure as a service (IaaS): It is developed on the virtualization technology where the service providers offer virtual machines as a service to the end-users. It allows the IaaS customers to create and discard virtual machines and networks.

ii) platform as a service (PaaS):

It is the second layer. In this layer customers do not manage the virtual servers but rather create the applications within the programming language. They host the programs on the platform services which they pay for. The management and maintenance of the OS and other hardware are done by the providers.

Software as a Service:

Applications that do not need to be installed come under this layer. Some services are free while some are billed monthly. In addition there is the hardware and virtualization layers that are owned and managed by the cloud hosting providers and the client layer which is the end user's hardware on which the services are delivered.

Merits and demerits

- i) Easy implementation: It allows businesses to retain the same applications and business processes without having to deal with the backend technicalities.
- ii) Flexibility for growth: It is easily scalable as companies grow further system will grow with them.
- iii) No hardware required: It maximizes productivity as it doesn't require a separate space to manage or install servers.
- iv) Accessibility: Access your data anytime, anywhere.

Demerits

- i) No longer in control
when moving services to the cloud you are handing over your data and information.
- ii) Bandwidth issues: For ideal performance clients have to plan accordingly and not pack large amounts of servers and storage devices.
- iii) NO redundancy: A cloud server is not redundant nor is it backed up as technology may fail here and there avoid getting burned by purchasing a redundancy plan.

Example of - cloud computing

Some of the major cloud computing providers are as follows.

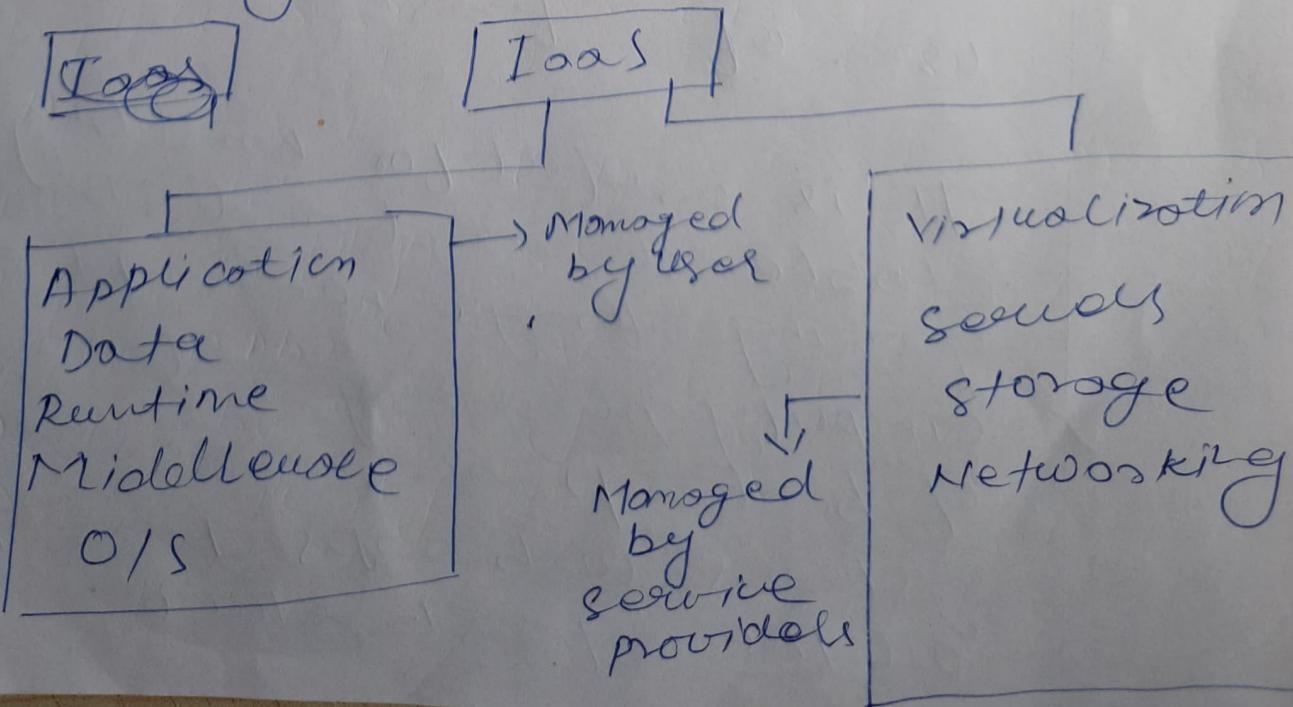
- i) Amazon Web Services (AWS)
- ii) Google cloud platform (G.C.P)
- iii) Microsoft Azure
- iv) IBM DB2
- v) Adobe creating cloud.
- vi) Slack

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Types of service by Infrastructure as a service

It provides vendors the virtualization, storage network and services. This way the user doesn't have to have an on-premise datacenter and doesn't have to have an on-premise datacenter and doesn't worry about physically updating or maintaining these components.

IaaS user has complete control of the infrastructure through an application API. It makes it easier to scale up/down and add resources like cloud storage instead of having to anticipate future needs and pay costs up front.



An IaaS provider provides policy based services responsible for housing, operating and maintaining the infrastructure equipment it provides for a client. clients usually pay on a per-use a utility computing basis.

The following characteristics of IaaS systems include:

- i) Automated administrative tasks
- ii) Dynamic scaling
- iii) Platform virtualizing technology
- iv) GUI and API-based access
- v) Internet connectivity.

Types of infrastructures as a service

already discussed in part-I

uses of infrastructure as a service

It is useful for handling predictable demand and steady growing storage needs. It can also simplify planning and management of backup and recovery systems. web apps. IaaS provides all the infrastructure

Types of IaaS services :-

i) Load balancers:

It provides load balancing capability at the infrastructure layer.

ii) Storage:

It provides back-end storage for storing files.

iii) Networking:

It provides networking component such as routers, switches and bridges for the VMs.

iv) Compute:

It provides virtual central processing units and virtual main memory for the VMs that is provisioned to the end-users.

OS

It defines a way to make software components reusable via service interfaces. These interfaces utilize common communication standards in a such a way that they can be rapidly into new applications without having to perform deep integration each time.

Service-Oriented Architecture

- i) SOA based competing packages functionalities into a set of interoperable service which can be integrated into different software systems belonging to separate business domains.
- ii) It allows user to combine a large no of facilities from existing services to form applications.
- iii) It has a set of design principles that structure system development and provide means for integrating components into a coherent and decentralized system.

Major role in SOA which are following
as,

- i) service consumer:
It can locate the service meta-data in the registry and develop the required client components to bind and use the service.

i) service provider

It is the maintainer of the service and the organization that makes available one or more services for others to use. To advertise services, the provider can publish them in a registry, together with a service contract that specifies the nature of the service, how to use it, the requirements for the service and the fees charged.

SOA principles

i) service reusability

logic is divided into the services with the intent of maximizing reuse. Once the code for a web service is written, it should have the ability work with various application types.

ii) service abstraction

Service hide the logic they encapsulate from the outside world. The service should not expose how it executes its functionality.

iii) Standardized service contract

A service must have some sort of description which describes what the service is about.

iv) loose coupling.

less dependency on each other
if the service functionality changes at any point in time it should just not break the client application or what stop it from working.

	Monolithic	Microservices
i)	If has share database	Each project module has their own database
ii)	It is not easy to scale based on demand	It is easy to scale based on demand
iii)	It is built as one large system and is usually one code-base	It is build of small independent module based on business functionality
iv)	large code base makes IDE slow and build time gets increase	Each project is small independent and small in size so overall build and development time gets decrease

Difference between SOA and microservices

SOA	Microservices
i) Designed to share resources across services	i) It designed to share resource across services
ii) It's fine-grained services	ii) It has larger more modular services
iii) It requires collaboration between teams	iii) It has common governance protocol across teams
iv) typically does not involve component sharing	iv) Frequently involves component sharing
v) Communication through an API layer	v) communication through an ESB

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Virtualization

It refers to the process of creating a virtual version of something such as operating system, a server, network resource or storage device.

with virtualization an application

a guest OS or data storage is separated from the underlying hardware or hostbase. A thin software layer known as a hypervisor reproduces the functions and actions of the underlying hardware.

The Advantages of virtualization

- i) Ease in server management
→ with the help of powerful hardware instead of creating multiple servers applications on multiple server hardware virtualization comprised into few
- ii) Blended hardware utilization:
→ Each application installed on the server doesn't consume an equal amount of resources at some given point of time the isolation feature of virtualization solves this problem very well which also improves hardware utilization
- iii) Dynamically contiguous
- iv) High reliability: it offers a reliable server application environment with the help of

with the help of additional solutions and tools to offer transparent load balancing, dynamic migration and rapid replication.

v) cost-effective

Disadvantage of virtualisation

i) Reduced performance

a single system has plenty of resources but when multiple VMs are running in parallel on a physical machine it slows down the performance of the system.

ii) Security

The communication between VMs if not managed and monitored properly in a protected environment could lead to an attack.

iii) Host crashed

If the physical machine's VM also crashes

iv) complex implementation and complex management!

To manage it the companies need special IT admins with extensive knowledge of managing virtualisation.

Types of virtualization

i) Network virtualization:

It essentially splits up the available bandwidth into channels each of which is separate and mobile. Virtualization masks the true complexity of the network by splitting it into manageable parts.

ii) Storage virtualization:

It refers to the pooling together of physical storage space from multiple storage device into this single storage device managed by single console.

iii) Desktop virtualisation:

In this process a workstation is virtualized as opposed to a server. This allows the user to access the desktop remotely.

-) cloud computing is based on the internet cloud and relies on internet access. Cloud storage strictly requires internet and without it you cannot run web-based application or open stored files on the web.

virtualization doesn't require any kind of internet whatsoever. So it can be example virtualization box doesn't require internet.

Virtualization

It allows you to create multiple simulated environments from a single physical hardware system. Software called a hypervisor connects directly to the hardware and allows you to split 1 system into separate

Cloud computing

It is a set of principles and approaches to deliver compute network and storage infrastructure resources, service, platform and applications to users on demand across any network.