Azure

Azure Support Plans: Developer 🡪 Standard 🡪 Professional Direct 🡪 Premier

Public Cloud:

With a public cloud, there is no capital expenditure on server hardware etc. You only pay for cloud resources that you use as you use them

Private Cloud:

A private cloud exists on premises, so you have complete control over security.

Hybrid Cloud:

A hybrid cloud is a mix of public cloud resources and on-premises resources. Therefore, you have a choice to use either.

Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring, and office tools. In this scenario, you need to run your own apps, and therefore require an infrastructure.

SaaS provides a complete software solution which you purchase on a pay-as-you-go basis from a cloud service provider. You rent the use of an app for your organization and your users connect to it over the Internet, usually with a web browser. All of the underlying infrastructure, middleware, app software and app data are located in the service providers data center. The service provider manages the hardware and software and with the appropriate service agreement, will ensure the availability and the security of the app and your data as well.

Platform as a service (PaaS) is a complete development and deployment environment in the cloud. PaaS includes infrastructure servers, storage, and networking but also middleware, development tools, business intelligence (BI) services, database management systems, and more. PaaS is designed to support the complete web application lifecycle: building, testing, deploying, managing, and updating.

A PaaS solution does not provide access to the operating system. The Azure Web Apps service provides an environment for you to host your web applications.  
Behind the scenes, the web apps are hosted on virtual machines running IIS. However, you have no direct access to the virtual machine, the operating system or  
IIS

The IaaS service provider manages the infrastructure, while you purchase, install, configure, and manage your own software  
However, virtual machines are examples of Infrastructure as a service (IaaS). IaaS is an instant computing infrastructure, provisioned and managed over the internet.

OpEx is ongoing costs (costs of operations) such as leasing software, employee salaries. If you purchased software as a one-off purchase, that would be CapEx, but leasing software is ongoing so it’s OpEx

Building a data centre infrastructure is capital expenditure, not operation expenditure

Regions:

Specific geographical location to host your services. Azure provides 60+ regions around the world

Advantages:

1. Low Latency: Can serve from nearest region for faster response
2. High Availability: By deploying in multiple regions, if one region is down. Can serve clients from other regions
3. Global Footprint
4. Adhere to global regulations

Zones:

1. Azure provides multiple availability zones in a region
2. 1 or more discrete data centers
3. Each AZ has independent and redundant power, networking, and connectivity
4. AZ in a region is connected through low latency links

Advantages:

1. Increased availability and fault tolerance within same region

Note: Not all Azure regions has availability zones

Azure Virtual Machines:

To deploy application on cloud we use Virtual Machines. Azure provides Azure Virtual Machines as a service

Features:

1. Create and manage life cycle of VM instances
2. Load Balancing and auto scaling of VM instances
3. Attach storage to virtual machine instances
4. Manage network connectivity and configuration for your VM instances

Azure Virtual Machines - Key Concepts

Image: Choose Operating System and Software

VM Family: Choose the right family of hardware (General purpose or Compute /Storage /Memory optimized or GPU or HPC)

VM Size (B1s, B2s, ...): Choose the right quantity of hardware (2 vCPUs, 4GB of memory) Disks: Attach Virtual Disks to VMs (Block Storage)

Single Instance VM:

* Premium SSD or Ultra Disk: 99.9%
* Standard SSD Managed Disks: 99.5%
* Standard HDD Managed Disks: 95%

Two or more instances in same Availability Set: 99.95%

Availability set is a logical grouping of VMs

* + Fault domains: Group of VMs sharing a common power source and network switch
  + Update domains: Group of VMs that are rebooted (updated) at the same time

Two or more instances in two or more Availability Zones in the same Azure region: 99.99%

Virtual Machine Scale Set:

1. To simplify creation and management of multiple VMs we use Virtual machine Scale Sets
2. Allow us to create and manage a group of Azure VMs, provides high availability to our applications
3. Add a load balancer
4. Distribute VM instances across Multiple AZs
5. Supports Manual scaling and Auto scaling
6. Supports up to 1000 VM instances
7. Static IP Address: Assign a fixed IP address to your VM, public IP addresses are charged per Ip per hour
8. Azure Monitoring: Monitoring of our Azure VM
9. Dedicated Hosts: Physical servers dedicated to one customer

|  |  |  |
| --- | --- | --- |
| **Terminology** | **Description** | **Azure VM** |
| Availability | Are the applications available when user need them? Like low / No down time | Available Sets and Scale Sets |
| Scalability | Can we handle growth in increased traffic, increase / usage of in no of users, without drop in performance? | By increase VM size (Vertical load balancing), Scale Sets and Load Balancers |
| Resilience | Ability of system to provide acceptability behaviour even when one or more parts of the system fail | Scale Sets and Load balancers |
| Geo Distribution | Distribute applications across regions and zones | Scale Sets and Load balancers |
| Disaster Recovery | How to keep your systems running in face of disasters? | Site Recovery |
| Managing Costs | You want to keep costs low | Auto scaling, Reservations, Spot instances |
| Security | Secure your VMs | Dedicated hosts |

Virtual Scaling:

1. Deploying application/database to bigger instance:

* A larger hard drive
* A faster CPU
* More RAM, CPU, I/O, or networking capabilities

1. In Azure: We can increase VM size

There are limits to vertical scaling

Databases:

Database Snapshots to safeguard the data on timely intervals.

Transaction logs:

Create a process to copy it over to the seconds

Standby database:

Will setup a secondary db which will have a continuous sync with primary db, by this we can have a high availability as we have secondary db as standby, no need to get the snapshots from primary db can get them from secondary db so that primary db won’t be slow.

Availability: Whenever we need data is our data available, can be achieved by multiple standby. 99.99 is good. Have multiple standby for high availability

Durability: Will my data available after 100 or 1000 years. Can be achieved by taking multiple snapshot, standby and transaction logs. 99.99999999 is considered good. Have multiple copies of the data in multiple zones and regions for high durability

RTO and RPO:

Recovery Time objective: Maximum acceptable down time

Recovery Point Objective: Maximum acceptable period of data loss

Achieving minimum RTO and RPO is expensive

Trade off based on criticality of data

Hot Standby – RPO -1min, RTO -5mins

Warm Standby – RPO -1 min, RTO – 15 mins

Consistency:

Strong Consistency: Synchronously replication to all replicas

Eventual Consistency: Async replication, A little lag few seconds before changes is available in all replicas

Read-after-Write consistency: Inserts are available immediately

Categories of Databases:

1. Relational DB
   1. Predefined schema with tables and relationships
   2. Offer strong transaction capabilities
   3. Used for OLTP (online Transaction processing)
   4. Used for OLAP (Online Analytics processing)

Recommended Azure Managed Services:

Azure SQL Database: Managed Microsoft SQL server

Azure DB for MYSQL: Managed MySQL

Azure DB for PostgreSQL: Managed PostgreSQL

1. mysql --host=mysql-mycode.mysql.database.azure.com --user=mysqlmycode@mysql-mycode -p
3. create database todos;
4. use todos;
5. create table user (id integer, username varchar(30) );
6. describe user;
7. insert into user values (1, 'Ranjith');
8. insert into user values (2, 'Ramesh');
9. select \* from user;

For Analytics we have Azure Synapys DB

Azure Cosmos DB is nosql db provided by Azure

In-memory DB Azure Cache for Redis

Azure App Service:

Fully managed platform for building, deploying, and scaling web apps, also supports REST APIs and mobile backends

Natively supports .NET, .NET Core, Node Js, Java, Python and PHP

Choose App service plan: define a set of compute resources for a web app

Features:

Automated deployment and management

Auto Scaling

Build in Load Balancing

Imp Points:

Azure support plans 🡪 Developer, Standard, Professional Direct, Premier

Azure support plan doesn’t support Basic

You are tasked with deploying Azure virtual machines for your company.  
You need to make use of the appropriate cloud deployment solution. 🡪 IAAS

Azure Machine Learning Studio 🡪 build, test, and deploy predictive analytics for the AI solution

1. Cloud computing has many benefits like
   1. Cost-effective
   2. Global (Can launch services anywhere in the world (any region))
   3. Secure
   4. Reliable (data backup, DR, Data replication , fault tolerance, etc)
   5. Scalable
   6. Elastic
   7. Current (Software/hardware upgrades/patches can be applied without any interruption or with min interruption)
2. Capital expenditure vs Operational Expenditure
3. Azure **region** is a grouping of multiple data centers. A Microsoft Azure **region** is a set of data centers deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network.
4. In Azure, each **region** is paired with another region 300 miles away. Only one region updated at a time to ensure there are no outages
5. Azure **Geo Redundant Storage** replicates data to a secondary region automatically ensuring that the data is durable even in the event of primary region non recoverable
6. Not all Azure services are available in every region. **Recommended** region provides the broadest range of service capabilities and is designed to support availability zones now or in the future. **Alternate (other) Region** extends Azures footprint within a data residency boundary where a recommended region also exists. Not designed to support AZs.
7. **GA** services are ready to use by public everyone.
8. Azure cloud services are categorized as 3 types.  These categories determine when the services are available.
   1. **Foundational**: When GA, immediately or in 12 months in Recommended regions and Alternate (Other) Regions
   2. **Mainstream:**When GA, immediately or in 12 months in Recommended regions. May become available in Other regions based on customer demand.
   3. **Specialized:** Available based on customer demand in both Recommended and Other regions.
9. Azure has **specialized regions** to meet compliance and legal reason
10. **AZ** is made up of one or more data center. Region generally contains 3 AZ (\*\*).  Azure labels AZ as 1, 2, 3.
11. An **Availability Zone** in Azure is a combination of Fault domain and Update Domain.
    1. **Fault Domain**: Logical grouping of hardware to avoid single point of failure within AZ. It’s a group of VMS that share power and network.
    2. **Update Domain**: Update domain ensure that resources doesn’t go offline during software or hardware update.
12. **Availability set** is a logical grouping that we can use in Azure to ensure that the VMs we place in Availability Set are different fault/update domains to avoid down time.

**While creating the VM we can set the Availability Set**

1. Azure has following has the following Computing Services
   1. **Virtual** **Machines**
   2. **Azure** **Container** **instances** (Docker as a service- Run containerized apps without VMs and servers)
   3. **Azure** **Kubernetes** Service (AKS)
   4. **Azure** **Service** **Fabric** (Container as a service – Runs in Azure or onprem)
   5. **Azure** **Functions** – Serverless
   6. **Azure** **Batch** – For plan, schedule and execute batch workloads
2. Azure has following has the following Storage Services
   1. **Azure Blob Storage** – Serverless storage. Store large files and large amounts of unstructured files
   2. **Disk Storage –** A virtual volume (SSD/HDD). Encryption by default
   3. **File Storage-** Can be accessed as a file server (Eg: SMB)
   4. **Queue Storage** – Messaging Queue
   5. **Table storage** – No SQL wide column database. Independent of any schema
   6. **Databox/Databox Heavy** – Briefcase compute to store Terabytes/petabytes of data.
   7. **Archive storage** – Long term cold storage
   8. **Data lake storage** – Centralized repo to store structured and unstructured
3. Azure has following has the following Database Services
   1. **Cosmos** **DB**: NoSQL Database. 99.999% availability.
   2. **SQL** **Database**: Fully managed MS SQL Database
   3. **Azure** **Database**: Fully managed MySQL, Postgres, Maria DB
   4. **SQL** **Servers** **on** **VM**: Lift and Shift MS SQL Servers from On-prem to Cloud
   5. **Azure** **Synapse** **Database** (Previously known as **SQL Dataware house**): Fully managed Dataware House
   6. **Azure** **Database** **Migration** **Service**: Migrates the Database without any code change to the application
   7. **Azure** **Cache** **For** **Redis**: In memory Cache
   8. **Azure** **Table** **Storage**: Wide Column NoSQL Database
4. Azure has following has the following Application Integration Services
   1. **Notifications Hub**: Pub/sub
   2. **API Apps**: API Gateway
   3. **Service Bus:** Messaging as a Service(MAAS)
   4. **Azure Stream Analytics**: Serverless real-time analytics
   5. **Logic Apps**: Schedule, Automate and orchestrate tasks, business processes and work flows. Serverless workflows using Azure functions.
   6. **API Management**: Hybrid, Multi cloud management Platform for APIs across all environments

\*\* **API Apps** is about hosting APIs, whereas **API management** is about managing APIs.

* 1. **Azure Queue Storage**

1. Azure has following has the following Developer and Mobile Tools
   1. **Signal R Service**: Realtime messaging. Easily adds real-time web functionality to applications.

Azure SignalR Service is a fully-managed service that allows developers to focus on building real-time web experiences without worrying about capacity provisioning, reliable connections, scaling, encryption or authentication.

* 1. **App Service:** Easy to use service for deploying and scaling web-applications with .Net, Java, Node, Python, PHP, etc
  2. **Visual Studio**: IDE
  3. **Xamarin**: Mobile App-Framework to create powerful and scalable native mobile apps with .Net and Azure

1. Azure has following has the following Devops Services
   1. Azure Boards
   2. Azure Pipelines
   3. Azure Repos
   4. Azure Test Plans
   5. Azure Artifacts – Create, Host and Share packages
   6. Azure DevTest Labs- Fast, Easy and lean dev test env
2. **Azure Resource Manager** is an **IAC** (Infrastructure as Code) allows us to create Azure Resources programmatically using JSON Templates. So ARM provides consistency across Azure Environments.
3. **Azure Quick Start Templates** is a library of **pre-made ARM templates** provided by community or partners to help us to quickly launch new projects.
4. **Virtual Network(vNet)** is a logically isolated section of Azure Network where we launch Azure Resources.
5. **Subnet** is a logical partition of IP Network into multiple smaller network segments. Subnets need to have a smaller CIDR range than VM.
6. Here is the list of Azure Cloud Native Networking Services
   1. **Azure DNS**: Provides ultra fast DNS response and ultra high domain availability
   2. **Azure Vnet**
   3. **Azure Load Balancer**: OSI (Open System Interconnection) Level 4 Load Balancer
   4. **Azure Application Gateway**: OSI Level 7 Load Balancer and also apply web app firewall
   5. **Network Security Group**: Firewall at subnet level
7. Here is the list of Enterprise/Hybrid Networking Services (Networking from OnPrem to Cloud)
   1. **Azure Front Door:** Scalable and secure entry point for fast delivery of global applications

\*\* Both Front Door and Application Gateway are layer 7 (HTTP/HTTPS) load balancers, the primary difference is that Front Door is a non-regional service whereas Application Gateway is a regional service.

* 1. **Azure Express Route**: A connection between onPrem to Cloud from 50Mbps to 10GBPS
  2. **Virtual WAN:** A networking service that brings many networking, security and routing functionalities together to provide single operational interface
  3. **Azure Connection**: VPN Connection that securely connects two Azure local networks via IPSec.
  4. **Virtual Network Gateway:** Site to site VPN between Azure and local network

1. **Azure Traffic Manager** operates at DNS layer to Direct DNS requests to routing method. It supports following Routing methods
   1. **Performance**
   2. **Weigted**
   3. **Priority**
   4. **GeoGraphic**
   5. **Multivalue**
   6. **Subnet**
2. Traffic Manger
   1. Route requests to servers which geographically near to reduce traffic
   2. Fail-over to redundant systems in case of system failure of primary server
   3. Route to Random system to simulate A/B Testing
3. **Azure DNS** allows to host domain names on Azure. It doesn’t allow you to purchase the domains. It allows only managing DNS
4. **Azure Load Balancer** is used to evenly distribute traffic. Using **LB** we can create
   1. Public load balancer which distribute traffic from internet to public facing servers
   2. Private load balancer to distribute traffic from internal servers to Private servers (having Private IP)
5. **Scale Sets** Increase/decrease the no.of VMs based on
   1. CPU, memory, Disk and network performance.
   2. Predefined schedule
6. Azure has the following IOT Services
   1. **IOT Central**: Connect IOT devices to cloud
   2. **IOT Hub**: Ensures Highly secure and reliable communication between IOT applications
   3. **IOT Edge**: Fully managed service built on Azure IOT Hub. It allows data processing and analysis near the IOT devices.
   4. **Windows 10 IOT core services:** A cloud services subscription that provides essential services needed to commercialize a device on Windows 10 IOT Core.

**Azure IoT Central** is a fully managed global IoT SaaS (software-as-a-service) solution that makes it easy to connect, monitor, and manage your IoT assets at scale.

**Azure IoT Hub** is managed service to enable bi-directional communication between IoT devices and Azure

1. Azure has the following BigData and Analytic Services
   1. **Azure** **Synapse** **Analytics**: Dataware house intended for running SQLs on large data sets
   2. **HDInsight**: Open Source Analytics software such as Hadoop, Kafka and Spark
   3. **Azure** **DataBricks**: Apache Spark based analytics platform

\*\* HDinsight Spark cluster is like a Hortonworks or cloudera cluster with their components hive, ozzie, etc.. In the other hand Databricks is only a **Spark cluster** where you can interact with other azure components.

* 1. **Datalake analytics**: On demand analytics service that simplifies bigdata. It is a storage repository that stores huge amount of raw data in its native format until needed.

1. Azure has the following AI/ML Services
   1. **Azure Machine Learning service**: Simplifies running AI/ML workloads by allowing us to build flexible pipelines. Use Python, R and Run DL workloads such as Tensorflow
   2. **Azure Machine Learning Studio(Classic)**: An older service that manages AI/ML workloads. Doesn’t support pipeline. Workloads transformation to new service is not easy.

1. **Azure Personalizer** delivers rich personalized experience for every user.  It helps applications choose the best content item to show its users
2. **Translator** Adds real time multi language text translation to apps, websites and tools
3. **Anomaly Detector** Detects anomalies in data
4. **Azure Bot Service** Intelligent serverless Bot Service that scales on demand
5. **Form Recognizer** automate extraction of text, key/value pairs and tables from documents
6. **Computer Vision** easily customize computer vision models for unique use cases.  
   Azure's Computer Vision service gives us access to advanced algorithms that process images and return information based on the visual features you're interested in.
7. **Language Understanding** Build natural language understanding to apps, bots, IOT.
8. **QnA Maker** Create a conversational question and answer bot from your existing content.
9. **Text Analytics** Extract information such as sentiment, key phrases, named cities and language from text (its an entity recognizer)
10. **Content Moderator** moderate text and images to provide safer and more positive user experience. Azure Content Moderator is an AI service that lets you handle content that is potentially offensive, risky, or otherwise undesirable.
11. **Face** detect and identify people and emotions in images
12. **Ink Recognizer** recognizes digital ink content, such as handwriting, shapes and document layout.
13. Azure has the following Serverless Services
    1. **Azure Functions**: Runs small amount of code in java, c#, javascript, python, powershell
    2. **Blob** **storage**: Serverless object storage
    3. **Logic** **apps**: Allows us to build serverless workflows composed of Azure functions.
    4. **Event Grid:** Uses pub/sub messaging system
14. **Azure Portal** is the dashboard to access azure services. We can utilize new features in
    1. Preview
    2. Beta
    3. Other pre-release
15. If we want to test preview features then use **preview.portal.azure.com.  Azure services** are accessible from the normal portal whereas preview UI is accessible from separate.
16. **Portal.azure.com** provides stable and production ready services.
17. **Powershell** is built on top of .Net Common Language Runtime.
18. **Azure Trust center** is a public facing providing easy access to private, security and regulatory compliance information
19. **Azure Security and Compliance programs**:
    1. Criminal Justice information service (CJIS)
    2. Cloud Security Alliance Start Certification
    3. General Data protection Regulation (GDPR)
    4. EU Model Classes
    5. Health Insurance Portability and Accountability Act (HIPAA)
    6. ISO27018
    7. Multi-Tier Cloud Security (MTCS) Singapore
    8. Service Organization Controls (SOC) 1, 2 and 3
    9. National Institute of Standards and Technology (NIST) Cybersecurity Framework (CSF)
    10. UK-Government G-Cloud
    11. Federal Information Processing Standard (FIPS) 140-2

1. **Azure Active Directory** is Microsoft’s cloud based Identity and Access Management Service. It can be used to implement SSO.
2. **Azure AD** comes in four editions
   1. **Free**: MFA, SSO, Basic Security, Usage report and User management
   2. **Office** **365** **Apps**: Company Branding, SLA, sync between On-prem and Cloud
   3. **Premium 1:** Hybrid Architecture, Advanced Group Access, Conditional Access
   4. **Premium2:** Identity Protection, Identity Governance
3. **Azure Security Center** is a unified infrastructure Security Management System. It strengthen the security posture of data centers and provides advanced threat protection across hybrid workloads in the cloud.  
   **Microsoft Azure Security Center** is a set of tools for monitoring and managing the security of virtual machines and other cloud computing resources within the Microsoft Azure public cloud.
4. **Azure Security Center** is a cloud security posture management system(**continuous process of cloud security improvement and adaptation to reduce the likelihood of a successful attack),** automatically checking for misconfigurations in the cloud set-up
5. **Key Vault** helps to safeguard Cryptographic keys and other secrets used by the cloud apps and services.
6. **Key Vault** supports many functionalities:
   1. **Secrets management:** store and control access to tokens, passwords, certificates, API keys and other secrets
   2. **Key management:** Create and control the encryption keys for data encryption
   3. **Certificate management:** Easily provision, manage and deploy public and private SSL certificates
   4. **Hardware Security Module:** Secrets and Keys can be protected either by software of FIPS 140-2 Level 2 validated HSM.
7. **Hardware Security Module (HSM)** is a piece of hardware designed to store encryption keys.
8. **HSMs** that are multi-tenant are FIPS 140-2 compliant.
9. **HSMs** that are single-tenant are FIPS 140-3 compliant.
10. **Azure** offers two tiers of **DDOS** Protection
    1. **DDOS Protection Basic**
       1. Free
       2. Already turned on. Protects all Azures global network
    2. **DDoS Protection Standard**
       1. Starting at $2994/month
       2. Metrics, Alerts, Reporting
       3. DDos Expert Support
       4. Application and Cost Protection SLA
11. **Azure Firewall** is a managed cloud-based network security service that protects your Azure Virtual network services.
12. Azure Firewall Features:
    1. Centrally create, enforce, log application and network connectivity **policies across subscriptions and virtual networks**
    2. Uses a **static public IP** address for your virtual network resources allowing outside firewalls to identify traffic originating from your Virtual Network.
    3. HA is built IN. **No additional load balancers are required**
    4. Can configure during deployment to **span multiple AZs for increased availability**
    5. **No additional cost** for firewall deployed in an AZ.
    6. **Additional cost** for inbound and outbound data transfers associated with AZs
13. **Azure Information Protection (AIP)** protects sensitive information such as mails and encryption, restricted access and rights and integrated security in office apps
14. **Application Gateway** is a web traffic load balancer (Layer 7) that route traffic based on set of rules. WAF can be attached for additional security
15. **IDS** Intrusion Detection System, **IPS** Intrusion Protection system is a device or software that monitors network or systems for malicious activity or policy violations
16. **Azure Advanced Threat Protection (ATP)** is a cloud based security solution that leverages on-prem Active Directory signals to identify, detect and investigate advanced threats, compromised identities and malicious insider actions directed at the organizations
17. **Microsoft Security Development Lifecycle (SDL)** is an industry leading software assurance process. SDL played a critical role in embedding security and privacy in Microsoft software and culture.
18. **Building security into each SDL Phase** of the development lifecycle helps us to catch issues early and it helps us to reduce the development costs.
19. Here is the SDL Phases
    1. Training
    2. Requirements
    3. Design
    4. Implementation
    5. Verification
    6. Release
    7. Response
20. **Azure Policies** allows us to enforce or control the properties of resources. Azure Policy evaluates resources in Azure by comparing the properties of those resources to business rules. These rules are described in JSON format and they are called Policy Definition.
21. **Role Assignments** is the way to control access to resources. A role assignment consists of :
    1. **Security Principal :** It can be User, Group, Service Principal, managed identity
    2. **Role Definition:** Collection of permissions like read, write and delete.
    3. **Scope:** Scope can be set at RG, Subscription and Management group (Group of account)
22. Azure has built-in roles like Owner, Contributor, Reader and User Access Administrator and we can also define custom roles.
23. By **locking resources** we can protect the resources from Accidentally deleting or modifying. In Azure portal we can see the following lock levels:
    1. CannotDelete (DELETE)
    2. ReadOnly
24. **Management Groups** helps in managing multiple subscriptions into hierarchical structure.

1. **Azure Monitor** is a comprehensive solution for collecting, analyzing and acting on telemetry from cloud and local on-prem environments.
2. **Azure Service Health** is the information about current and upcoming issues like:
   1. Service impacting events
   2. Planned maintenance
   3. And other changes that may effect availability
3. **Azure status** informs about service outages in Azure. **Azure Service Health** is a personalized view of health of Azure services and regions we are using.
4. **Azure Resource Health** is the information about the individual cloud resources
5. **Azure Advisor** is a personalized cloud consultant that helps us to follow **best practices** to optimize Azure deployments.
6. **Azure Advisor Dashboard** displays recommendations about
   1. **HA**
   2. **Security**
   3. **Performance**
   4. **Cost**
   5. **Operation Excellence**
7. **SLA** describes the commitments for uptime and connectivity. SLA’s are individualized per Service. Azure doesn’t provide SLA’s for free tier or shared tiers.
8. **Service Credits** is a compensation for an under performing Azure Product or service based on **SLA**. It’s a discount applied on the bill.
9. Different services are having different SLA’s. If we combine all these SLAs then it will be a composite SLA.
10. **Total Cost of Ownership** (TCO) generates a detailed report and it can be exported as a PDF.
11. Azure has 4 support plans:
    1. Basic
    2. Developer
    3. Standard
    4. Professional Direct
    5. Premier

The Premier support plan provides customer specific Architectural support such as design reviews, performance turning, configuration and implementation assistance.

Professional Direct support plant provides only Architectural Guidance.

1. **Azure Hybrid Benefit** (or) **Azure Hybrid Use Benefit** (HUB) gives the customers the right to use their windows server related existing licenses. HUB can be turned on and off at anytime for existing VMs. HUB can be applied at deployment time for new VMs.
2. Azure Subscription is same as Azure Account. There are 4 tiers of Azure subscription.
   1. Free Subscription ($200 initially for 30days, Credit card required)
   2. Pay As You Go Subscription (PAYG, Credit card required)
   3. Enterprise Agreement (Azure and Enterprise agrees for certain discount on cloud services)
   4. Student Subscription( No Credit card , $100 free credits for 12 months and valid student email required)
3. Using **Azure Cost Management** we can perform cost-analysis and visualize the spending of cloud resources. WE can also create budgets and alerts on particular threshold.
4. **Azure Sentinel** is a **SIEM** (Security Information and Event Management) and Security Orchestration and Automated Response (**SOAR**) system in Microsoft's public cloud platform  to assist clients with a birds-eye view across a certain project..
5. **Azure Defender** for Cloud is a tool for security posture management and threat protection. It strengthens the security posture of your cloud resources, and with its integrated Microsoft Defender plans, Defender for Cloud protects workloads running in Azure, hybrid, and other cloud platforms.
6. Azure Security Center and Azure Defender are now called **Microsoft Defender** for Cloud.
7. The Azure Defender pane inside the Azure Security Center shows you whichworkloads are protected by Azure Defender or not.
8. Azure Storage supports three types of blobs:
   1. **Block blobs** store text and binary data. Block blobs are made up of blocks of data that can be managed individually. Block blobs can store up to about 190.7 TiB.
   2. **Append blobs** are made up of blocks like block blobs, but are optimized for append operations. Append blobs are ideal for scenarios such as logging data from virtual machines.
   3. **Page blobs** store random access files up to 8 TiB in size. Page blobs store virtual hard drive (VHD) files and serve as disks for Azure virtual machines. For more information about page blobs
9. There is **no upfront commitment** in **DDos. DDos** supports Always-on monitoring and automatic network attack mitigation
10. DDoS is not a type of rule.
11. **Azure Reservations** help you save money by committing to one-year or three-year plans for multiple products.
12. As per **Microsoft Online Subscription Agreement** The customer is responsible for maintaining the confidentiality of any non-public authentication credentials associated with your use of the Online Services. Customers must promptly notify Microsoft's customer support team about any possible misuse of accounts or authentication credentials or any security incident related to the Online Services.
13. Greater scalability and agility are not characteristics of a **private cloud**.
14. Advantages of Microsoft Azure hybrid clouds include the following options below:
    1. **Control**: An organization can maintain a private infrastructure for sensitive assets in azure.
    2. **Flexibility**: An organization can take advantage of additional resources in the public cloud when needed in azure.
    3. **Cost-effectiveness**: With the ability to scale to the public cloud, an organization pays for extra computing power only when needed in azure.
    4. **Ease**: Transitioning to the cloud doesn't have to be overwhelming because an organization can migrate gradually, phasing in workloads over time in azure.
15. Only those who **pay for premium** azure services receive alerts, notifications, and incident data proactively.
16. **Azure** **defender** cost is not fixed.
17. To actively manage all resources we need resource group not inventory.
18. **Azure firewall** utilize IP addresses and domains data to protect victims of attacks? The data collected becomes part of the Microsoft Threat Intelligence Feed for Azure services
19. **Private Previews** are limited to select Microsoft users who beta-test a product during development. Public preview is for all
20. Outbound traffic results in an added charge, whereas ingress does not.
21. Azure Pay-as- you-go is an **OpEx** not a **CapEx**. Azure Reserved Instances and Azure Reserved Capacity allow you to buy capacity in advance. So they are **CapEX**.
22. 65,535 is the uppermost limit for traffic when managing NSG groups.
23. To utilize any Microsoft Azure Marketplace offering, even if it is free, you must install and configure the offering on an active account.
24. A scale set is a virtual machine that can be deployed across multiple update and fault domains to maximize availability, which also ensures resiliency due to data center outages and unplanned maintenance events for Microsoft Azure.
25. **SDK support** is not a legitimate feature in app service plan
26. **Standard SSD** is appropriate for backup, recovery, and noncritical storage and is also useful for web servers, lightly used applications, and web-based applications in Microsoft Azure
27. **An Azure geography** is an area of the world that contains at least one Azure region
28. **Microsoft Azure Machine Learning Studio** is a web portal in Azure Machine Learning for low-code and no-code options for model training,
29. **Azure Blueprints** service is designed to help with environment setup. This setup often consists of a set of **resource groups, policies, role assignments, and Resource Manager** (ARM) template deployments.
30. **An ARM Template** is the basic model from which each Server gets created.
31. A **Blueprint** is a saved workflow that can be defined and re-played at any time on the platform.
32. **ARM templates** are documents typically stored locally or in source control outside of Azure. **Azure Blueprints** are stored in Azure.
33. AzureChinaCloud,AzureGermanCloud,AzureUSGovernment are all **sovereign clouds**.
34. **Sovereign clouds** are architected and built to deliver security and data access that meets strict requirements of regulated industries and local jurisdiction laws on data privacy, access and control
35. Azure VM can have **stopped** and **Stopped (Deallocated)** states. The first stopped option we will reach the VM using RDP and to turn off operating system inside. In other words, it is same as turning off and turning on your computer in your daily life. Even stopped the VM with this process, you will continue to be charged because of allocated resources (cpu, ram etc. ) on the VM is not released. Because you are charged for using resouces by Microsoft Azure. While an Azure VM is in the “**Stopped (Deallocated)”** state, you will not be charged for the VM compute resources. However, you will still need to pay for any OS and data storage disks attached to the VM.
36. All **previews** are excluded from Microsoft **SLAs** and warranties.
37. From an SLA perspective of Microsoft Azure, the key metrics are RPO and RTO
38. A **99.99% VM uptime SLA** is offered when two or more VMs are deployed across two or more Availability Zones within an Microsoft Azure region.
39. Azure PowerShell can be installed on Linux, Windows, and macOS.
40. A resource group is a container that holds related resources for an Azure solution.
41. **Blob storage** is designed for:
    1. Serving images or documents directly to a web browser
    2. Storing files for distributed access
    3. Streaming video and audio
    4. Writing to log files in cloud
    5. Storing data for backup and restore, disaster recovery, and archiving for all data
    6. Storing data for analysis by an on-premises or Microsoft Azure-hosted service
42. **Logic Apps** simplifies app integration, data integration, system integration, enterprise application integration (EAI), and business-to-business (B2B) communication, whether in the cloud, on premises, or both
43. **Conditional Access** is the tool used by Azure Active Directory to bring signals together, to make decisions, and to enforce organizational policies. Conditional Access is at the heart of the new identity-driven control plane. Conditional Access can be used to block or grant access from specific **locations**.
44. **Azure Government** uses the same underlying technologies as Global Azure.
45. Microsoft Azure **Active Directory B2B** is meant for enterprise businesses, while **B2C** is for consumers.
46. Setting the scope for the current user as Administrator or Superuser is not supported in Microsoft Azure.
47. Just In Time (JIT) vms can be enabled using Azure Security Center
48. Azure Information protection (AIP) can be used to mask sensitive information like credit card, bank account, phone numbers. AIP can encrypt documents and Emails.
49. Security Center Blade from Azure Portal should be used to evaluate whether your company Azure environment meets regulatory requirements.
50. Most of the Azure servicers are introduced in private preview before being introduced in public and GA
51. Services in private or public preview are usually offered at reduced cost. However, the costs increase not decrease when the services are released to GA.
52. To store the data disks of a VM we can use Blobs (or BLOB Containers).
53. In Chrome OS/Android Laptop use Bash in Cloud shell to create VM
54. Azure Active Direcoty P2 has an SLA of 99.9% where for free tier there is no SLA. When uptime is below SLA, user will get credits.
55. Azure supports PAYG, Enterprise agreement (EA) and Microsoft Customer Agreement(MCA)
56. To use different payment options per department, we need to create separate subscription per department.
57. We cant merge two subscriptions but we can move resources between subscriptions.
58. A company store resources under multiple subscriptions. But one resource will be part of one subscription.
59. Azure advisor provides recommendations for Application Gateway, App Services, Availability sets, Azure Cache, Data factory, DB for Mysql/PSQL/MariaDB, express Route, Cosmos DB, Public IP address, Synapse Analytics, SQL servers, storage accounts, traffic manager profiles and VMs.
60. Azure Advisor doesn’t provide inputs about Security of Active Directory and Network settings.
61. A tenant in AD represents an Organization
62. An Azure AD tenant can have multiple subscription but Azure Subscription can only be associated with one Azure AD Tenant.
63. We can change Azure AD tenant to which an Azure subscription is associated.
64. If subscription expires, we will lose access to all the other resources associated with the subscription but the Azure AD remains in Azure. We cant even start the VMs.
65. Azure CDN is a globally distributed network of servers that can efficiently deliver web content to consumers. CDN can be used for best video play back experience.
66. SLA guaranteed uptime for paid Azure services is at least 99.9%. SLA uptime can be increased by adding resources in multiple regions.  SLA cant be increase by adding more subscriptions.
67. Azure Traffic manager is a DNS based traffic load balancer
68. To access VM from the internet over HTTP we need to modify the firewall.
69. In azure outbound traffic is charged under normal rate whereas inbound traffic is free
70. Traffic between azure services within same **region** is always free.
71. **Microsoft online services privacy statement** explains what data Microsoft processes, how Microsoft processes the data and purpose.
72. **GDPR** defines protection and privacy rules and it applies to companies that offer goods services to individuals in EU. Azure can provide GDPR compliant infra
73. Federation is a collection of domains that have established trust.
74. Access to Azure resources can be provided using third party cloud services and on-prem AD. This is known as Federation.
75. Azure Activity Log store events for 90 Days.
76. Azure App Services, Azure Storage and SQL DB are examples for PAAS
77. **Azure monitor** can monitor the performance of on-prem computers, and it can also send alerts to **Azure AD** Security Groups in the form of Emails. It can also trigger alerts based on data in Azure log Analytics workspace.
78. B2S is one of the instance type. Though 2 VMs are having same B2S size the cost might vary as they might have different disk configuration.
79. If the data is stored in Archive access tier then Azure storage account must be **rehydrated** before the data can be accessed.
80. When you are implementing SAAS solution then you are responsible **for configuring** SAAS solution
81. Azure resources under single resource group can be from Different regions. If we assign tag to RG then it doesn’t applicable for azure resources. If you set permissions to RG then all the azure resources inherit the permissions.
82. If a Resource Group has delete lock, to delete the RG, the admin must remove the lock.
83. We are charged for read and write operations in General Purpose V2 storage accounts apart from Storage charges.
84. Transferring data between Azure Storage Accounts in Different Regions is not free. You should be charged for the read operations at the source storage account and write operations in the destination storage account.
85. Azure AD is used to retrieve security Tokens by an application connect.
86. If there are multiple installations required for application setup then use IAAS instead of PASS.
87. Azure advisor can generate a list of VMs that are **not protected by** Azure Backup. If we implement security recommendations provided by Azure Advisor then organization secure score will increase. There is **no requirement** to implement the security recommendations provided by Azure Advisor.
88. Monthly uptime= (maximum available minutes-downtime)/Max available minutes\*100
89. US government Entity and US Government Contractor can use Azure Government. Azure Government is a dedicated public cloud for federal/state agencies in US.
90. From Azure portal we can distinguish between services that are generally available and services that are in public preview.
91. Public preview services are not recommended for production but no one stops you in using production.
92. AD is a cloud based Service. So it doesn’t need domain controllers.
93. User accounts in Azure AD can be assigned multiple licenses for Different Azure or Microsoft 365 services.
94. For products governed by Modern Life Cycle policy, Microsoft provides minimum 12 months notice before ending support for a service.
95. Azure Free account has 200$ spending limit, 5GB blob storage and 5GB file storage. Supports only 10 web, mobile or api. 60min CPU with1GB RAM and 1GB diskspace.
96. There are different replication options in Azure. The minimum replication option is Locally Redundant Storage(LRS) which creates 3 copies of data.  Data is not backed-up by Azure another data centers. Storage limit is 2PB in US and Europe where 500TB in other regions.
97. Azure IoT HUB can route messages to Blob Storage and Data lake storage Gen2.
98. Paas Doesn’t provide full control of OS. PAAS provides ability to scale the platform automatically. PAAS solutions in Azure provides professional development services to continuously add features to custom application.