Cloud Computing:-

It is the delivery of Computing Services over the internet Enabling faster innovation, flexible resources, & Economies of scale.

* Compute * Networking * Storage * Analytics

public cloud:-

* Owned by Cloud Services (or) hosting provider
* Services to multiple Organizations & users
* Accessed via secure network Connection

Ex:- Azure, Aws etc * No Capital Expenditure.
* pay only for what they use,

private cloud:-

* Organizations create a cloud environment in their data center.
* Doesn't provide access to user outside of the organization.

Ex:- Hospital data * Hardware must be purchased
* Control over resources & security

Hybrid cloud:-

Combines public & private clouds allow applications to run in the most appropriate location.

* Provides the most flexibility
* Organizations determines where to run their applications.

cloud benefits:-

* High Availability: large size of storage (or) other are Availability.
* Scalability:-

To increase the size automatically by adding resources.

* for Customer Happiness.
*

Elasticity:- The ability to match resources sufficient for a workload size
* for saving money.

Fault Tolerance:- One Server fail then other works.

global reach:- The ability of a business to sell to Customers in different parts of the world.

Customer latency Capabilities:- The ability to deploy resources in data Centres around the globe, to address Customers latency issues.

Agility:- The ability to rapidly develop, test, & launch application, which Constantly Changing IT Environment.

predictive Cost Considerations:- The Cost are less Compared to the private cloud which pay as use.

Disaster recovery:- The files which you can another System when a system wasn't working. Because it stored in Cloud.

Security:- The files are fully Secured.

CapEx:- Capital Expenditure
* The up-front spending of money on physical infrastructure.
* Cost will reduces overtime.

Op Ex:- Operational Expenditure:-
* Spending on products & Services as needed,
pay-as-you-go
* Cost billed

Cloud Services :-

1. Infrastructure as a Service (IAAS) :-

Build pay-as-you-go IT infrastructure by renting Services, virtual machines, storage, networks & OS from the cloud providers. (select OS)

2. Platform as a Service (PAAS) :- (max version)

provides Environment for building, testing, & deploying software applications without focusing on managing underlying infrastructure. (Analytics) purpose.

Identifying difference :-

Operating System in PAAS gives maximum version of version whne as in Infrastructure you need to updates it gives just virtual machines.

Software as a Services (SaaS) :-

Users Connect to & use cloud-based apps over the Internet.

Ex :- office 365 etc.

In IAAS :- Compute, Networking, Storage are cloud provider.

In PAAS :- IAAS & runtime, Operating System, virtual machine. are cloud provider.

In SAAS :- Applications & PAAS are the cloud provider.

In All Services you need provide Data & Accessing *

Serverless Computing :-

Azure function :- It creates infrastructure based on an Event

Azure logic apps :- Helps you automate & takes sequences tasks & etc when you need to integrate apps & services

Regions :-

Regions are made up of one (or) more data centers in close proximity.
provides flexibility & scale to reduce latency

Region - pairs :-

* At least 300 miles of separation b/w region pairs.
* updates sequentially to minimize downtime.

Ex :- South East Asia ⟷ East Asia.
India South ⟷ India Central.

Availability options :-

VM SLA :-

* 99.9% with premium storage.
* Single vm

SLA (Service level argeement)

VM SLA :-
99.99%
Availability zones

multi-Region Disaster Recovery & Region pairs

Availiability zone :-

* Provides protection against downtime due to datacenter failure
* Separate data centers within the same region
* Connected through private Fiber-optic networks

Azure Resources:-

1. Virtual machines 2. Storage Accounts 3. virtual networks
4. App services 5. SQL Databases 6. Functions

Resource group:-

A resource group is Container to manage & aggregate resources in a single unit

Azure Resource manager:- provides a management layer that Enables you to create, update & delete resources in your Azure subscription.

* Billing boundary:- Generate Separate billing reports of Each subscription.
* Access control boundary:- manage & control access to the resources.

Management Groups:-

management group can include multiple Azure subscription.

Core - Azure workload :-

1. Azure Compute Services:-

Azure Compute is an on-demand Computing services that provides computing resources such as disks, processors, memory, networking, & operating systems.

i. Azure Virtual Machines:-

Azure VM are Software Emulations of physreal Computers. Including processors, memory, storage & networking. (IAAS provides total control & customizatron)

ii. Azure App Services:-

Azure App Services is a fully managed platform to build, deploy & scale web apps & API's quickly.

* works with .net, Java Etc.
* (PAAS) with Security & Compilance requirements

iii. Azure Container Services:-

Azure Containers are light-weighted, virtualized Environment that does not require OS management & can respond to changes on demand.

iv. Azure Container Instances:- a PaaS offering that runs a Container in Azure. without the needs to manage a virtual machine (or) other Services

Azure kubernetes services:- a Sequences of Service for Containers with distributed architectures & large volumes of Containers.

v. windows virtual Desktop:- is a desktop & app virtualization that runs in the cloud.

reduce costed with pooled, multi-session resources.

2. Azure networking Services:-

1. Azure Virtual Network (vnet):- Enables Azure resources to Communicate with Each other, the internet & on-premises networks.

2. Virtual private Network Gateway (VPN):- is used to Send Encrypted traffic b/w an Azure virtual network & an on-premises location over the public internet.

3.

3. Azure Express Route:- Extends on-premises networks into Azure over a private Connection.

3. Azure Storage Services:-

1. Container Storage (blob):- is optimized for storing massive amounts of unstructured data, Such as text (or) binary data.

2. Disk storage:- provides disks for vm, applications & other Services to access & use

3. Azure Files:- Sets up a highly available network file shares that can be accessed by using the standard message Block (SMB) protocol). Shared access signature is not required to access Azure files.

Azure Storage access tiers:-

HOT - Frequently accessing the stored data

COOL - infrequently accessing & stored for atleast 30 days

ARCHIVE - rarely accessed & stored for atleast 180 day with Flexibility latency requirement.
* Highest Rehydration cost
* not avaliable at a ace level.

4. Azure database Service:-

1- Azure Cosmos Database:- is a globally distributed database Service that Elasticity & independently scales throughput & storage. It support key-value & document datamodel.

2. Azure SQL Database:- is a relational database as a Service based on latest stable version of microsoft SQL Server database Engine.

3. Azure Database for MySQL:- Fully managed mysql database Service for app developers.

4. Azure Database for postgreSQL:- is a relational db Services based on Open-Source postgres db Engine.

Azure SQL Managed Instance:- allows Existing SQL Server Customer to lift & shift their on-premises applications to the cloud with minimal application & db change. preserved all Paas Capabilities.

Azure Marketplace:- Allows Customers to find, try, purchase & provision application & Services. which all are Certified by Azure.

much more with 10000+ listings

Core Azure Solution:-

Azure IOT:-

IOT:- ability for devices to gather & then relay information for data analysis.

Azure IOT Central:- SaaS Solution that make it Easy to connect, monitor, & manage IOT assets at scale.

Azure IOT Hub:- managed service hosted in cloud that acts as a central message hub for bi-directional Communication b/w IOT apps & the devices manages

Azure Sphere:- Secured, High level app platform with built-in Communication & Security features for internet-connected devices

Big-data & analytics:-

Azure Synapse Analytics:- A cloud-based Enterprise Data warehouse.

Azure HDInsight:- A Fully-managed, Open-Source analytics service for Enterprises.

Azure Databricks:- Apache Spark based analytics Services

AI & ML:-

Azure Machine Learning:- cloud-based to develop, train, & deploy ML model.

Azure Cognitive Services:- Quickly Enable apps to see, hear, Speak, understand, & interpret a user's needs

Azure bot Service:- develop intelligent, Enterprise-grade bots.

Develop your apps with DevOps & Github:-

Azure Devops:- development collaboration tools including pipelines, kanban boards, & automated cloud-based load testing.

Github:- Software development hosting with version Control & source.

Github Action for Azure:- automate Software workflow to build, test, & deploy From withing Github

Azure DevTest Labs:- quickly create Environments in Azure while minimizing waste & Controlling Cost.

Azure management Tools:-

Azure portal
Azure mobile app
Azure Rest API
Azure powershell
Command-Line Interface (CLI)
Azure cloud shell

Azure advisor:- Analyzes deployment Azure resources & makes recommendations based on best pratice to optimize Azure deployment
* Reliability * Security * performance * Cost

Azure monitor:- maximizes the availability & performance of apps & services by collecting, analyzing & acting on telemetry from cloud & on-premises Environment
* Smart Alerts * Log Analytics * Application Insights

Azure Service health:-
Azure Service Health provides a personalized view of the health of Azure services & the regions being used.

Azure Resource Manager (ARM) templates are JSON files that can be used to create & deploy Azure infrastructure without having to write programing commands.
- Built in validation - Exportable Code - Declarative Syntax.

Azure Security Center:-
Azure Security center is a monitoring service that provides threat protection accoss both Azure & on-premise datacenter.
* Detect & block malware * Analyze & identify potential attacks.

Capabilities:-
* policy compliance * Security alerts * Secure Score.
* Thread protection * Resource Security Hygiene * Tailored Recommendations

Azure Sentinel:- provides Security analytics & thread intelligence accoss an Enterprise.

Connector & Integrations:-
* Office 365, Active Director.

Azure key vault:- Stores application Secrets in a Cloud location in order to Securely Control access permissions.
* key management * Security management.

Azure Dedicated Host:- provides phipical servers that host one or more Azure Virtual machines that is dedicated to a single organization's workload

* Hardware isolation at a server level
* Aligned with Azure Hybrid Use benefit

Secure Network Connectivity:-

1. Defense in depth:-
Provides multiple levels of protection.
Shared responsibility Security b/w Cloud providers & Customers

2. Network Security Groups (NSG's):-
Filter network traffic to & from Azure resources on Azure virtual networks.
Set inbound & outbound rules to filter by source & destinated IP address, port & protocols.
Add multiple rules, as needed, within subscription limits.

3. Azure firewall:-
* managed firewall as a Service (FaaS) that grants/denies server access based on originating IP address. (from your virtual net)
* Built in- high availability., uses Azure Montior logging, inspection

4. Azure Distributed Denial of Service (DDoS) protection:- Basic & standard
* DDos attacts overwhelm & Exhaust network resources,
* Basic Service tier is automatically Enabled in Azure.
* Standard Service tier adds mitigation capabilities that are tuned to protect Azure Virtual Network resources (from DDos attack)

NSG + Azure Firewall - defense in depth

perimeter layer:- protects your network boundaries with Azure DDOS protection & Azure firewall.

Networking layer:- permits traffic to pass b/w Network resources with NSG inbound & outbound rules.

Azure Disk Encryption:- Encryption protects your vm VHDs from Exposure.

Compare Authentication & Authorization :-

1. Identifies the person or service seeking access to a resource.
2. Basis for creating secure identity & access control principles.

Authorization :-

1. Determines an authenticated person's (or) services level of access
2. Defines which data they can access.

Azure multi-factor Authentication :-

provides additional security for your identities by req two (or) more elements for full authentication.

Azure Active Directory (AAD) :- is microsoft Azure's cloud-based identity & access management service.

Authentication, Bussiness to Bussiness, Bussiness to Customer &:-

Conditional Access :-

is used by Azure Active directory to bring singals together, to make decision.

* User or Group membership * IP Location * Device.
* Application.

Role-based access control (RBAC) :-

fine-grained access management which in a company the work & access is given based on their role.

Resource locks :-

protect your azure resources from accidental deletion (or) modification.

lock types :-

	Read	Update	Delete
(1) Can Not Delete.	✓	✓	✗
(2) Read only	✓	✗	✗

Tags :-

* provides metadata for your Azure Resources.
* Consists of name-value pair.
* used for rolling up billing information.

Azure policy:-

* It provides governance & resource Consistency with regulatory Compliance, Security, cost & management.
* provides built-in policy & initiative definitions under categories such as storage, Security center -Etc.

Azure blueprints:- makes it possible for development teams to rapidly build & stand up new environments.. organizational Compliance with a set of built-in components. in order to speed up. development & delivery.

Cloud Adoption Framework:-

The One microsoft approach to cloud adoption in Azure from on-premises.

Security:- Security with built in intelligent Security. using automation & artificial intelligence.

privacy:- we are commited to ensuring the privacy of Organizations through our Contractual agreements.

Compliance:- we respects local laws & regulations & provide Comprehensive Coverage of Compliance offerings

Ex:- CJIS, HIPAA, CSA STAR CERTIFICATION

Microsoft privacy statement:-

microsoft provides Openness & honestly about how microsoft handles the User's data

Online Services Terms:- The licensing terms define the terms & Conditions for the products & online Service can purchase through microsoft volume Licensing programs

Data protection Addendum:- DPA set forth the obligations with respect to the processing & security of customer data & personal data.

Trust Center:- Learn about security, privacy compliance, policies, features & practice across microsoft cloud product

Azure Compliance Documentation:-
microsoft offers a set of compliances offering to help your organization comply with national, regional, Global that govern the collection & use of data.

Azure Sovereign Regions (US Government Services):-
Azure Government: Separate instance of Azure.
Accessible only to screened, authorized personal.

Azure Sovereign Regions (Azure China):-
Microsoft is china's first foreign public cloud services.

Azure china feature:-
Physical Separate instance of Azure.
All Data stays within china.

Planning & Cost management:-
* factors affected the cost (resource type, Services, locations, egress traffic)
* The cost reduced by reserving the instance, caching, hybrid use
* Describe the functionality & usage of pricing Calculator & Total Cost of ownership (TCO) Calculator

① The primary affecting Costs:- Total 6
① Resource Type
② Services
③ Location.
④ Band-width → data transfer Rate.
⑤ Reserved instance → 72% off on reservation
⑥ Azure Hybrid use Benefit.

pricing Calculator:-
Helps you to Estimate the cost of Azure products of the Regions, Tier, Billing options, Support options, programs & offers.

TCO Calculator:-
A tool to Estimate cost, Savings you can realize by migrating to Azure.

Azure Cost Management:-
Reporting - billing reports, Budgets - Set Spend budgets, Alerting - when cost exceed limits, Cost recommendations.

Service Level Agreements (SLA's):-
SLA describes Microsoft's commitment for uptime & connectivity.
It depends on individual products & Services.
Azure performance - targets range from 99% to 99.999%
It means the downtime is 7hr 18 mins to 26secs.

Lower your SLA:-
* Adding more Services
* Choosing free (or) non-SLA Services.

Raise your SLA:-
* Availability Zones
* Redundant Systems

Azure preview program:-
Azure previews, users can test beta & other pre-release features products, Services, Software & regions to provide feedback.
public preview: All Azure Customers can evaluate the new features
Generally Available (GA): After public preview is completed All customers can use the feature

Monitoring Services & features updates:
Azure updates provides information about the Azure products, Services, & features in addition to product roadmaps & availability.

Questions

CapEx → Allows you to pay monthly, rather than pay upfront for physical

Hybrid Cloud → private & public, on-prim & public.

public → minimal IT Expertise, no CapEx

minimal cost & saas application → Hybrid

*Cloud computing → delivery Computing Services. Such as Compute, power, Storage & Analytics.

private cloud requires the intrastructure to a private network.

* Hybrid cloud → Adv → To augment on-premise resources by providing Overflow Capacity.

* Shared responsibility mode → Install Critical updates on VM.

* Spot Instances reduces cost by taking Adv of unutilized Compute capacity.

* public cloud are better over private → cost are lower & Spread among multiple tenants
no capEx required

* Increasing or decreasing resources to meet a predictable → Scability workload

* Automatically ↑'es or ↓'es resources to meet spikes & drop in demand → Elasticity

* Cloud bursting → cloud based resources are provisioned when on-premises servers reach 100% resource capacity

* paas manages containers orchestrators

* A Subscription have multiple license

* 30 days is the max lenght of time you can use the credit from a Azure free Subscription.

* ExpressRoute traffic is routed through private connection
* Azure App Services Enable us to perform automated deployments from Azure DevOps
* Configure virtual machines to scale vertically by adding compute & memory resources to each virtual machine
* Azure Files Storage is used to deploy a simple application
* Azure Database for postgre Single Server General purpose tier.
  * most cost effective option
  * 1 TB & uses Azure premium storage.
  * point-in-time restore is met by all Azure Database.

Azure postgre SQL single Server Basic tier is limited to 1TB & limited to Azure Standard storage.

Azure Database for Single Server memory optimized tier more Expensive than General purpose tier.

Azure Data. postgre SQL HyperScale (Citus) :- Horizontally Scaled queries across multiple machines using sharding.

Transfer on-premises virtual hard disk to Azure.

Azure Storage Explorer, Azcopy.

Azure geo-redundant storage is for multiple location.

RA-GRS:- read Access for multiple location.

LRS (Locally Redundant Storage) Stores in one datacenter

Standard General-purpose v2 storage acc supports Blob, Queue, Table storage. Services

premium block blobs Storage account only support Blob Storage Service.

Premium File share only support file shares

premium page blobs supports page blob storage which can stored unstructured data, textfiles, images.

Azure DDOS protection standard is not set up Automatically

Linux Costs less than windows

Availiability Zone is Azure region is a combination of a fault domain & an update domain.