1. Introduction to Azure

Basics of Azure

- **Question:** What is Microsoft Azure, and what are its key services?
  Answer: Microsoft Azure is a cloud computing platform offering various services such as computing, storage, networking, AI, and databases. Key services include Azure Virtual Machines (VMs), Azure App Services, Azure Kubernetes Service (AKS), Azure SQL Database, Azure Storage, and Azure Functions.

Azure Regions and Availability Zones

- **Question:** What are Azure Regions and Availability Zones, and why are they important?
  Answer: Azure Regions are geographical areas where Microsoft hosts its data centers. Availability Zones are physically separate locations within a region that provide high availability by isolating failures between zones. They are important for ensuring resiliency and disaster recovery.

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2. Azure App Services

App Service Plan

- **Question:** What is an Azure App Service Plan, and how does it affect application performance?
  Answer: An App Service Plan defines the region, features, scaling, and pricing tier for an Azure App Service. It determines the resources (CPU, memory) allocated to your web apps, APIs, and functions, directly impacting performance and cost.

Deployment Options

- **Question:** What are the different deployment options available for Azure App Services?
  Answer: Azure App Services support several deployment options, including:

  - **Azure DevOps Pipelines:** CI/CD pipelines for automated deployments.

  - **Git:** Direct push from Git repositories.

  - **FTP/FTPS:** Manual file uploads.

  - **Local Git:** Git deployment to Azure without a remote Git server.

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3. Azure Functions

Serverless Architecture

- **Question:** What is Azure Functions, and how does it fit into a serverless architecture?
  Answer: Azure Functions is a serverless compute service that automatically scales based on demand and charges only for the resources used. In a serverless architecture, developers focus on code execution without managing infrastructure, which is automatically provisioned by Azure.

Triggers and Bindings

- **Question:** What are triggers and bindings in Azure Functions?
  Answer:

  - **Triggers:** Define how Azure Functions are invoked (e.g., HTTP trigger, Timer trigger, Event Grid trigger).

  - **Bindings:** Provide a way to connect to services like Azure Storage, Cosmos DB, and Service Bus without writing boilerplate code.

4. Azure Storage

Azure Blob Storage

- **Question:** What is Azure Blob Storage, and what are its common use cases?

  Answer: Azure Blob Storage is a service for storing large amounts of unstructured data, such as images, videos, and backups. Common use cases include data lakes, static website hosting, and backups.

Storage Tiers

- **Question:** What are the different storage tiers in Azure Blob Storage, and when would you use each?

  Answer: The storage tiers are:

  - **Hot:** For frequently accessed data.

  - **Cool:** For infrequently accessed data that must be stored for at least 30 days.

  - **Archive:** For long-term storage of data that is rarely accessed.

5. Azure Virtual Machines (VMs)

Virtual Machine Sizes and Pricing

- **Question:** How do you choose the right Azure VM size for your application?

  Answer: Azure VM sizes are chosen based on the application's resource requirements such as CPU, memory, and disk throughput. Pricing also varies based on the VM size, and different VM series (e.g., D-series, E-series, B-series) are optimized for different workloads.

Scaling Azure VMs

- **Question:** How can you scale Azure VMs?

  Answer: VMs can be scaled vertically (changing to a larger or smaller VM size) or horizontally (adding more instances using Virtual Machine Scale Sets). Horizontal scaling is ideal for load-balanced, stateless applications.

6. Azure Kubernetes Service (AKS)

Basics of AKS

- **Question:** What is Azure Kubernetes Service (AKS), and why would you use it?

  Answer: AKS is a managed Kubernetes service in Azure that simplifies container orchestration, scaling, and management. It abstracts away the complexity of managing Kubernetes clusters, making it ideal for deploying, scaling, and managing containerized applications.

AKS Scaling

- **Question:** How do you scale an AKS cluster?

  Answer: AKS clusters can be scaled automatically using the **Cluster Autoscaler** to adjust the number of nodes or manually via the Azure portal or CLI. You can also scale pods based on resource utilization using Kubernetes' **Horizontal Pod Autoscaler**.

7. Azure Identity and Security

Azure Active Directory (Azure AD)

- **Question:** What is Azure Active Directory, and how does it integrate with Azure services?
  Answer: Azure AD is Microsoft's cloud-based identity and access management service. It allows users to authenticate and access Azure resources and integrates with services like Azure App Services and Microsoft 365 for single sign-on (SSO) and multi-factor authentication (MFA).

Role-Based Access Control (RBAC)

- **Question:** How is RBAC used in Azure to manage access to resources?
  Answer: RBAC allows granular control over who can perform specific actions on Azure resources. Users are assigned roles (e.g., Owner, Contributor, Reader) that define their permissions at different scopes (resource group, subscription, or resource level).

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8. Azure Networking

Azure Virtual Network (VNet)

- **Question:** What is an Azure Virtual Network (VNet), and how is it used?
  Answer: An Azure VNet is a private network that enables secure communication between Azure resources like VMs and PaaS services. VNets can be segmented into subnets, connected to on-premises networks via VPNs, or peered with other VNets for private communication.

Load Balancer vs Application Gateway

- **Question:** What is the difference between Azure Load Balancer and Application Gateway?
  Answer:

  - **Azure Load Balancer** operates at the transport layer (Layer 4) and distributes traffic based on source IP and port.

  - **Azure Application Gateway** operates at the application layer (Layer 7), providing advanced routing features like URL-based routing, SSL termination, and Web Application Firewall (WAF).

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9. Azure SQL Database

Scaling Azure SQL Database

- **Question:** How do you scale an Azure SQL Database?
  Answer: Azure SQL Database can be scaled vertically by changing the service tier or the number of DTUs/vCores and horizontally by using Elastic Pools to distribute resources across multiple databases or by sharding the data across multiple databases.

High Availability in Azure SQL

- **Question:** How does Azure SQL Database provide high availability?
  Answer: Azure SQL Database provides built-in high availability through a redundant architecture. Data is automatically replicated across three nodes in a region, and in the premium tier, it supports zone-redundant databases to provide additional resiliency across Availability Zones.

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10. Azure DevOps and CI/CD

Azure DevOps Pipelines

- **Question:** What is Azure DevOps Pipelines, and how does it facilitate CI/CD?

  Answer: Azure DevOps Pipelines is a CI/CD service that automates the process of building, testing, and deploying applications to any platform, including Azure. Pipelines support multiple languages and integrate with Git repositories for continuous integration and delivery.

Continuous Deployment with Azure DevOps

- **Question:** How do you set up continuous deployment using Azure DevOps Pipelines?

  Answer: Continuous deployment is set up by configuring a release pipeline in Azure DevOps that automatically deploys new builds to Azure App Services, VMs, or AKS after successful testing. You can also use approvals and gates to control the deployment process.

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11. Azure Monitoring and Logging

Azure Monitor and Application Insights

- **Question:** What is Azure Monitor, and how does it help in monitoring applications?

  Answer: Azure Monitor collects, analyzes, and acts on telemetry from Azure resources and applications. It provides insights into application performance, infrastructure health, and logs via services like Application Insights (for app-level monitoring) and Log Analytics (for querying logs).

Setting Alerts in Azure Monitor

- **Question:** How do you set up alerts in Azure Monitor?

  Answer: You can set up alerts in Azure Monitor by defining metric or log-based conditions that trigger when a threshold is breached. Alerts can be configured to send notifications via email, SMS, or integrations with ITSM tools like PagerDuty.

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12. Azure Logic Apps and Functions

Logic Apps vs Azure Functions

- **Question:** What is the difference between Azure Logic Apps and Azure Functions?

  Answer:

  - **Azure Logic Apps** is a low-code service for automating workflows and orchestrating services using predefined connectors.
  - **Azure Functions** is a serverless compute service where developers write custom code to respond to events or triggers. Logic Apps are ideal for business workflows, while Functions are better for custom, event-driven compute tasks.

Automating Workflows with Logic Apps

- **Question:** How do you automate workflows using Azure Logic Apps?

  Answer: You can automate workflows by creating Logic Apps that connect to various services using built-in connectors (e.g., Office 365, Azure Blob Storage, SQL Server). Logic Apps can be triggered by events like HTTP requests, timers, or external services.

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13. Azure Resource Management

ARM Templates

ARM Templates

- **Question:** What are Azure Resource Manager (ARM) templates, and how are they used?
  Answer: ARM templates are JSON files that define the infrastructure and configuration of Azure resources. They are used to automate the deployment of Azure resources in a consistent and repeatable manner. ARM templates support parameters and conditions, enabling flexible, customizable deployments.

```
{ "$schema": "https://schema.management.azure.com/schemas/2019-04-
01/deploymentTemplate.json#", "contentVersion": "1.0.0.0", "resources": [ { "type":
"Microsoft.Storage/storageAccounts", "apiVersion": "2019-04-01", "name": "
[parameters('storageAccountName')]", "location": "[resourceGroup().location]",
"sku": { "name": "Standard_LRS" } } ] }
```

Deploying Resources with ARM Templates

- **Question:** How do you deploy resources using ARM templates?
  Answer: ARM templates can be deployed using several methods:

  - **Azure Portal:** Upload the template in the Azure portal.
  - **Azure CLI:** Use the `az deployment group create` command to deploy the template.
  - **Azure PowerShell:** Use the `New-AzResourceGroupDeployment` cmdlet to deploy the template.

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14. Azure Automation

Azure Automation Runbooks

- **Question:** What are Azure Automation Runbooks, and how are they used?
  Answer: Azure Automation Runbooks are scripts used to automate tasks in Azure. They are written in PowerShell, Python, or graphical formats and can be scheduled or triggered by events. Common use cases include automating VM shutdowns, patching, and resource scaling.

```
Start-AzVM -ResourceGroupName "MyResourceGroup" -Name "MyVM"
```

Desired State Configuration (DSC)

- **Question:** What is Azure Automation DSC, and how does it ensure compliance?
  Answer: Azure Automation DSC is a service that ensures the configuration of resources stays

consistent with a predefined state. It automatically applies the configuration and monitors for changes, ensuring compliance across environments by continuously applying the desired state.

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15. Azure Service Bus and Messaging

Azure Service Bus

- **Question:** What is Azure Service Bus, and when would you use it?
  Answer: Azure Service Bus is a fully managed enterprise message broker that allows applications to communicate asynchronously through messages. It is ideal for decoupling applications, load leveling, and enabling reliable communication between distributed systems.

Queues vs Topics

- **Question:** What is the difference between Azure Service Bus queues and topics?
  Answer:

  - **Queues:** Used for point-to-point communication, where each message is processed by a single consumer.

  - **Topics:** Used for publish-subscribe communication, where messages are delivered to multiple subscribers based on filtering criteria.

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16. Azure API Management (APIM)

API Management

- **Question:** What is Azure API Management (APIM), and how does it help in managing APIs?
  Answer: Azure API Management is a service that allows you to create, manage, secure, and monitor APIs. It provides features such as request throttling, caching, authentication, and analytics, making it easier to manage and scale APIs in a secure way.

Policies in APIM

- **Question:** What are policies in Azure API Management, and how are they applied?
  Answer: Policies are configurations that modify the behavior of APIs in APIM. They can be used to enforce security, log requests, cache responses, and transform payloads. Policies are defined in XML and applied at different levels such as global, API, or operation levels.

```
<inbound> <rate-limit calls="10" renewal-period="60" /> </inbound>
```

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17. Azure Cosmos DB

Cosmos DB

- **Question:** What is Azure Cosmos DB, and what are its key features?
  Answer: Azure Cosmos DB is a globally distributed, multi-model NoSQL database service. It offers low-latency and high-availability features across multiple regions, with support for various data models, including document, key-value, graph, and column-family models.

Consistency Levels

- **Question:** What are the different consistency levels in Azure Cosmos DB?
  Answer: Cosmos DB provides five consistency levels, allowing trade-offs between consistency, availability, and performance:

  - **Strong:** Ensures reads return the most recent write.
  - **Bounded Staleness:** Guarantees that reads lag behind writes by a defined time or version window.
  - **Session:** Guarantees consistency for a single client session.
  - **Consistent Prefix:** Guarantees that reads return data in the order of writes.
  - **Eventual:** Provides the lowest latency but no guarantee of the order of reads.

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18. Azure Key Vault

Azure Key Vault

- **Question:** What is Azure Key Vault, and why is it used?
  Answer: Azure Key Vault is a service that securely stores and manages sensitive information such as secrets, encryption keys, and certificates. It ensures that applications do not store sensitive information directly in code and provides secure access through access policies and RBAC.

Accessing Secrets from Key Vault

- **Question:** How do you access secrets from Azure Key Vault in an application?
  Answer: You can access secrets from Azure Key Vault in an application using the Azure SDK or directly from Azure services that integrate with Key Vault. Secrets can be retrieved using the `SecretClient` in the Azure SDK.

```
var client = new SecretClient(new Uri("https://myvault.vault.azure.net/"), new
DefaultAzureCredential()); var secret = await client.GetSecretAsync("MySecret");
```

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19. Azure Event Grid and Event Hubs

Azure Event Grid

- **Question:** What is Azure Event Grid, and how does it differ from Event Hubs?
  Answer: Azure Event Grid is a fully managed event routing service that delivers events from various sources to event handlers. It uses a push-based model. In contrast, Azure Event Hubs is a data streaming platform used to ingest large volumes of data in real time for telemetry and analytics purposes.

Event Grid Use Cases

- **Question:** What are some common use cases for Azure Event Grid?
  Answer: Common use cases include:

  - **Serverless Event-Driven Architecture:** Triggering Azure Functions when new blobs are added to storage.
  - **Real-Time Notifications:** Notifying subscribers when resource state changes in Azure.
  - **Workflow Automation:** Automatically triggering workflows based on events from various Azure services.

20. **Azure Cost Management**

Monitoring and Managing Costs

- **Question:** How do you monitor and manage Azure costs effectively?
  Answer: Azure Cost Management and Billing provides tools for tracking and optimizing your Azure spend. You can set budgets, configure cost alerts, and analyze spending patterns to identify inefficiencies. Using Reserved Instances and optimizing resource usage are common ways to reduce costs.

Azure Pricing Tiers

- **Question:** What are Azure pricing tiers, and how do they impact service costs?
  Answer: Azure services often offer multiple pricing tiers based on performance, redundancy, and features. Choosing the appropriate tier (e.g., Basic, Standard, Premium) impacts the cost and service capabilities. For example, an Azure SQL Database in the Basic tier will have fewer resources than one in the Premium tier but at a lower cost.