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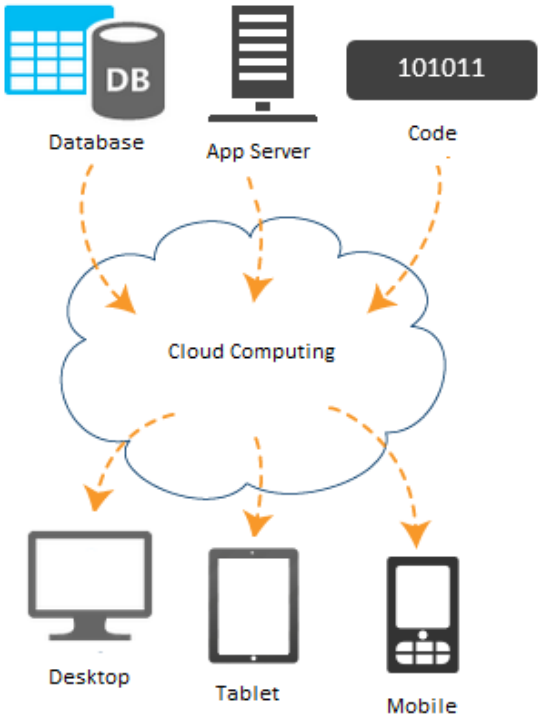
Cloud Computing

Q1. What is Cloud Computing?

Ans. Cloud computing is a way to deliver computing as a service rather than a product. It is completely based on the Internet. Cloud computing provides on-demand hardware (like Server), storage, application hosting and other services. In this way, it reduces the need for having your local servers or personal devices to configure and manage your services and applications.



Q2. What are the key characteristics exposed by Cloud Computing?

Ans. The key characteristics of cloud computing are given below-

1. **Scalability and Elasticity** - Scalability allows you to handle the increasing workload by increasing the number of resources or its capacity-on-demand or based upon the usage of the resources.
   Elasticity allows you to use or free, a resource capacity dynamically. It is measured based upon the speed as the resources are requested on-demand and the usage of the resources.

2. **Maintenance** - Maintenance of a cloud computing application is easier, as it does not require to be installed on each user's machine. Also, the applications which are deployed or running on the cloud, you don't need to install on each system. Everyone can access it using the internet.

3. **Reliability** - Your deployed application or database multiple copies are maintained by the cloud vendors, which makes well-designed cloud computing suitable for business continuity and disaster recovery.

4. **Cost -** Cloud vendors always charge only for the usages and used storage. If a resource is not in use, you don't need to pay extra cost for any unused resource.

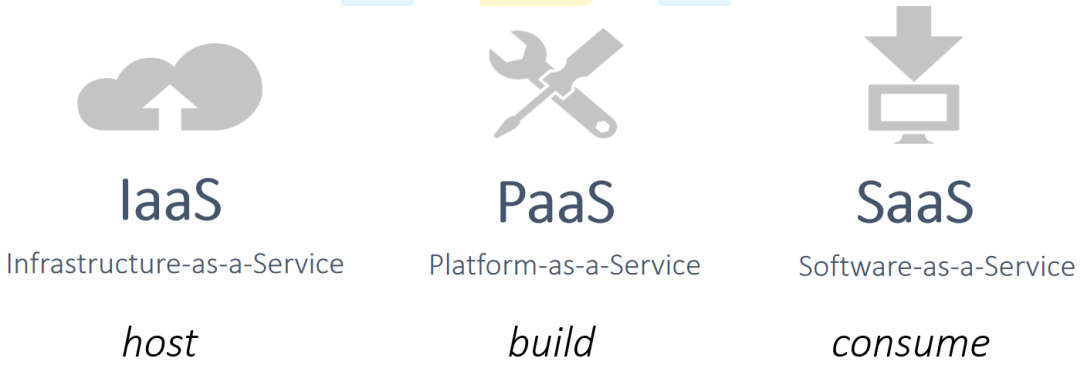
5. **Security** – All the created resources are secured by each cloud vendors. Even they are certified from various certification authorities which ensure your privacy and data security.

Q3. Why you Choose a Career in Cloud Computing?

Ans. Cloud Computing is in demand because of its benefits and easiness. Every year, demand is increasing with 20% annual growth. Also, it expected to reach $200 billion markets by 2020. Moreover, all the MNCs or corporates are migrating their existing applications, data and resources to Cloud. This is providing an enormous growth opportunity for each in the market.

Q4. What are the offerings of cloud computing?

Ans. Cloud computing service offering can be classified into three categories like SaaS, PaaS and IaaS.



Q5. What is a cloud vendor or cloud service provider?

Ans. A Cloud is just a combination of hardware (computer, other devices), networks, storage, services, and interfaces that help in delivering computing as a service. It has mainly three users - end user, business management user, and cloud service provider.

The end-user uses the services provided by the cloud. The business management user takes care of the data and the services provided by the cloud. The cloud service provider is responsible for the maintenance of the IT assets of the cloud.

Q6. Who are the main Cloud vendors or providers in the market?

Ans. Amazon Cloud Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), VMWare, IBM Cloud, Alibaba etc. are the major Cloud vendors in the market which are providing the

Q7. What are the reasons you should choose Azure instead of AWS?

Ans. There are the following reasons you should choose Azure over AWS:

- Azure is growing faster than AWS from last 4 years 2016, 2017, 2018, 2019.
- Azure provides more integrated support for .Net related applications.
- Azure provides a better ROI to existing Microsoft clients.
- Azure aligns with Microsoft .Net technologies, open sources and other widely used technologies.

2

Introducing Microsoft Azure

Q1. What is Microsoft Azure?

Ans. Microsoft Azure is an open and flexible cloud platform that serves as the development, data storing, service hosting and service management environment. Microsoft Azure provides developers with on-demand compute and storage to host, scale, and manage web applications on the internet through Microsoft data centers.

Microsoft Azure helps you to build and manage enterprise-level web, mobile, IoT apps faster using your existing skills and technologies you know.

Q2. What are Microsoft Azure Advantages?

Ans. These are the following advantages of Microsoft Azure:

- Reduce the effort and costs of IT management
- Reduce the cost of building and extending on-premises resources
- Respond quickly to changes in your business & customer needs
- Choose on-premises or off-premises deployment model that suits you
- Scale your IT resources up and down based on your needs
- Consume computing resources ONLY when the needs arise
- Remove the need to manage hardware
- Use your existing development skills to build cloud applications
- Consistent development and management experience across on-premises and the cloud

Q3. What are the different types of hosting offered by Azure?

Ans. Azure provides three types of Hosting:

1. **Public Cloud** where the hosting infrastructure is in Microsoft premises.

2. **Private Cloud** where the hosting infrastructure is in your own premises.
3. **Hybrid Cloud** where the hosting infrastructure can be in Microsoft or AWS or your premises.

Note: Private Cloud is required in case the Customer needs to ensure that the sensitive data is not going outside their infrastructure boundaries.

Q4. What are the different types of services offered by Azure?

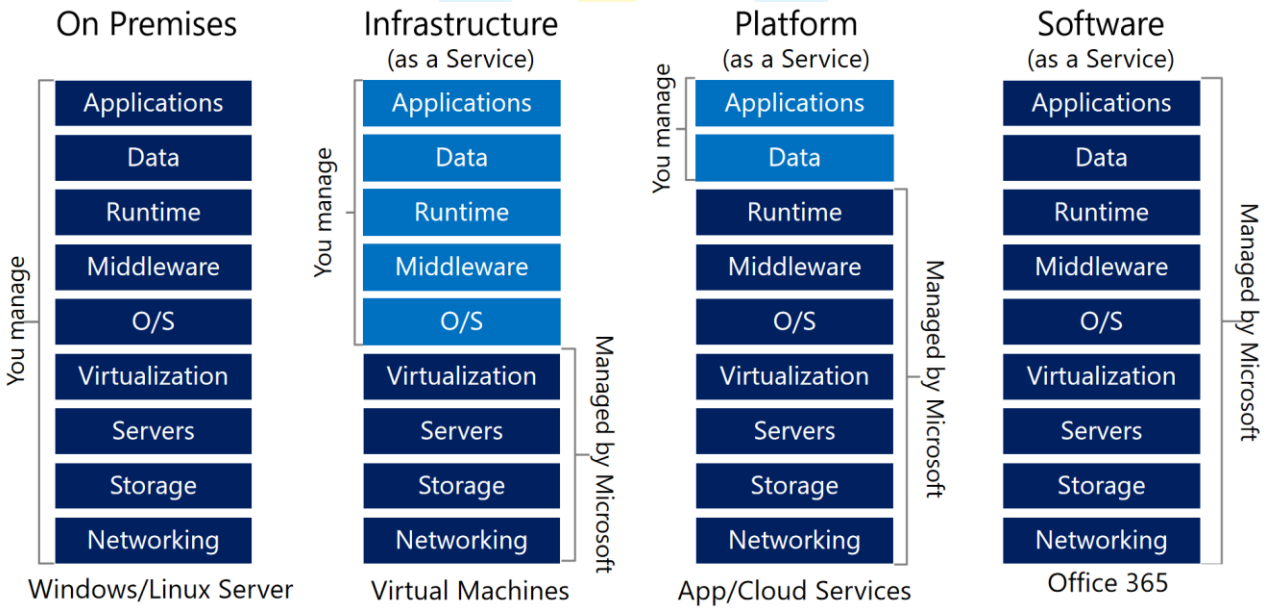
Ans. Azure offers all three types of cloud services:

1. **IaaS (Infrastructure as a Service) -** IaaS is an infrastructure provided by the cloud service vendor to create, run and manage VMs that run on the vendor's infrastructure. Depending on the vendor, you can create a VM running Windows or Ubuntu or Linux and install anything you want on it. In IaaS, you don't have control over the hardware or virtualization software, but you have control over the creation, running and management of VMs. So unlike PaaS, you are completely responsible for it.

   For Example, Microsoft Azure provides the ability to set up virtual networks, load balancers, storage and many other services that run on its infrastructure.

2. **PaaS (Platform as a Service)** - PaaS is a platform provided by the cloud service vendor, where you can deploy your existing application. This makes the developers free from the infrastructure management and allows them to focus on development rather than environment.

   For Example, Web Apps and Cloud Services offered by Microsoft Azure can be used to deploy your app without knowing the nuts and bolts of hosting environment.



3. **SaaS (Software as a Service) -** SaaS is software that is centrally hosted and managed for the end customer. So that all customers can access it. Even, it can be scaled out from one instance to multiple instances to provide the best performance in all locations. SaaS is usually provided by a monthly or annual subscription.

   For Example, Microsoft Office 365, Dropbox, WordPress and Amazon Kindle etc.

Q5. What are Microsoft Azure role-based certification exams or paths?

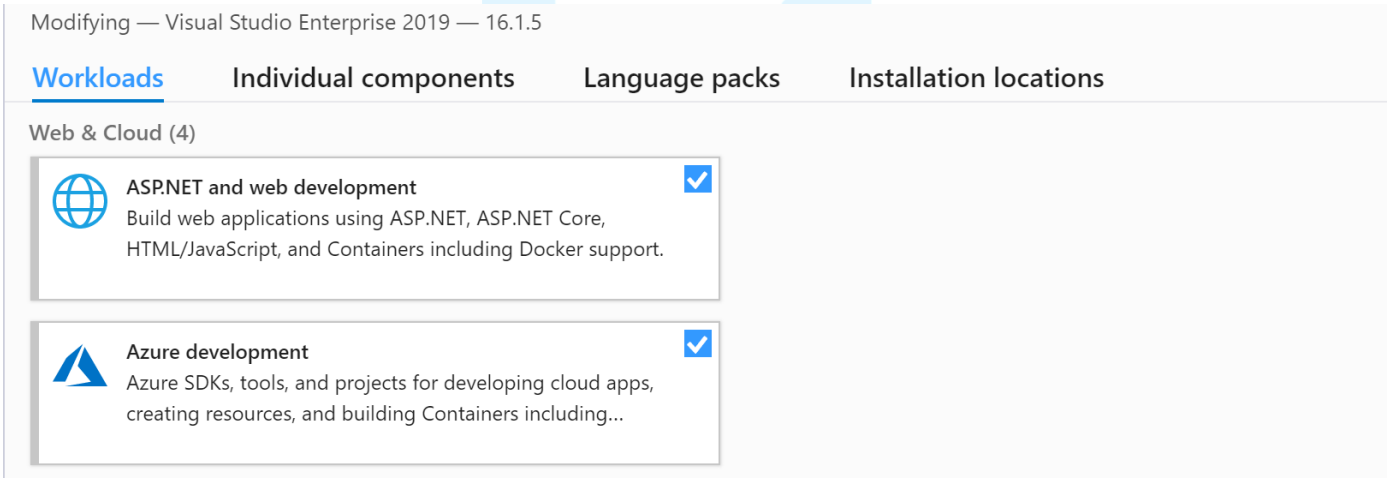
Ans. Microsoft announced new roles based Azure certification paths for Administrators, Developers, Solutions Architects and DevOps Engineer who are working with Microsoft Azure Cloud platform. These new certification paths have been introduced based on technical roles and working, rather than covering the broad range of Microsoft Azure features and services to each of them.

Role-based Certification Badges

The new role-based certifications will help you to be aligned with your technical role and skills. Earn a role-based Azure certification and make a bright career in Microsoft Azure as a Developer, Administrator, Solutions Architect or DevOps Engineer.

Q6. How to setup Visual Studio for Azure Development?

Ans. For Azure development Visual Studio 2017 or higher is recommended. Please do install Azure development tools using Visual Studio installer as shown in below pic.



Q7. What is a Resource group?

Ans. A resource group is a logical container for created resources in Azure. An ARM resource can exist only in one resource group. A resource group is created in a region and it can have the resources from the other regions. All resources within the resource group share the common lifecycle.

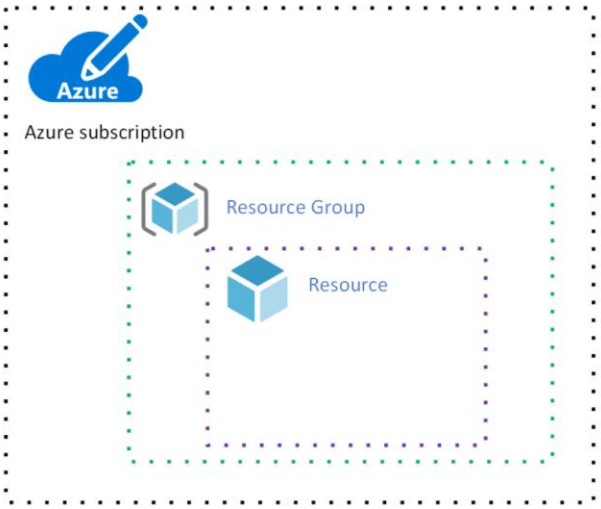


Image Source: https://docs.microsoft.com/en-us/azure/architecture/cloud-adoption/governance/resource-consistency/azure-resource-access

Q8. Can you move a resource from one group to another?

Ans. Yes, you can. A resource can be moved among resource groups.

Q9. How many resource groups a subscription can have?

Ans. A subscription can have up to 800 resource groups. Also, a resource group can have up to 800 resources of the same type and up to 15 tags.

Q10. What are Tags?

Ans. Tags are used to categorize the resources for management and billing. For example - All resources for a project are tagged with project tag and value as a project name. You can search resources based on tag value.

Q11. What are the ways to manage resources in Azure?

Ans. Resources in Azure can be managed by using the following options:

- Azure Portal
- PowerShell
- Azure CLI

All these three options use REST API endpoints to communicate with the Azure Resource Manager to manage (create, update and delete) the resources.

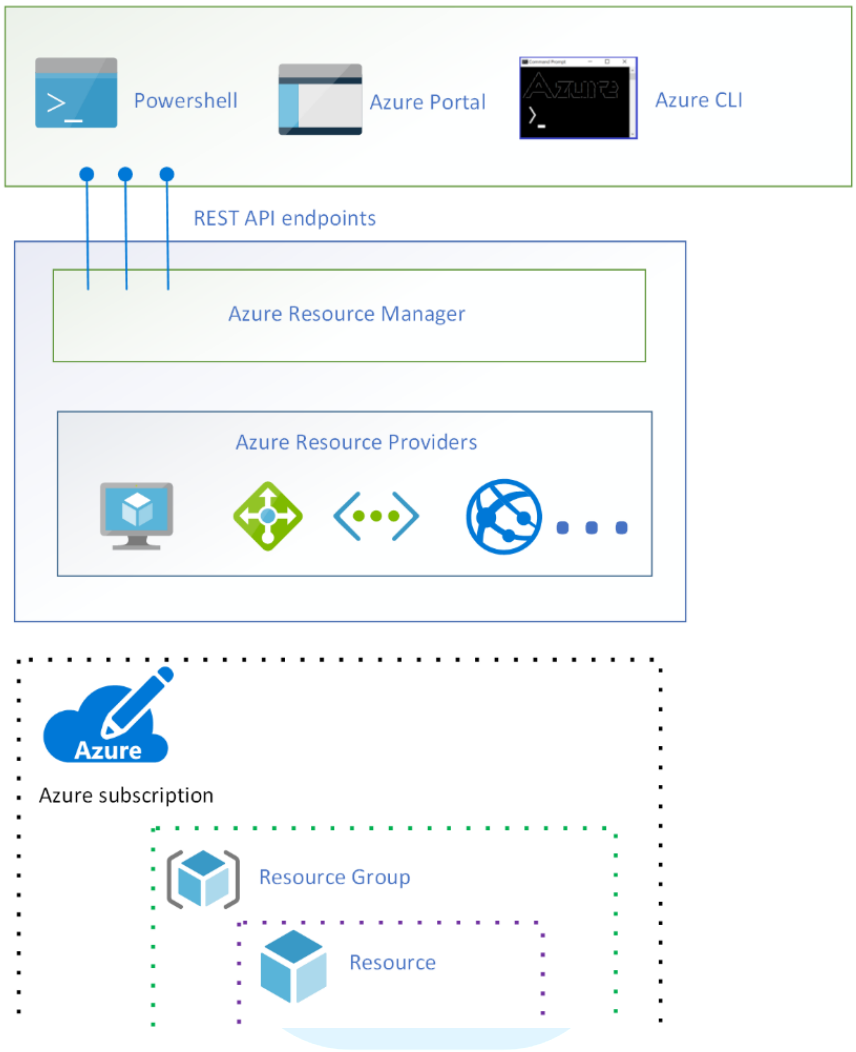


Image Source: https://docs.microsoft.com/en-us/azure/architecture/cloud-adoption/governance/resource-consistency/azure-resource-access

Q12. What is Azure CLI?

Ans. A cross-platform command line tools for managing Azure resources and services. It is used for executing the script to automate tasks. You can also use it in your browser with Azure Cloud Shell. It can be installed on Windows, Mac, Linux, Ubuntu and Docker.

Q13. What is PowerShell?

Ans. PowerShell is a command-line shell designed for system administrators. It is used for task automation and configuration management. It is based on the .NET framework and will install with windows OS.

Q14. Case Study: You are working on a migration project from on-premises to Azure. How will you map the following technologies used by your current project to Azure?

- SQL Database
- Virtual Machines
- Large File Storage
- Frequent Data Read
- Data Aggregation
- Full-Text Search
- Stateless Services
- NoSQL Database
- Video Streaming
- MSMQ
- External Authentication

Ans. Following are the technologies mapping for local resources in Azure.

Local Resources	Azure Resources
SQL Database	SQL Azure
Virtual Machines	Azure Virtual Machines
Large File Storage	Azure BLOB Storage
Frequent Data Read	Azure Redis Cache
Data Aggregation	Azure Data Lake
Full-Text Search	Azure Search
Stateless Services	Azure Functions
NoSQL Database	Cosmos DB
Video Streaming	Azure Media Service
MSMQ	Service Bus
External Authentication	Azure Tokens

3

Azure Virtual Machine

Q1. What is Azure Virtual Machine?

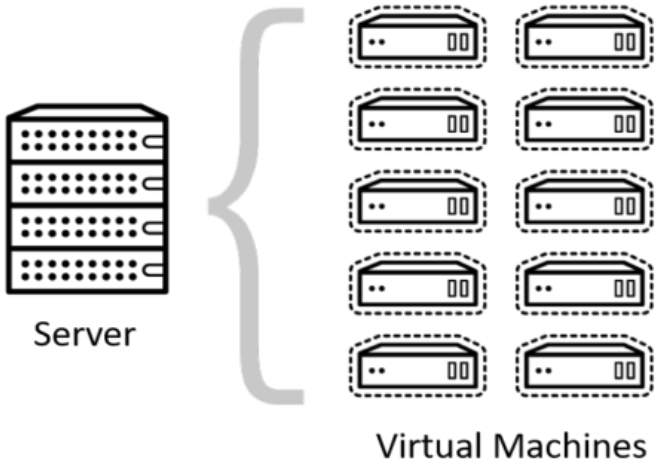
Ans. Azure Virtual Machines are on-demand computing resources or virtual machines offering of Microsoft Azure. We can typically use a VM as a service when required and shut down the system when not in use. The Azure Virtual Machines are listed under Infrastructure as a service (IaaS) category in Azure.

With Azure Virtual Machines we get more control over the environment to customize the development environment or hosting. In fact, the concept behind the Azure Virtual Machine is the same that runs the entire cloud platform – Virtualization.

Q2. What is Virtualization?

Ans. Virtualization is a process of sharing resources like compute, storage, network and cloud service so that it is virtually available. We can create a virtual machine (VM) in our own system too by sharing the Hardware configurations. Similarly, in large data centers, cloud service providers share some physical servers to be made available to many cloud service consumers by the process called virtualization.

Azure VMs are part of hardware virtualization. An advanced topic will be discussed in a separate section for software virtualization called Containerization.



Q3. Explain Azure VM architecture?

Ans. An Azure VM architecture contains the following components:

- **Resource Group –** A resource group a logical container for all related resources based on the lifetime of resources. This also helps to provide access to users for a particular set of resources attached to the same resource group.
- **Virtual machine -** This can be created in Azure by the portal, PowerShell or Azure CLI from the list of published images or by a custom image VHD file uploaded into Azure Blob.
- **Temporary disk -**The VM also has a temporary disk stored on a physical drive on the host machine. It is not persisted during reboot events.

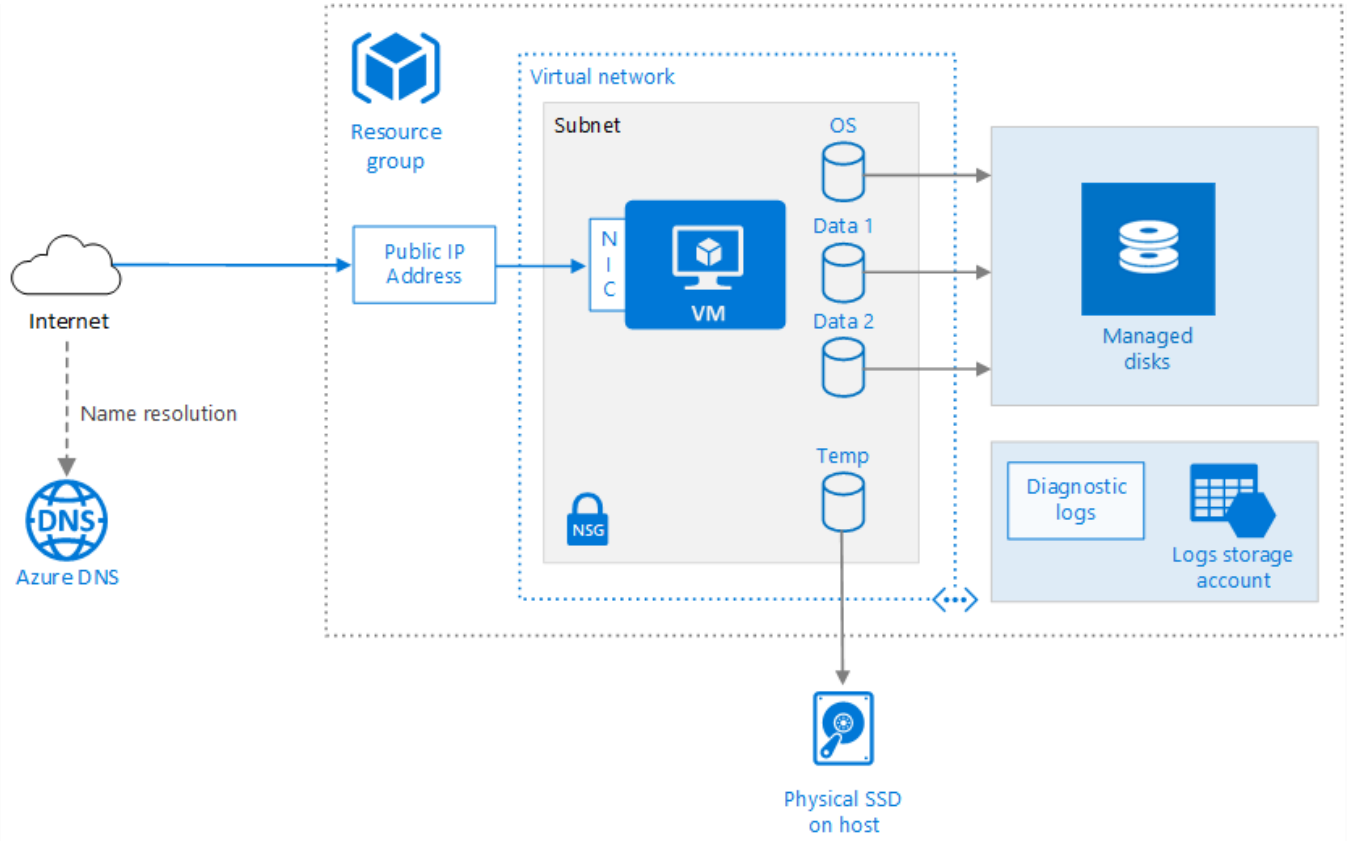


Image Source: https://docs.microsoft.com/en-us/azure/architecture/reference-architectures/n-tier/windows-vm

- **Virtual network –** VMs can be deployed in a separate Virtual network (VNet) that can be divided into multiple subnets to support different layers of application architecture. Each Subnet should be associated with different Network Security Group (NSG) with defined inbound and outbound rules which takes care of allowing or denying web traffic.
- **Network Interface –** The Network Interface (NIC) allows the VM to be configured for the Virtual Network.
- **Public IP –** A public IP address is by default added with a VM. This is used to communicate with VM from the outside like Remote Desktop.

Q4. What are various VM size available in Azure?

Ans. In Azure Portal, you can create a VM from the available list of the pre-loaded OS images from the marketplace. Both Windows and Linux virtual machines have similar size and type of VMs available in the marketplace.

1. **General purpose –** Sizes: Av2, B, Dv2, Dv3, DSv2, Dsv3 These sizes of Azure VMs are generally used for small or medium traffic web servers and can be used as a development or test environment. It has a balanced CPU to memory ratio.
2. **Compute optimized -** Sizes: F, Fs, FSv2 This category is optimized for running heavy background workloads. This size group is suitable for medium traffic web server and has high CPU to memory ratio.
3. **Memory Optimized –** Sizes: Ev3, ESv3, G, M, GS These VMs have High memory to CPU ratio and recommended for relational databases and in memory analytics.
4. **Storage Optimized –** Size: Ls This VM category is suitable for large databases like No SQL and Big Data storage. It has high throughput and IO operations.
5. **GPU optimized -**Sizes: NV, NC, NCv2, NCv3 GPU optimized VM sizes are specialized virtual machines available for high-density graphical rendering work or video editing. These sizes are designed for compute-intensive, graphics-intensive, and visualization workloads.
6. **High Performance –** Size H This is the highest power category VM with the highest throughput and network interfaces.

Q5. What is Availability Set?

Ans. Availability Set is a Logical grouping of VM resources to ensure that the VMs are Isolated from each other. This is to ensure High Availability during hardware failures.

Q6. What are Fault Domains?

Ans. A set of racks in a data center that has a common power source. This means that if the power supply goes off, the VMs deployed in those set of racks will shut down. Like how we organize bookshelves in a library, a particular shelveset for a particular section of books can be considered to a fault domain.

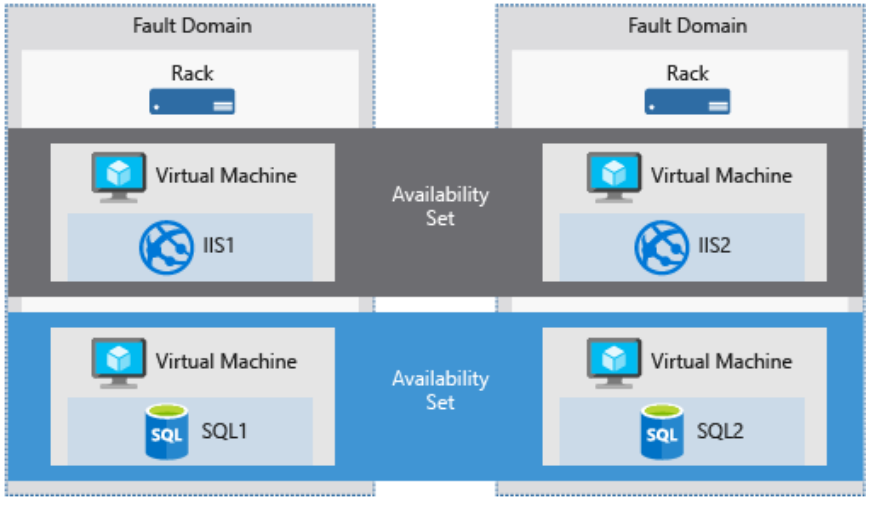


Image Source: https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability

Q7. What are Update Domains?

Ans. One rack in a Fault domain is called update domain. This can be considered as one unit in a cabinet of hardware or one unit of the subsection in a book shelve. Multiple update domains are part of a fault domain. If the power goes off for the fault domain, the update domains automatically go down.

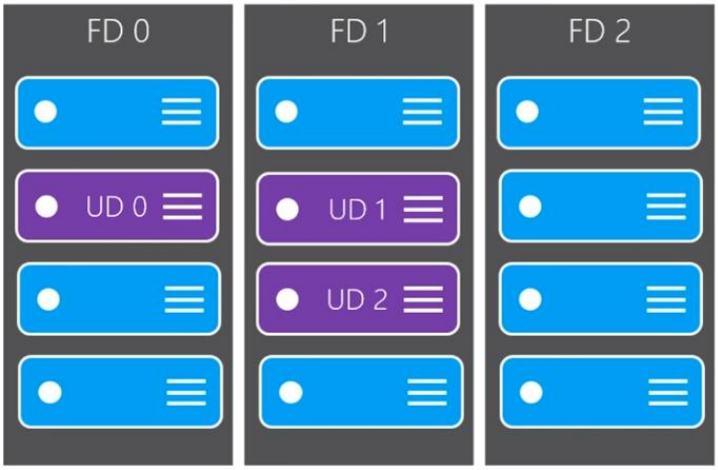


Image Source: https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability

By default, Azure deploys the virtual machines in an availability set in 3 Fault domains and 5 update domains. We can configure it to use up to 20 update domains. It is recommended to have different availability sets for web servers and API servers.

Q8. Can you assign an existing VM to an availability set?

Ans. No, you cannot assign an existing VM to an Availability Set. You should first create an availability set and then while creating VMs you should associate Availability Set to VM.

Q9. What are the steps to create highly available VMs?

Ans. Following steps, you need to follow to create highly available VMs:

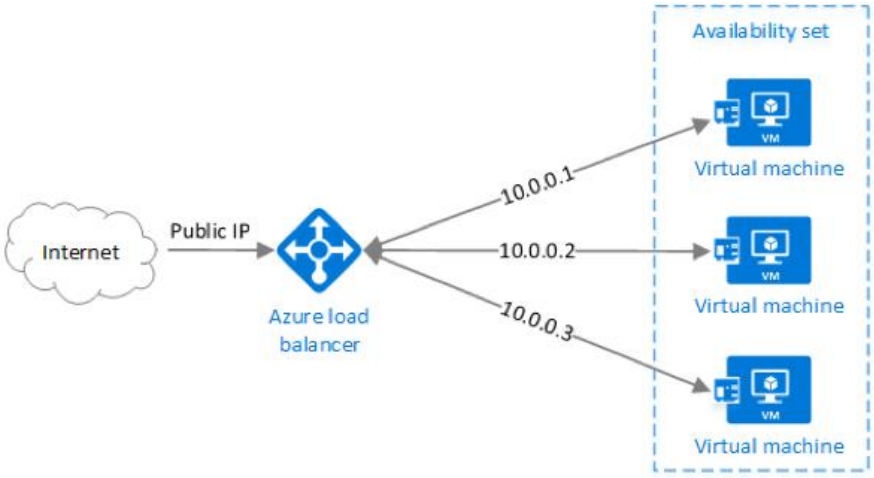
- **Step1:** Create an availability set
- **Step2:** Create VM using as, basic nsg with RDP, http ports and without public IP
- **Step3:** Create a new Load balancer with static public IP
- **Step4:** Create a Backend pool in LB to configure VMs within an availability set
- **Step5:** Add Inbound NAT rules in Load Balancer for VM's RDP connection
    - Port: 5000, Enable through Custom Port Mapping (RDP) 3389
    - Port: 5001, Enable through Custom Port Mapping (RDP) 3389
- **Step6:** Create Health Probes in Load Balancer setting
- **Step7:** Add Load Balancing Rule in Load Balancer setting

- **Step8:** Finally, install webserver for hosting your web application

Q10. What is Azure Load balancer?

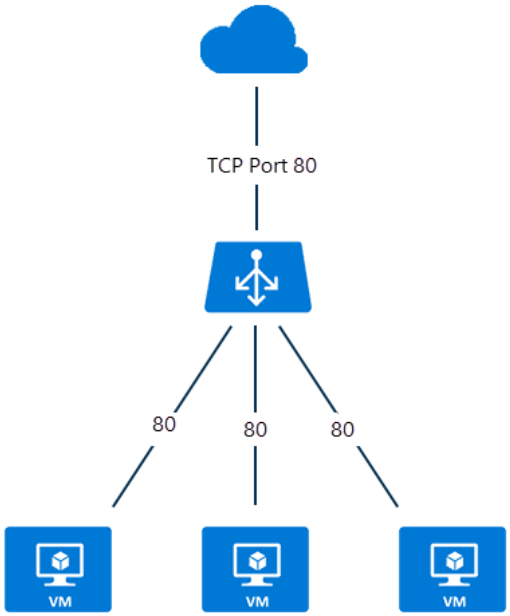
Ans. An Azure load balancer is used to distribute incoming traffic among healthy VMs. In load balancer health probe monitors, a given port on each VM and only distributes the traffic to an operational or healthy VM.

You need to define load balancer rules for specific ports and protocols that are mapped to your VMs to control the flow of traffic.



Q11. What is Application gateway?

Ans. Azure Application Gateway is web-based traffic load balancer. It distributes incoming traffic among healthy VMs for your web applications. The traditional load balancers can be used for managing web-based and non-web based traffic also.

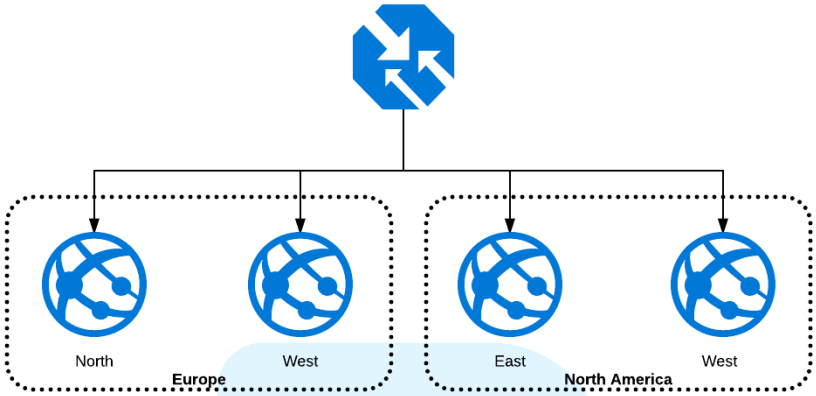


Q12. What is Azure Traffic Manager?

Ans. Azure Traffic Manager is a DNS based Load Balancer which distributes the traffic to different servers across the globe to provide high availability and responsiveness.

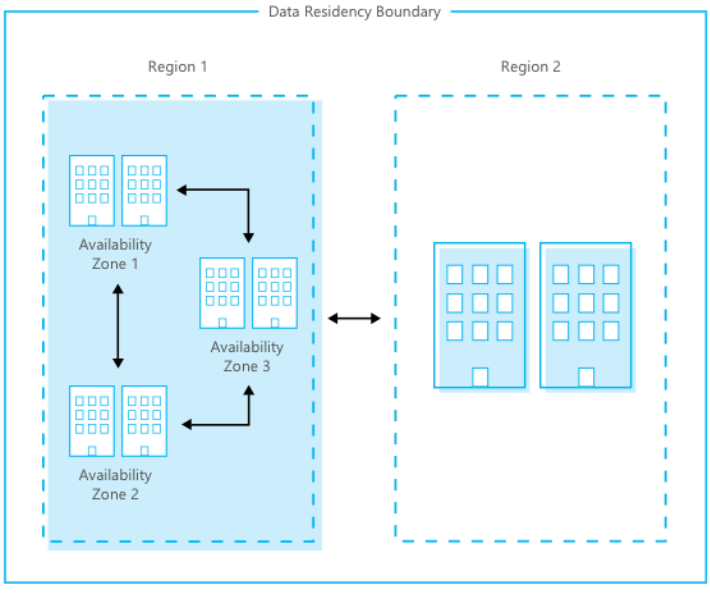
Azure Traffic Manager also optimizes the performance by checking the health of the servers & distributing the load to the closest server or low traffic server.

Note: Traffic manager profile & endpoints need to be configured to use this feature.



Q13. What is the Availability Zone?

Ans. Availability Zones is made up of one or more datacenter. They are equipped with independent power supply, cooling, and very low-latency network. Availability Zones offer a high-availability service that safeguards your application and database engines from any kind of fault or data center failures.



Achieve full resiliency with data residency.

Pair region and Availability Zones within the same data residency boundary for high availability, disaster recovery, and backup.

Image Source: https://azure.microsoft.com/en-us/global-infrastructure/regions

Resilience is ensured by maintaining a minimum of three separate zones in all regions which are active. Availability zones are separated within a region which makes your applications deployed on them resistant to the single point of failure in terms of the underlying infrastructure.

Your applications and data across Availability Zones get replicated by Zone-redundant services, to protect them from a single point of failure. Because of this particular feature, Azure boasts of industry best 99.99% uptime for VMs that have two or more instances deployed across two or more Availability Zones in the same Azure region. (There is no additional price for VMs launched in Availability Zone).

Q14. What are the regions that support Availability Zones?

Ans. At the time of writing this book, the following regions support availability zones:

- Central US
- France Central
- East US 2
- West Europe
- Southeast Asia

Q15. What are the services that support Availability Zones?

Ans. At the time of writing this book, the following services support Availability Zones:

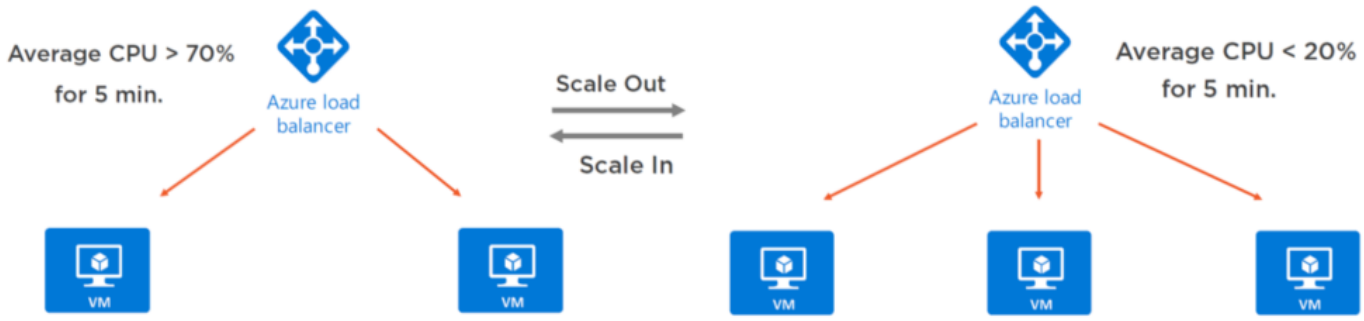
- Linux VMs
- Windows VMs
- VM Scale Sets
- Managed Disks
- Load Balancer
- Public IPs
- Zone-redundant storage
- SQL DB
- Event Hubs
- Service Bus
- VPN Gateway
- ExpressRoute

Q16. What is horizontal scaling in VMs?

Ans. Horizontal scaling means increasing or decreasing the number of VM instances.

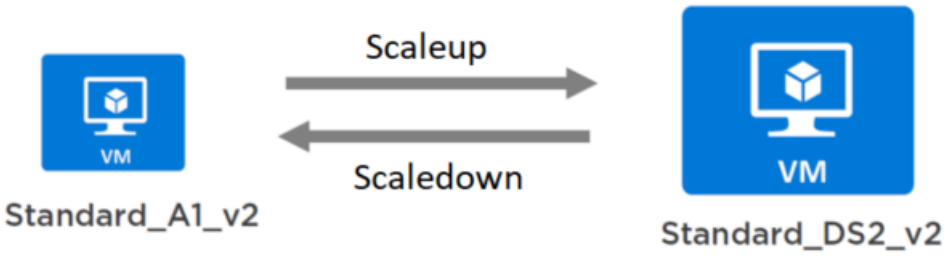
For Scale-out operation of VM, we can add another similar configuration VM instance and add a load balancer to distribute the incoming HTTP requests. This kind of scaling is well supported with Virtual machine Scale Sets.

For Scale-In, VM instances are removed. It is easy to manage VMs with Scale sets as VMs can be created on-demand or scheduled time from a central configuration. A load balancer will automatically be created and integrated. This also takes care of deploying multiple VMs across Availability sets.



Q17. What is vertical scaling in VMs?

Ans. In vertical scaling, the size of the VM is changed. Scale-up for VMs is to upgrade the size of VM to a higher level. This will require a reboot of the system and that will have an outage. Similarly, scale down of VM instance is to downgrade the size of VM.



Q18. How to achieve horizontal scaling in Azure VM?

Ans. It can be achieved by using VM Scale sets.

Q19. What is VM Scale Set?

Ans. A Scale set is a group of Multiple VMs which enables to scale them in a group. A Scale Set can consist of Web frontend, Backend Web API & SQL Server which can be Scaled together through a Scale Set.

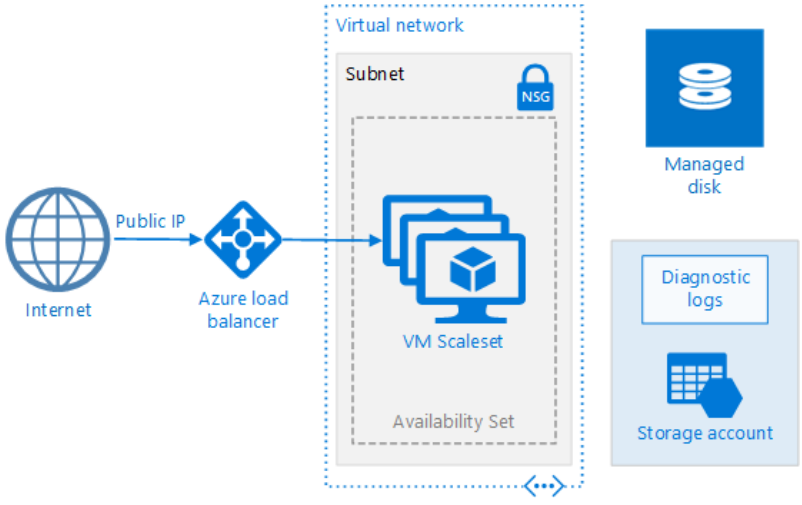
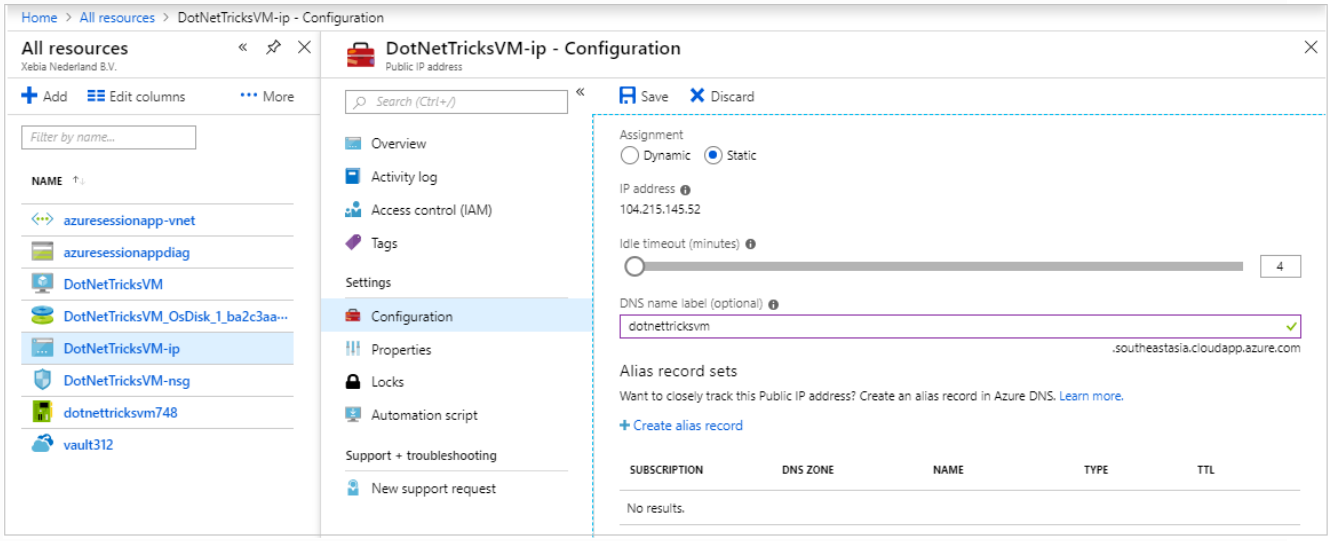


Image Source: https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/overview

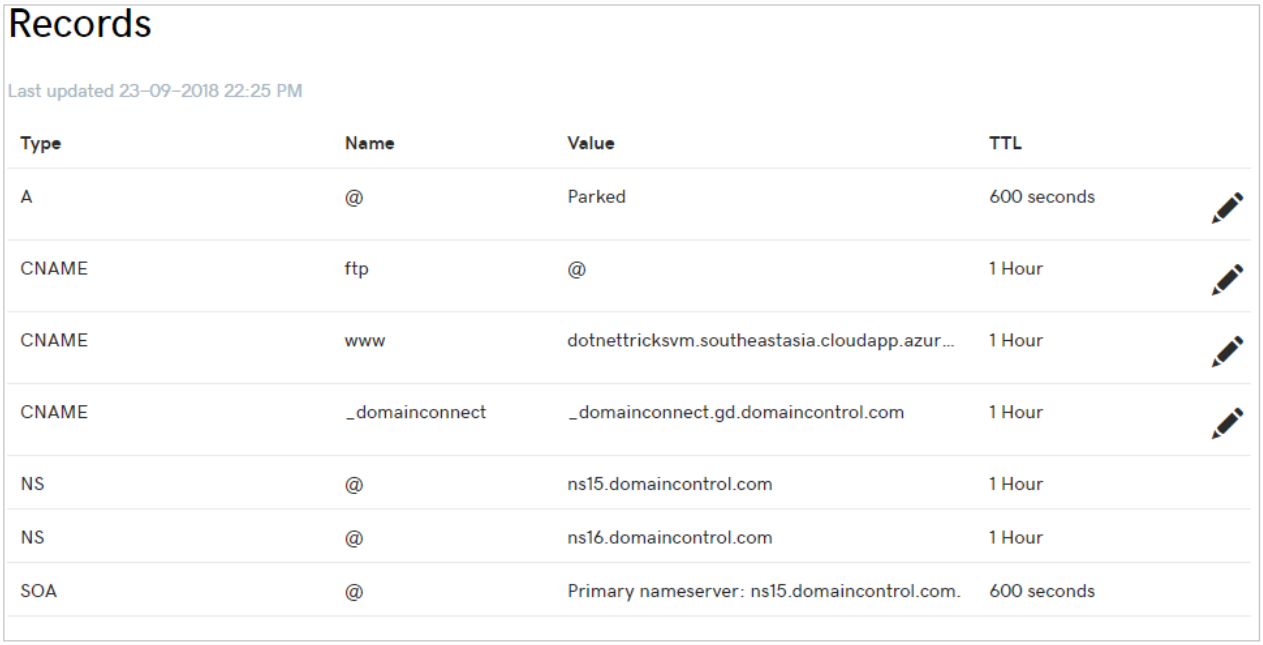
Q20. How to configure a custom domain in VM?

Ans. A custom domain can be configured by following the given steps:

1. Go to the Public IP resource in Azure Portal and click on the Configuration section.



2. Provide the DNS name and browse the link on the browser. It displays the deployed application.
3. Now, we can add a custom domain to this VM by following the next steps.
4. Go to the DNS Provider website and enter the DNS records section.
5. Add an entry of type CNAME with values as obtained at step 2.



6. The web application deployed on Azure VM is now available on the custom domain.

4

Azure Storage Services

Q1. What is Azure Storage?

Ans. Azure Storage is Microsoft's storage solution for data persistence scenarios. Azure Storage offers highly durable, available and scalable as compared to traditional data storage solution.

In Azure storage, you have to pay only for what you use and it is exposed via easy and open REST APIs. It's having support for rich Client Libraries and Tools.

Q2. What are the different types of storage available in Azure?

Ans. The different types of Storage are:

- **Blobs** - Used for storing massive amounts of unstructured and large data.
- **Queues** - Used for storing messages used for communication between application components.
- **Files** - Used for storing files and sharing it among the VMs as shared disk storage.
- **Disks** - Used for creating virtual machine disks for high I/O and random read-write operations.
- **Tables** - Used for storing structured data in NoSQL format. Suitable for small size database.

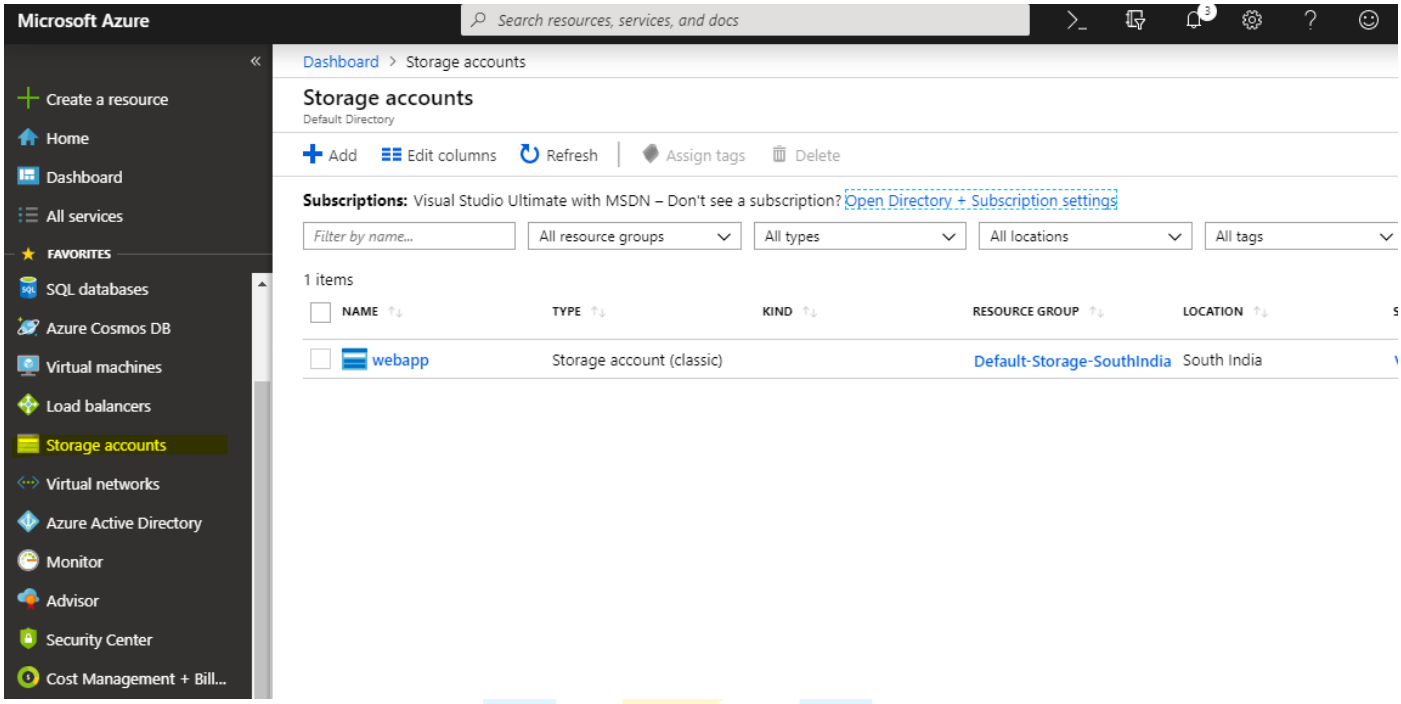
Q3. What is a Storage Account?

Ans. Storage Account is a Unique Namespace which contains all the Azure Storage Objects like a blob, files, queues, tables, disks etc.

Each storage service within the account has a unique address for accessibility.

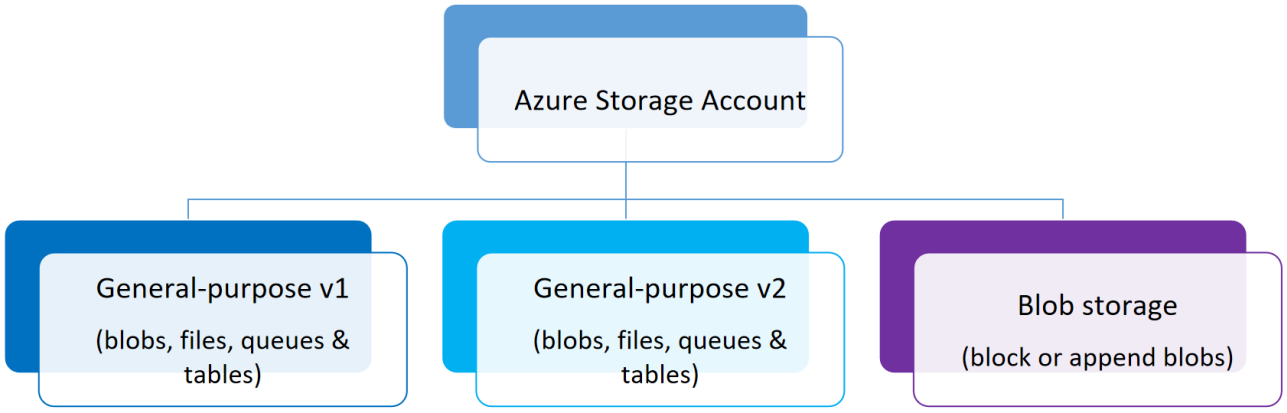
Example: http://mystorageaccount.blob.core.windows.net/

You can create Storage Account using the Azure Portal as shown below.



Q4. What are the different types of storage accounts in Azure?

Ans. Azure supports three types of storage accounts. Each type has its own pricing model.



General-purpose v2 account: It supports the latest Azure Storage features and includes all of the functionality of general-purpose v1 and Blob storage accounts. It delivers the lowest prices for Azure Storage per gigabyte (GB).

General-purpose v1 account: It provides access to all Azure Storage services, but does not have the latest features and the lowest pricing per gigabyte (GB).

Blob storage account: It is a specialized storage account for storing unstructured object data as block blobs. This account type supports block blobs and append blobs, but not page blobs, tables or queues.

Q5. Explain the features of Blob Storage?

Ans. There are following features for blob storage:

- Blob Storage allows storing Massive amounts of unstructured data such as text or Binary. It is ideal for storing images, files, streaming video & audios.
- It is also used as CDN, backup storage etc.
- Blob can be accessed through HTTP or HTTPS and SDKs.
- Azure also provides Premium Blob Storage allowing storing in Hot, Cool & Archive storage based on the frequency of accessibility.

Q6. Explain the features of Queue Storage?

Ans. There are following features for Queue storage:

- Queue Storage allows storing of a large number of messages. Queues are helpful in building decoupled application components which require asynchronous communication.
- Queue supports each message up to 64KB in size with a maximum of 200TB storage. The queue can be accessed through HTTP or HTTPS and SDKs.

Q7. Explain the features of Table Storage?

Ans. There are following features for table storage:

- Table Storage allows storing of structured-data with No-SQL access.
- Lower in cost than traditional SQL for similar volumes of data.
- Table Storage supports flexible-schema which allows multiple records with different fields.

Q8. Explain the features of File Storage?

Ans. There are following features for file storage:

- File Storage allows fully managed File Shares in the Cloud for data sharing among the VMs or machines.
- The Files can be accessed with REST and Server Message Block (SMB) protocols.
- File storage can be upto 1TB in size.

Q9. Explain the features of Disk Storage?

Ans. There are following features for Disk storage:

- Premium storage for I/O-intensive applications.
- Used as a hard disk for a VM in Azure.
- Highly available, durable and secure for your VM.
- Supports automatic 3 replication.

Q10. What is the difference between Storage Queue & Service Bus Queue?

Ans. There are following differences between Storage Queue and Service Bus Queue:

- Storage Queue is part of **Azure Storage** infrastructure, Service Bus Queue is part of **Azure Service Fabric** infrastructure.
- Storage Queue provides simple REST get/put/peek interface. Service Bus Queue provides advanced Publish/Subscribe interfaces.
- Storage Queue can support more than 80GB queue size. Service Bus Queue have limitation of 80GB.
- Storage Queue does not guarantee FIFO order, but Service Bus Queue follow it.
- Storage Queue does not allow batches processing over messages. Service Bus Queue supports it.

Q11. What is redundancy in Azure storage?

Ans. Redundancy replicates data to ensure its high availability, if hardware failure. Data is replicated synchronously within a region and asynchronously in the background to secondary regions.

Q12. What are the replication options?

Ans. There are four different replication options

- Locally Redundant Storage (LRS)
- Zone-Redundant Storage (ZRS)
- Geo-Redundant Storage (GRS)
- Read-Access Geo-Redundant Storage (RA-GRS)

Q13. How each replication option is different from each other?

Ans. Each replication option is having the following set of features:

- Locally Redundant Storage (LRS)
  - Data is replicated 3 times within a single data center in your chosen region
  - Provides data durability for disk, node and rack failures
  - Doesn't provide protection against data center failures
  - Cheaper than the other types of redundancy
- Geo-Redundant Storage (GRS)
  - keeps 6 copies of your data across two regions (3 in each region)
  - 3 copies stay in the primary region, and 3 copies stay to a secondary region
  - Protect data against major regional natural disasters
- Read-Access Geo-Redundant Storage (RA-GRS)
  - The default redundancy setting
  - Replicates data to a secondary region, where apps also get read access to the data
- Zone-Redundant Storage (ZRS)
  - keeps 3 copies of your data across two or three data centers, either within your chosen region or across two regions
  - Protect data against zone failures (e.g. fire burning down a facility)
  - Only available for block blobs and GPv2

Q14. What are the storage tools, you can use to access storage account?

Ans. You can use the following tools to access the storage account :

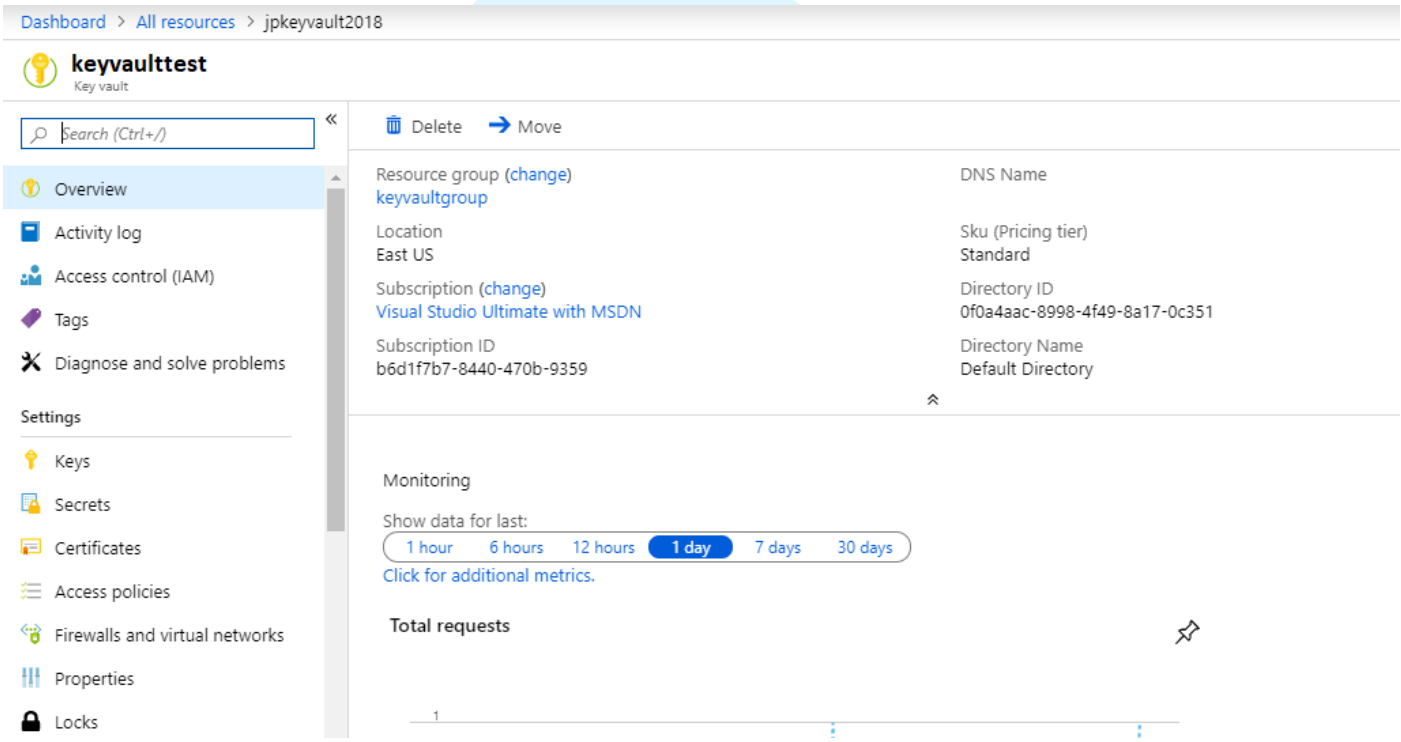
- Microsoft Azure Portal
- Microsoft Azure Storage Explorer
- Microsoft Visual Studio Server Explorer
- Third-Party Client Tools like Cerabrata Azure Management Studio, Redgate Azure Explorer etc.

Q15. How can you store sensitive data like connection strings & passwords in Azure?

Ans. Azure Key Vault Storage is best suitable for storing Sensitive Data. Key Vault provides Encryption of Sensitive Data using HSM (Hardware Security Module) physical devices.

A developer can have Separate Keys for Staging & Production slots of the application thereby Securing the Sensitive Keys.

You can create Key Vault using Azure Portal > All Resources > Key Vault



Q16. Case Study: You are working on an application which requires storage of magazine PDF Files. What storage type would you recommend?

Ans. Azure Blob Storage would be useful for this scenario.

Q17. Case Study: You are working on Decoupling a Backend from the UI. The purpose is to Individually Upgraded Backend without losing UI Requests. What is the recommended Azure approach?

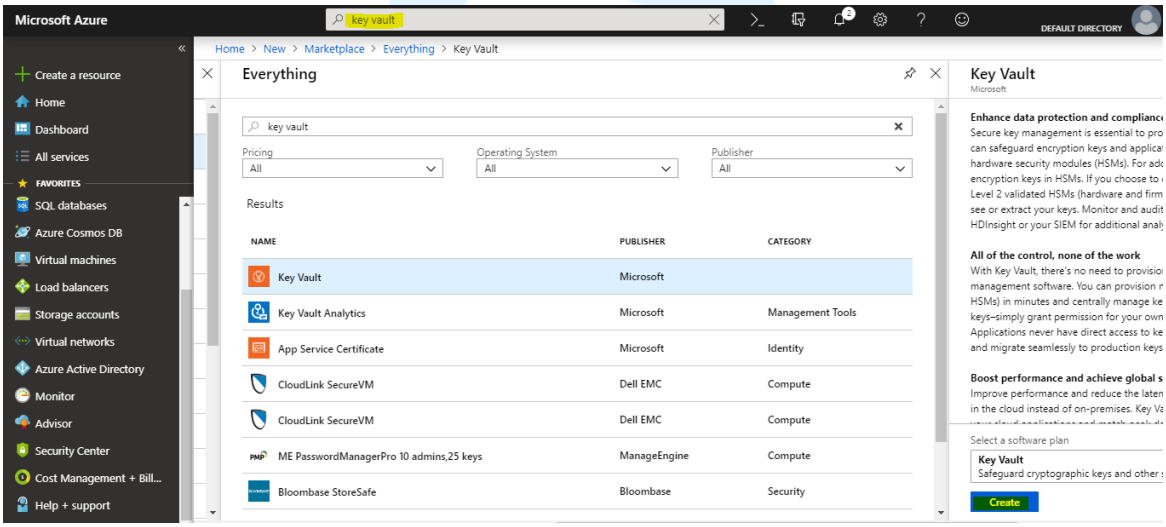
Ans. Azure Storage Queue can be used to store the UI requests. In this way, the Synchronous communication can be converted to Asynchronous.

All UI requests will be stored in the Queue while the Backend is upgrading. Once the Backend is ready it will Peek the Queue and Process the Requests.

Q18. Case Study: You are working on an Application which restricts special characters in a Filename. The characters can be changed by support Team and should not be hard-coded in the application. What would be the recommended solution?

Ans. Azure Key Vault would be the recommended solution.

Create a Configuration Property & Load the Value from the Azure Key Vault. This enables us to change the values without hard-coding into the application.



Q19. Case Study: You are working on Migrating an SQL Server Database of 100TB to SQL Azure. Online Data Transfer induces High Charges & Time. What is the Optimal Approach for this?

Ans. Azure Import/Export Service is the best option which allows Disk Shipping of On-premise data. The SSD Drives can be collected from Microsoft, Copy the Data through USB & Ship the Disks back to Microsoft.

5
Azure App Services

Q1. What are Azure App Services?

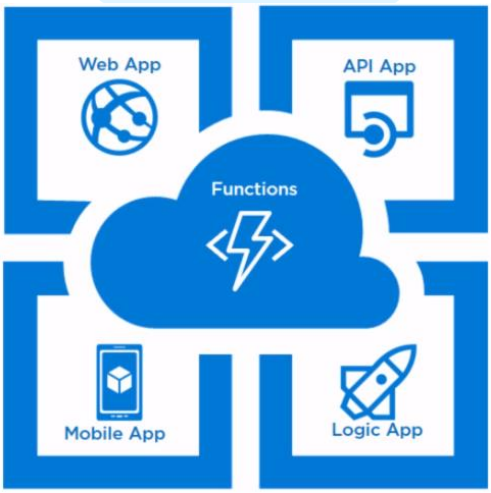
Ans. Azure App Services is the part of PaaS offering from Microsoft Azure. These are used to Quickly build, deploy, and scale enterprise-grade web, mobile, and API apps running on any platform. Behind the scenes VMs are used but they are abstracted.

These support manual scaling and auto-scaling. It having support for Java, Node.js, PHP, Python, .NET and Ruby.

Q2. What are the different types of applications provided by App Services in Azure?

Ans. Azure App Service supports the following types of applications.

- Web Apps
- Mobile Apps
- API Apps
- Logic Apps



Q3. What are the different ways to host web sites in Azure?

Ans. Azure supports multiple ways to Host like App Service (**PaaS**), Virtual Machine (IaaS) and Service Fabric.

- **App Service** is the best option for Most of the web sites. It allows quick deployment, scalability, management & also cost-effective.
- **A Virtual Machine** is an option if your existing Web Sites requires Custom Configurations in IIS Level, Cannot Fit into App Service etc.
- **Service Fabric** is an option if you are writing a Microservice application which requires Massive Scaling, Stateful Services etc.

Q4. What are the advantages of App Services?

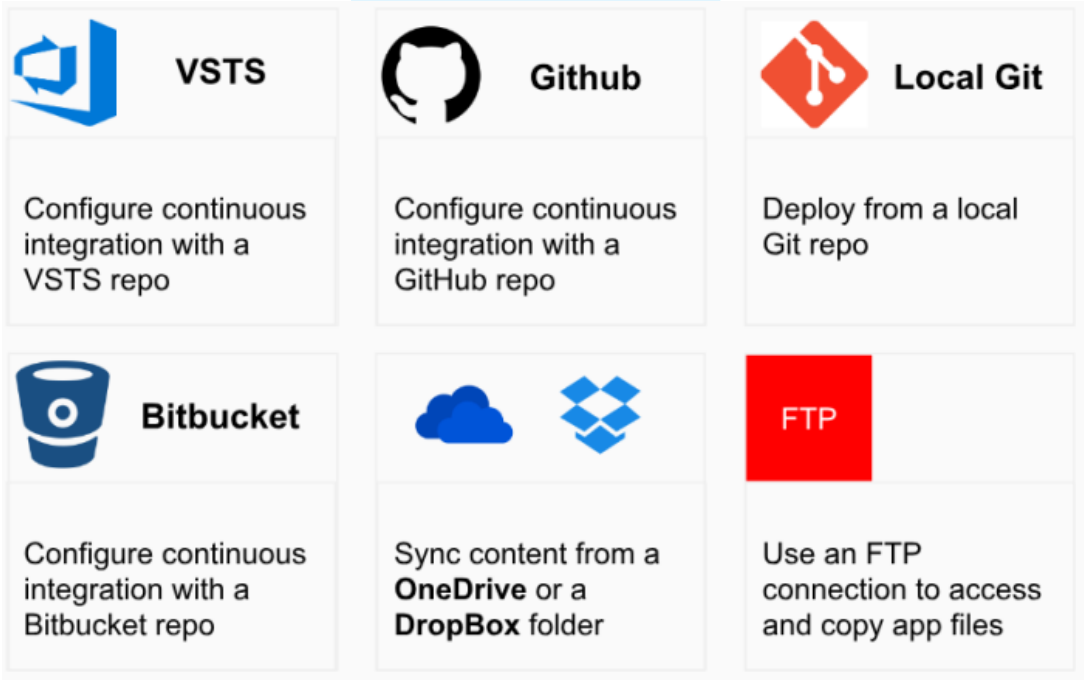
Ans. Azure App Services provides a PaaS (Platform-as-a-Service) feature to quickly build & deploy applications. The infrastructure provides cost-cutting & faster deployment & management of applications.

Q5. What are the features of Web Apps?

Ans. Azure Web Apps supports multiple languages like C#, Java, PHP, Python etc. It supports automatic scaling, high availability with automatic server updates & 99% SLA. It allows CI/CD integrations.

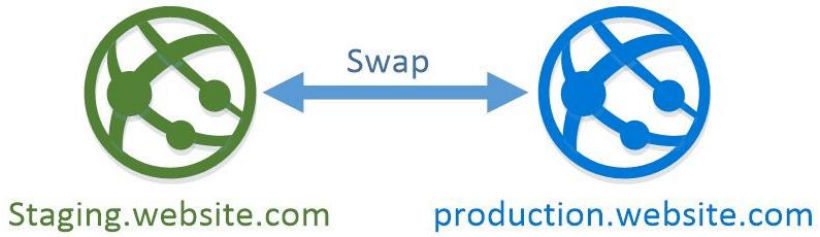
Q6. What are various web app deployment options?

Ans. There are following deployment options are supported by web app:



Q7. What are the deployment slots?

Ans. Deployment Slot is a feature of App Service. We can create different Slots named Staging, Production, Testing etc. Swapping technique can be used to quickly convert a Staging Slot to Production.



A web app can support up to 20 deployment slots based upon app service plan. Also, scaling is only supported in the production slot.

Q8. How the app services can be scaled?

Ans. An app service supports two types of scaling - vertical (up/down) and horizontal (out/in). During scaling, there is no impact on service availability.

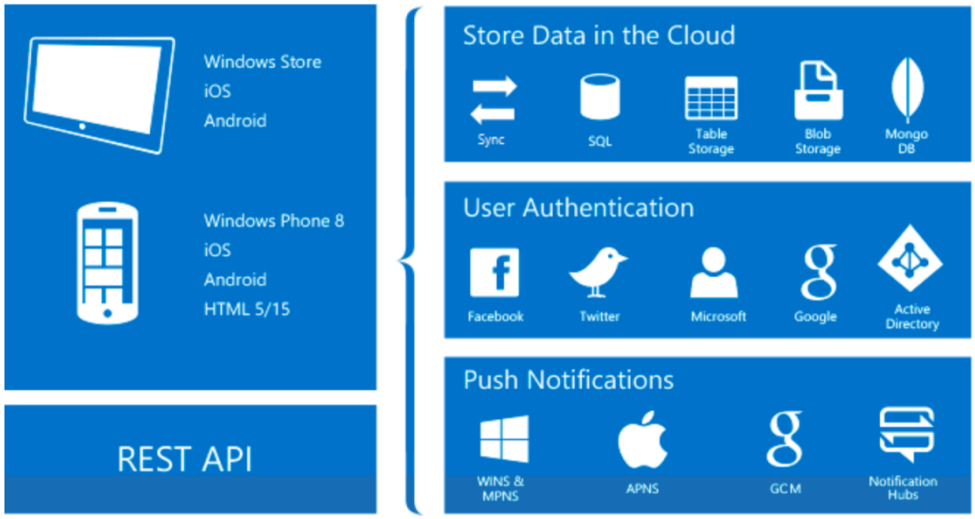
- In **vertical scaling**, VM size can be increased or decreased as per your need.

- In **horizontal scaling**, identical VMs of the desired size will be created or removed as per your need

- Autoscaling is supported by standard and premium based on matrices (response time, memory, cpu, data uses etc.)

Q9. What are the features of Mobile Apps?

Ans. Azure Mobile Apps supports Windows, Android & iOS apps integration along with Automatic Scalability. It supports multiple platforms Xamarin solution too. Other features include Offline Synchronization, Social Media Integration, Push Notifications, CI/CD Integration etc.



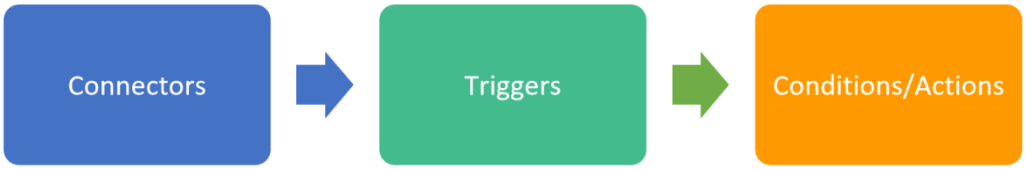
Q10. What are the features of Logic Apps?

Ans. Azure Logic Apps provides Serverless workflows. This is a designer-first approach which contains a large collection of Business Connectors and Actions where we can connect to Salesforce, Dropbox, Google Cloud etc.

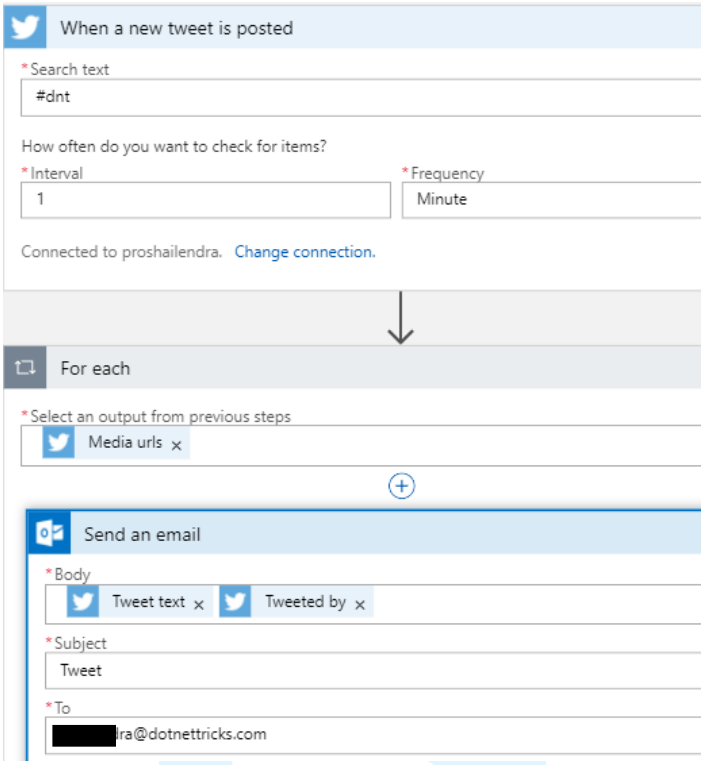
For example, automatically finding negative tweets about your company and sending notifications to a Slack channel. In this way, Logic apps are used to automate business processes and workflow.

Q11. How to create a Logic app?

Ans. A Logic app begins with a trigger and can have many combinations of actions, conversions, and condition logic to define your workflow.



A logic app can be created using twitter connector to find the tweets containing hashtag #dnt and can be informed about this one to the desired person as given below:



Q12. What is Web Job?

Ans. A web job simplifies the background tasks. It is used to run a block of code on a schedule, manually or from a trigger like Timer trigger, Queue trigger. It always runs inside an App service plan.

You should use Web Jobs if you want to share code or settings between the Web Job and your web app.

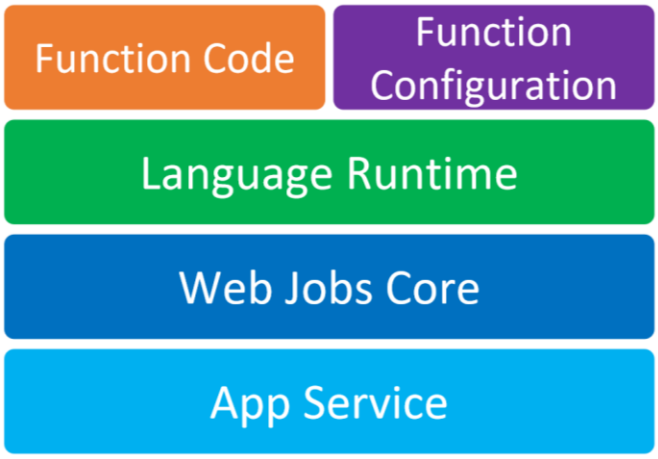
Q13. What is Serverless Computing?

Ans. Serverless computing is one of the most coined terms in the cloud these days. Unleashing the PaaS feature with immense amount compute power without any server to host an app has really impacted the web development a big way. The idea is to do compute without hosting the app on a server.

Basically, we can think of it to be a cab aggregator or even food delivery startups which provide us with a platform to book a cab or order food but the actual service will be provided by a third-party vendor. On a similar note, we put our logic on a serverless computing module which can connect to different third-party services to do the job.

Q14. What is Azure Function?

Ans. Azure Function is a **Serverless** Compute Service which Runs code on Demand like Events or External-Invoke. Azure Functions can Scale up Automatically based on Demand. Azure functions are the evolution of Web Jobs. You can develop functions in C#, Node, Java, Python etc. Internally, Azure functions use App services.



We can use Functions for Backend Services, Event-based Processing like Data Table creation on File Upload, Scheduled Tasks etc.

Q15. What are the Advantages of Hosting in Functions vs. App Service Hosting?

Ans. Azure Functions under **Consumption Plan** will only Charge for the Usage Time with Automatic Scaling to meet demand.

Hence Functions Costs less than App Service if properly chosen for Occasionally used scenarios.

Q16. Where Azure function can be used?

Ans. An azure function can be used in the following cases:

- Scheduled data processing/clean up/archiving.
- Serverless Web app/SPA back-ends via HTTP.
- Serverless mobile app back-ends.
- Real-time/Internet of Things event processing.
- Azure service event-based processing such as responding to new queue messages.

Q17. What is the Execution time limit for Functions?

Ans. Five Minutes is the **Default** Time Limit under Consumption Plan. This can be increased to 10 Minutes through the host.json file.

Q18. How you can have Stateful Functions in Azure?

Ans. Durable Functions is the answer. Durable Functions is Advanced Extension of Functions. It allows Stateful Co-ordination problems in Serverless applications.

Q19. How we can Trigger the execution of a Function?

Ans. There are multiple Trigger options for a Function execution:

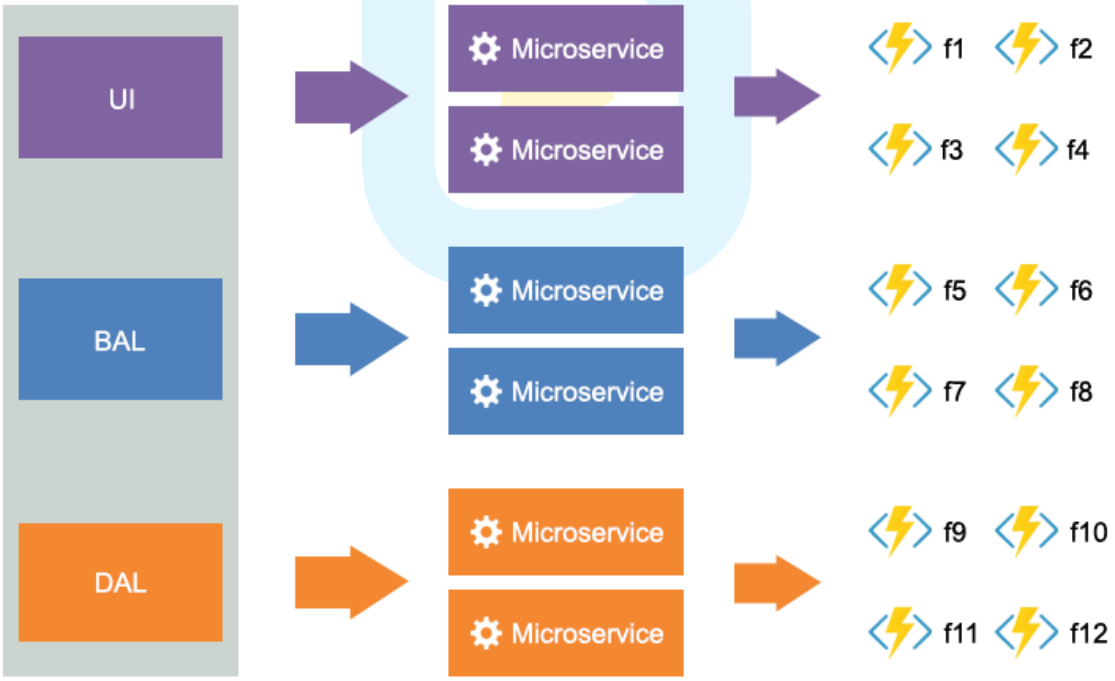
- **HTTP Trigger** where an HTTP Request triggers execution

- **BLOB Trigger** where a BLOB insertion triggers execution
- **Queue Trigger** where a Queue insertion triggers execution
- **Timer Trigger** where a Timer Interval triggers execution

Q20. How to break the Monolithic Architecture into functions?

Ans. Earlier we used to build one big application with much complex architecture to maintain which was the integration of all modules of an application and was tightly dependent on each other. Any failure on any of the module was making the entire application go down.

To resolve this issue, we moved on to segregate the modules into different services and with this, we also get the facility of using different technology stack for different microservice and we can deploy each of the microservice independently.



Monolithic vs Microservice vs FaaS

Now the number of microservices increased and the challenge came to host different instances of microservice up in multiple servers in order to keep the application running. Serverless computing helps us mitigate such issues by using Azure Functions as we have only functions that take care of different modules interact with third-party services like cognitive services or Sigle sign-on services, Graph and chart image services etc.

Q21. What Pricing model Azure Function support?

Ans. Azure Functions can be hosted with two different kinds of pricing

- **Consumption plan -** It provides all necessary resources to the function app dynamically and will charge only when the function runs.
- **App Service plan -** If there is already an app service plan you are using for other app services like Web app, API app etc., the same hosting plan can be used here with no extra cost and will be charged only for the number of times the function app executes.

Q22. What are the limitations of Azure Functions?

Ans. There are the following limitations of Azure functions:

- **Lack of Troubleshooting ways** - It's difficult to identify an issue in production since there is no way to debug a function. Azure provides app insights feature by default with Azure function to help analyze the logs.
- **Third-Party API Trust** - Since Serverless computing heavily relies on third-party services and we need to trust the response and security of these services.
- **Vendor Locking** - Outbound requests may also be expected to return quickly which can further be processed. Any lock state in third party services will cause delay and unexpected behaviour.
- **Over Complex Architecture** - Too many functions in an application may also result in a very complex architecture which will be difficult to manage.
- **Latency** - Initial booting time and latency over network caused because of hoping from one function to other increases latencies and may impact the SLAs.

Q23. What is a CRON expression?

Ans. A CRON expression decides the frequency of code execution. A CRON expression is composed of six fields: *{second} {minute} {hour} {day} {month} {day of the week}.*

Here are some examples:

- Every 15 minutes: 0 */15 * * * *
- Every hour: 0 0 * * * *
- Every hour from 9 AM to 5 PM: 0 0 9-17 * * *
- At 9:30 AM every day: 0 30 9 * * *
- At 9:30 AM every weekday: 0 30 9 * * 1-5

Q24. What is Azure API App?

Ans. An Azure API app makes easy to develop, host, and consume APIs. Azure API app has integrated support for Swagger (http://swagger.io). It offers a built-in authentication service for restricting access to APIs.

Q25. What is swagger?

Ans. Swagger is a free and open-source framework to simplify API development for users, teams and enterprises. It defines a standard, language-agnostic interface to a REST API. It helps you to design, build, document and consume REST APIs and make API discovery easier.

Q26. Case Study: You are working on a Mobile App for Android & iOS which requires Data to be stored locally in the Mobile whenever the User is working remote location without an internet connection. What are the recommended solutions in Azure?

Ans. Azure Mobile App Service along with Xamarin would be the recommended approach.

Xamarin App ensures Compatibility with Android & iOS.

Azure Mobile App Service provides data synchronization frameworks.

Q27. Case Study: A Support person approaches you to create a Sequential Processing Solution. The person doesn't any Coding Skills. What is the Azure Solution approach you would recommend?

Ans. Azure Logic App would be the solution. It provides designer-oriented actions & does not require any coding skills.

Q28. Case Study: You are working on a Customer Engagement Application which will be used for 1-year. While starting the Engagement the customer will upload a set of large data which should be processed. This processing takes 24 hours and it is a one-time operation throughout the engagement. What Azure features would you recommend for this?

Ans. Azure Functions would be the right choice here as It provides High Computing Power & Cost Advantage that it is only needed for 24 hours.

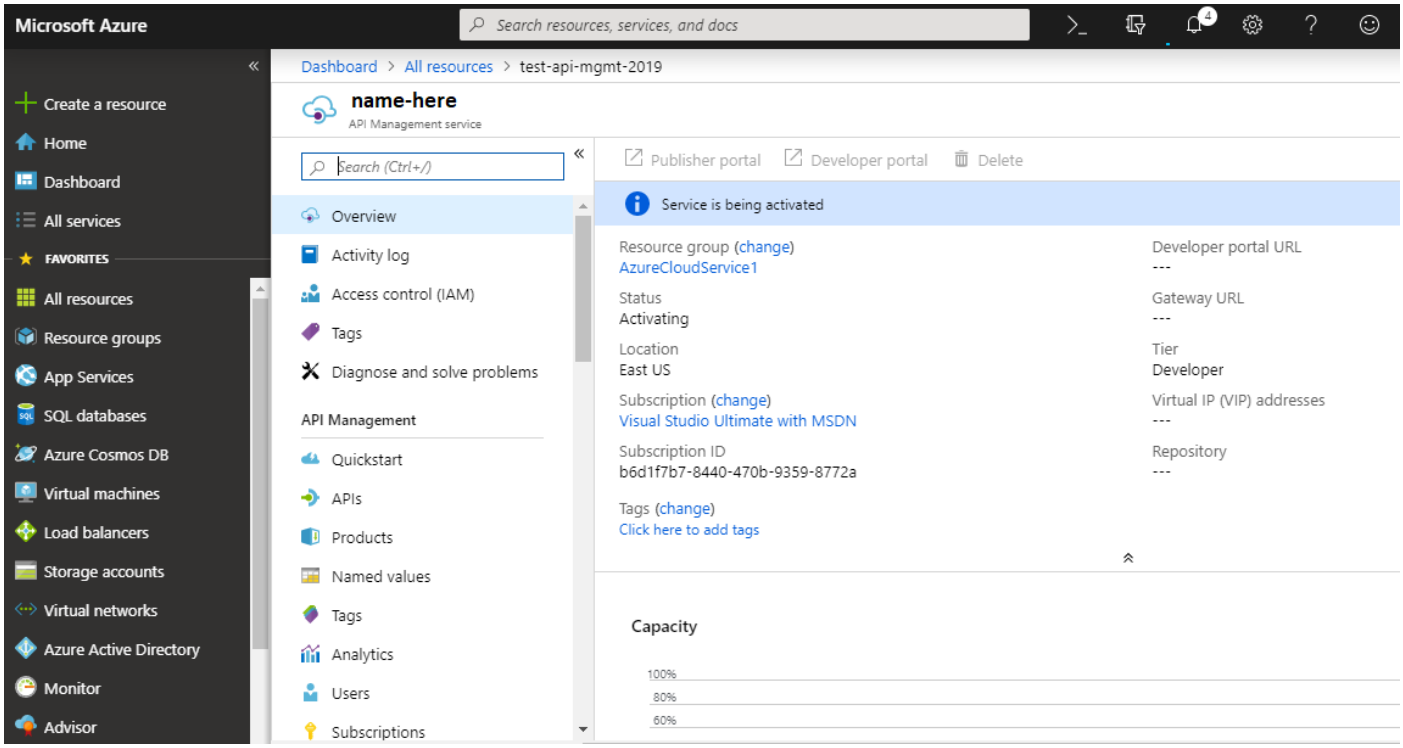
6

Azure API Management

Q1. What is API Management Service?

Ans. Azure API Management Service allows Developers to Host, Publish & Monetize APIs. It provides a Secured, Scalable, Broadcasting service for the APIs.

You can create API Management Service through Azure Portal > All Services > API Management.



Q2. What are the Different Plans available for API Management?

Ans. The current plans available are Developer, Basic, Standard, Premium & Consumption. Developer Tier is only for Development & Testing. The other plans are for Production usage.

Q3. What is API Gateway?

Ans. API Gateway acts as a **Reverse Proxy** between the Client and API Services. API Gateway is an Architecture Pattern which decouples the client and services, provides a single endpoint to the client, monitor new service endpoints etc.

API Gateway also performs cross-cutting tasks like authentication, SSL termination, rate limiting, IP whitelisting, firewall enforcement, response compression, response caching etc.

Q4. What is Request Tracing?

Ans. Request Tracing is a Debugging & Troubleshooting feature for the API. We can initiate Trace A Call from the Azure Portal and Trace the Console Logs for viewing the Response received.

Q5. What is a product in API Management?

Ans. Product is a Collection of API with a well-defined Usage Quota and Terms of Use. A product can be Published to the broader audience & Subscribers can be added using the Azure Portal along with Billing features.

Q6. Case Study: A Healthcare Company which provides Services to External Hospitals approached you. They need to Expose the Core Services in a Secured, Scalable & Metered manner. Additional needs are Caching of 1GB which can grow to 5GB over years. The current users will be within East US & in future spanning to other regions. Which Plan of API Management Service would you recommend?

Ans. Azure API Management Service supports the core features of Security, Scalability & Metering of connections.

API Management Service with Standard Plan is required to support the 1GB Caching requirement. It also supports Single Region of East US.

In future, the Plan can be upgraded to Premium when the Caching expansion Or New Region support needed.

7

Azure SQL Azure

Q1. What is SQL Azure?

Ans. SQL Azure is Cloud-hosting of Microsoft SQL Server with some limitations in features. SQL Azure offers advantages like Quick Provisioning, Automatic Scalability, High Availability etc.

Q2. What are Azure SQL Database Models?

Ans. Azure supports the three database models for storing database as given below:

- **Standalone Database** - An isolated and self-contained database service that has database scoped functionalities. It is designed for modern cloud-based applications, software-as-a-service solutions, and microservices that use singe database to store data.

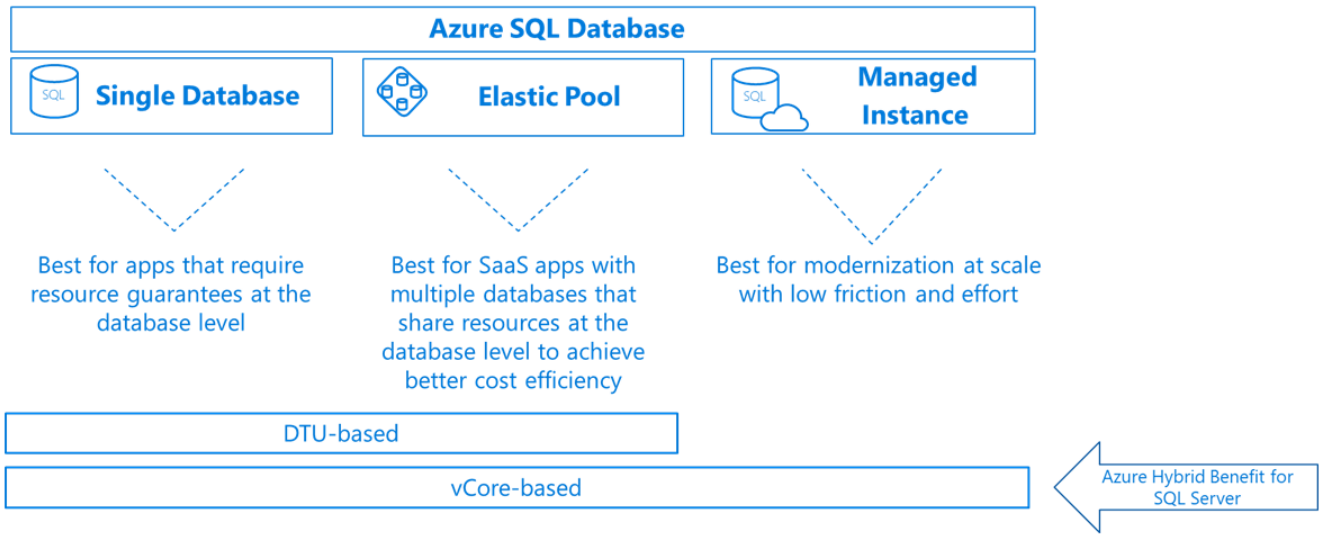


Image Source: https://azure.microsoft.com/en-us/blog/a-flexible-new-way-to-purchase-azure-sql-database/

- **Elastic pool** - A group of standalone databases that share the same resources. Helpful to reduce the operational cost.

- **Managed Instance** - A full SQL Server Instance with instance-level functionalities (SQL Agent, Broker, .NET hosting). Designed for easy migration of most of the on-premises databases to Azure cloud.

Q3. How security is ensured in SQL Azure?

Ans. Data in Transit is protected through SSL & Firewall.

Data at Rest is protected through Transparent Data Encryption (**TDE**).

Q4. What are the different service tiers available for the single database?

Ans. SQL Azure provides the following 3 Service Tiers:

- Basic
- Standard
- Premium

Service Tier determines the Uptime SLA, Database Size Limit, Disaster Recovery & Performance factors. Higher the Tier, Higher the Performance is.

Q5. What is the size limit for each service tier in a single database?

Ans. Basic Tier has a Limitation of 2GB.

Standard Tier has a Limitation of 250GB.

Premium Tier has a Limitation of 500GB.

Q6. What tiers elastic database pools support?

Ans. It supports the following three tiers:

- Basic
- Standard
- Premium

Q7. What is DTU?

Ans. DTU is Data Throughput Unit. DTU provides the Capacity of the underlying database. Higher the DTU better the Performance is.

Q8. How to choose between DTU and vCore?

Ans. Refer to the following suggestions:

- Use the DTU model If there are no performance issues.
- In DTU based model, you need to pay a fixed amount each month for pre-configured compute resources.
- vCore allows you to dig into the underlying resources and scale them independently for optimal performance.
- vCore allows you to take Azure Hybrid Benefit for SQL Server.
- You can migrate between DTU-based and vCore-based model though portal online.

Q9. What are the tools used to work with SQL Azure?

Ans. Azure Resource Manager Tool for Creation & Configuration.

SQL Server Management Studio Tool for Connectivity, Querying.

SQL Azure MW Tool for Migrating databases from On-Premise to AQL Azure.

Q10. How do you Backup an SQL Azure database?

Ans. Backup is done automatically for SQL Azure. The Backup will be stored for a max of 35 days. SQL Azure also uses geo-redundant backup so any location-based disaster will not lose the data.

We can manually Restore data using the Azure Portal. We can automated Restore data using PowerShell Script or Database Copy command.

Q11. How to migrate your on-premise or local database to SQL Azure?

Ans. Microsoft offers Database migration assistant tool for database migration. This tool helps you to upgrade your existing database to a modern data platform of SQL Server or of Azure SQL Database. It has the following benefits:

- Allows you to move your schema, data, and uncontained objects from your source server to your target server.
- Discover issues that can affect an upgrade to on-premises SQL Server like breaking changes, behaviour changes and deprecated features

Q12. How data is protected in SQL Azure?

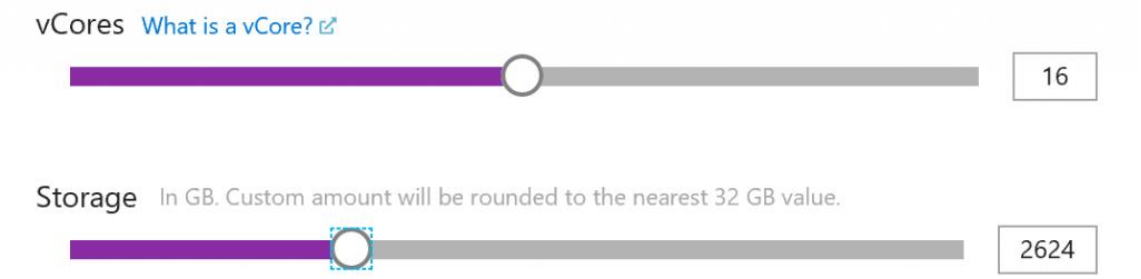
Ans. There are the following options in SQL Azure to protect your data.

- Automatic, continuous backups
  - Retention varies by service tier: Basic 7 days, Standard 14 days, Premium 35 days
  - Daily backups also copied to a remote datacenter
- Oops recovery
  - Self-service point-in-time restore from local backups, including deleted databases
- Data center disaster
  - Self-service restore from remote backups to any region at any time
  - No charge for backups, normal database rates apply for restored databases

Basic, Standard & Premium databases are protected from accidental data corruption, deletion & disaster

Q13. How to scale SQL Azure database?

Ans. Your SQL Azure database can be scaled up/down via portal, APIs, PS, as per your need. The database remains online while scaling your database.



Q14. Can you switch a database from vCore-based purchasing model to a DTU-based purchasing model?

Ans. Yes, you can easily convert your database to any supported performance objective by using the Azure portal, PowerShell, the Azure CLI, T-SQL, or the REST API.

Q15. What is Federation in SQL Azure?

Ans. Federation is a Scalability Feature in SQL Azure by Repartitioning and Redistributing data to different Nodes.

Q16. What is Azure Data Lake?

Ans. Azure Data Lake is a hyper-scale repository built-on YARN and HDFS for Data Storage & Data Analytics. Azure Data Lake consists of Data Lake Store, Data Lake Analytics & HDInsight.

Note: YARN expansion is Yet Another Resource Negotiator. HDFC expansion is Hadoop Distributed File System

Q17. What is Azure HDInsight?

Ans. Azure HDInsight provisions Apache Hadoop clusters to Analyze big data in Azure premises. HDInsight processes both structured & unstructured data.

HDInsight saves the cost of hardware & expensive software setting up process.

Q18. What are the Advantages of Data Lake Store?

Ans. Data Lake Store offers Flexibility of storing data in Native format for both Structured & Non-Structured data. We can store database, server logs, social media data in Data Lake Store.

Q19. What is the Difference between Data Warehouse & Data Lake Store?

Ans. Data Lake Store allows Non-processed data in raw format. Data Warehouse only allows Refined or processed data to be stored.

Q20. Case Study: A Logistics company with 10 Data Centers worldwide approached you on Upgrading their System, Increase the Performance & Reduce Operations Costs. What is your Solution Approach?

Ans. Individual Data Centers can be Merged into a Single Data Center in Azure using Microsoft Enterprise Services. Thus, hardware upgrade, software upgrade, periodic updates & performance issues are addressed.

Once the Migration costs are break-even over a few months, the Operations Costs will also reduce drastically.

8
Azure Cosmos DB

Q1. What is Azure Cosmos DB?

Ans. Azure Cosmos DB is a Planet-scale, Globally Distributed Database provided by Azure. It is Schema-agnostic and hence considered a NoSQL database.

Cosmos DB provides Incredibly Low Latency in the order of Milliseconds.

Cosmos DB supports a wide range of APIs including SQL, MongoDB, Cassandra, Graph, Table etc.

Q2. What are the Use Cases for Cosmos DB?

Ans. Cosmos DB is used heavily by **IoT** (Internet of Things), Gaming & Retail as it enables High Throughput and Low Latency.

Cosmos DB is used in Social Media applications as it offers Non-structured data storage allowing Social Graphs to be created from User-generated data, Elastic Scalability which allows easier scaling.

Cosmos DB is also highly used in Schema-Variant Apps where each New Version can be released without worrying about schema changes.

Q3. How does Cosmos DB database engine work?

Ans. Cosmos database engine is based on atom-record-sequence (ARS). In ARS, atoms consist of a small set of primitive types e.g. string, bool, number etc. and records are structs and sequences are arrays consisting of atoms, records or sequences.

Cosmos database engine is capable of efficiently translating and projecting the data models onto the ARS based data model.

Natively accessible from dynamically typed programming languages and can be exposed as-is using JSON or other similar representations. Natively supporting popular database APIs for data access & query.

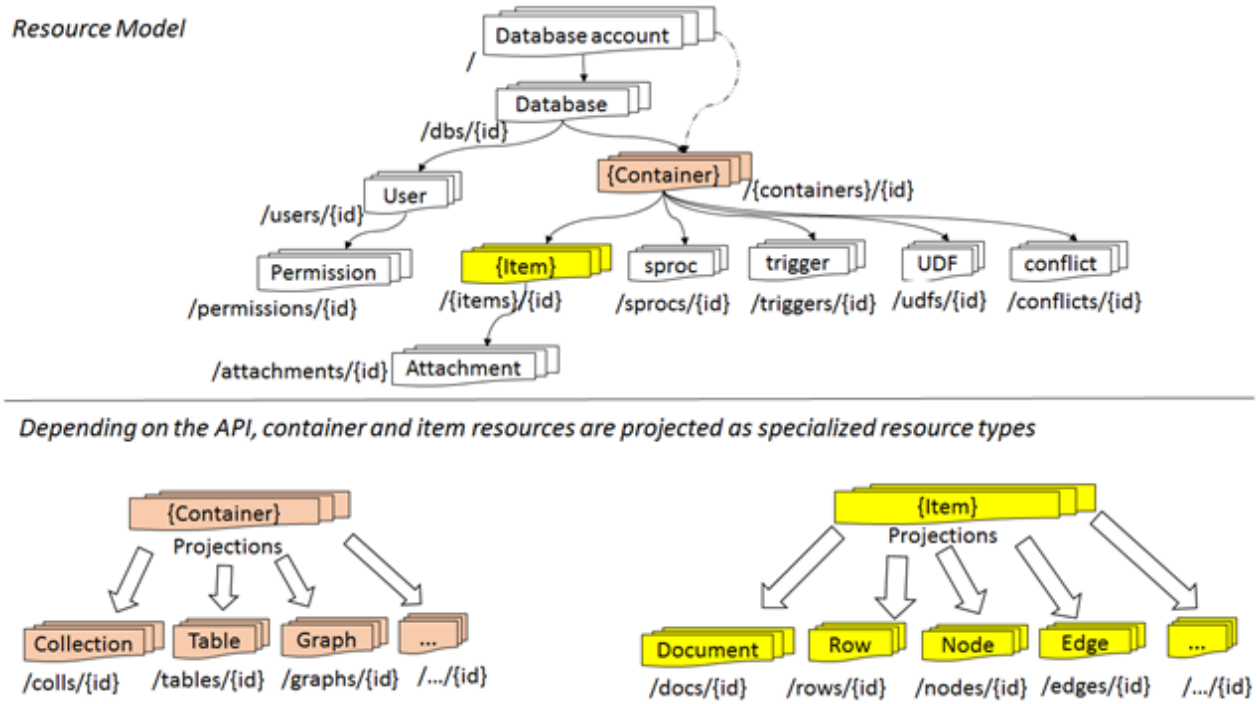


Image Source: https://azure.microsoft.com/en-us/blog/a-technical-overview-of-azure-cosmos-db/

Q4. What is Cosmos DB Emulator?

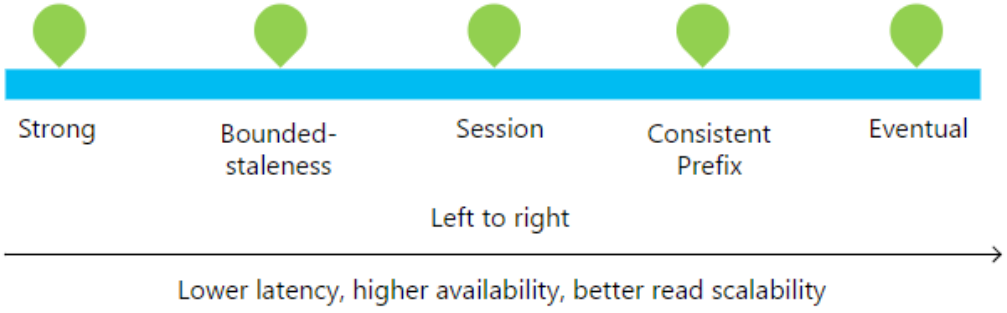
Ans. Cosmos DB emulator provides a local environment that emulates the Azure Cosmos DB service for development purposes. It facilitates to develop and test your application locally, without creating an Azure subscription or incurring any costs. After testing your app in the Azure Cosmos DB Emulator, you can switch to use an Azure Cosmos DB account in the cloud.

Q5. What is document DB?

Ans. Document DB is a fully-managed, highly-scalable, NoSQL document database service. It is schema-free storage and store data as JSON documents. In this, you query JSON documents using SQL like syntax and JS. Like SQL databases, it supports Stored Procedures, Triggers, User-defined functions.

Q6. What consistency levels Cosmos DB supports?

Ans. Cosmos DB supports the following consistency levels:



Q7. How Cosmos DB consistency levels guarantees read?

Ans. Each Cosmos DB consistency level has the following read guarantees.

Consistency Level	Guarantees
Strong	Linearizability. Reads are guaranteed to return the most recent version of an item.
Bounded Staleness	Consistent Prefix. Reads lag behind writes by at most k prefixes or t interval
Session	Consistent Prefix. Monotonic reads, monotonic writes, read-your-writes, write-follows-reads. Session consistency is scoped to a client session.
Consistent Prefix	Consistent prefix guarantees that reads never see out of order writes. If writes were performed in the order A, B, C, then a client sees either A, A,B, or A,B,C, but never out of order like A,C or B,A,C.
Eventual	Out of order reads

Q8. What is MongoDB API in Cosmos DB?

Ans. Cosmos DB can be used as the data store for apps written for MongoDB. In this way, your application will use Cosmos DB instead of MongoDB. You don't need to manage and scale your MongoDB databases. Cosmos DB is a fully managed service.

Q9. What is Elastic Scalability?

Ans. Elastic Scalability is the Automatic Mechanism by which Resources are Scaled Up or Down based on Workload Increase and Decrease.

Q10. Case Study: There is a multiplayer game and it needs 1-millisecond fast storage & easy scaling up during weekends. The administrator needs reporting for the new player registration, active status, played games and data transformation etc. What will be your database design approach for this game?

Ans. Here a Hybrid Approach is recommended:

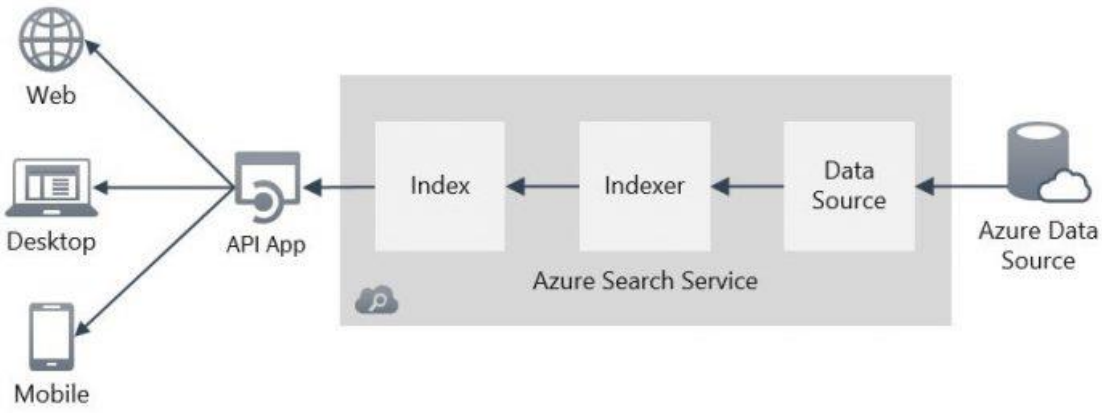
- Cosmos DB provides better speed & easier scalability than SQL Azure. Hence Cosmos DB can be used to accomplish the first requirement
- SQL Azure can be used for storing the new player registrations & status management. Here a fixed schema can be used, transformations can be applied & SSRS reports will be viewed

9

Azure Search and Redis Cache

Q1. What is Azure Search?

Ans. Azure Search is a **Search-as-a-Solution** hosted & managed by Azure. Azure Search allows Developers to build Search Experience over multiple sources of contents in web, mobile & enterprise applications queryable with a REST API interface.



Azure Search itself takes care of Index creation, Service availability, Scaling and Service updates.

Q2. What are the main features of Azure Search?

Ans. Azure Search offers Full-Text Search, Operator Query Syntax, AI-Powered Search, Multiple Data Source Integration, Linguistic Analysis, Geo-search, Auto-complete, Search Suggestions, Filters, Traffic Analysis and Scalability etc.

Q3. What are the steps involved in Azure Search?

Ans. The steps involved in Azure Search are:

- Provision Search using Azure Portal.
- Create Index to define the structure & query of the Search
- Load Data from Sources using available Indexers
- Perform Search using REST API

Q4. What are Azure Search Keys?

Ans. Azure Search service provides two keys for accessing search database and performing operations.

- **Admin keys** - Grant full rights to all operations. This includes managing the service, creating and deleting indexes, and data sources
- **Query keys** - Grant read-only access to indexes and documents, and should be used by applications that issue search requests

Q5. What integration Azure Search support?

Ans. Azure Search can be integrated with Azure SQL Database, Azure Cosmos DB, or Azure Blob storage.

Q6. What is Redis Cache?

Ans. Redis Cache is an open-source, single-threaded, in-memory key-value cache and store used by Twitter, Github, Weibo, Pinterest, Snapchat, StackOverflow, Flickr. Following are the features of Redis Cache:

- Supported data types: strings, hashes, lists, sets, sorted sets
- Rich set of clients, higher-level libraries
- Low latency, high throughput key-value store
- Publisher-Subscriber pattern
- Highly customizable replication support
- Supports the hierarchy of Slaves per Master

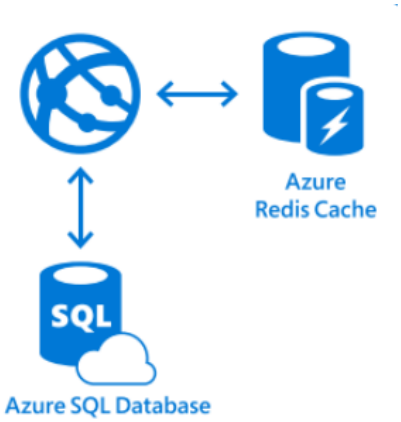
Q7. Why uses a cache?

Ans. There are the following reasons to use cache. The cache will help you to:

- Decrease load on the database
- Store data close to the application
- Speed up data access
- Scale-out application

Q8. What is Azure Cache for Redis?

Ans. The cache is a temporary storage of data. Azure Cache for Redis is a Caching Provider hosted & managed in Microsoft Azure. It provides a Secured, Dedicated, In-Memory Access to Caching thereby Increasing the Performance of underlying applications.



Note: Azure Cache for Redis is inherited from open source Redis Cache.

Q9. What are Tiers available for Azure Cache for Redis?

Ans. Basic, Standard & Premium tiers are available for Azure Cache.

Basic	Standard	Premium
Single node Multiple sizes up to 53 GB No SLA supports Ideal for development/test and non-critical workloads	Two-node primary/secondary Multiple sizes up to 53 GB High-availability SLA Ideal for critical workloads	Two-node primary/secondary Multiple sizes up to 530 GB High-availability SLA Disaster recovery, enhanced security and more Ideal for bigger workloads

Q10. How High Performance Availed in Azure Cache for Redis?

Ans. Azure Cache for Redis stores data in Memory instead of Disk. Thus, it provides Low Latency in the order of Milliseconds. Caching can be applied for Database, File System etc.

Q11. How Azure Cache for Redis helps to Reduce Cost?

Ans. Azure Cache for Redis helps to reduce the number of expensive calls to SQL Azure by looking up the Values in memory. Thus, Cost Reduction is possible.

Q12. Case Study: You have a Stock Market Application having SQL Server Table with 200 Columns upon which 150 are Computed columns. The data will be changed everyday midnight as part of a SQL Job. The database size is 5GB. You need to Optimize the Performance. What will be your Design Approach?

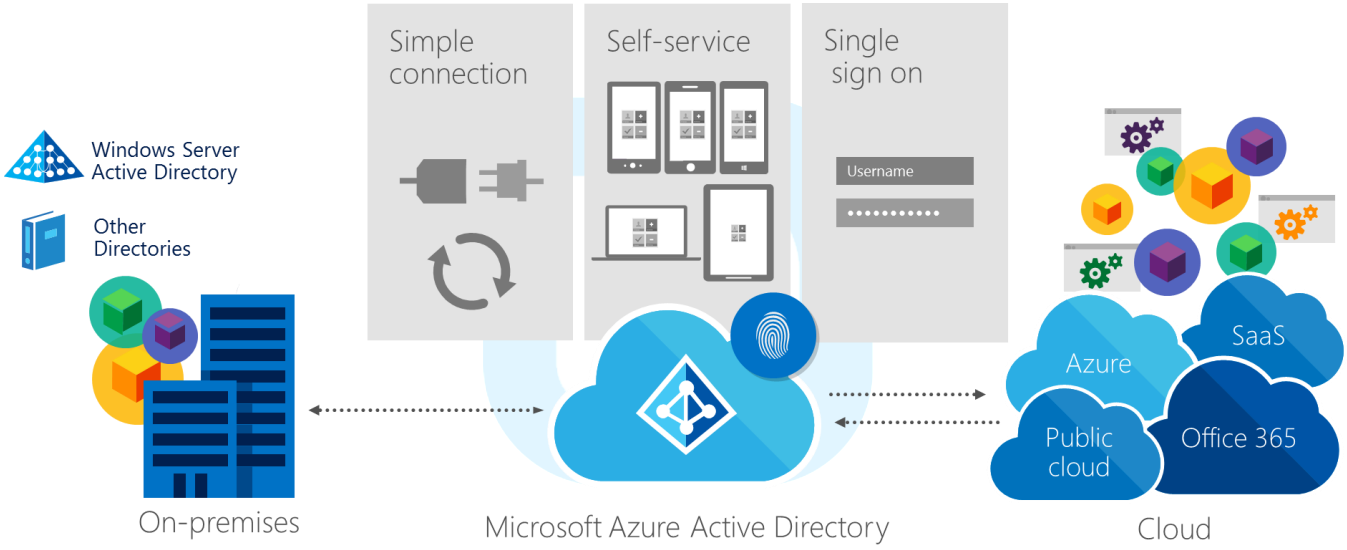
Ans. Azure Cache for Redis would be a Right Solution for the scenario as Caching increases Performance due to the In-memory Availability of Data, Preventing Duplicate Computations, No Network Latency between Application Server & SQL Server etc.

- Azure Cache for Redis can be configured to run every midnight after the SQL Job completion. In this way, the Cache Creation process is required to run only once a day.
- Premium Plan is required to support the 5GB database size.

10
Azure Active Directory

Q1. What is Azure Active Directory?

Ans. Azure Active Directory (AAD) is a **Cloud-based Identity and Access Management System** provided by Microsoft Azure.



AAD provides Access Control to Apps and Resources, Allows Single-Sign-On (**SSO**) to the Apps, Provides Libraries to integrate token-based client applications.

Q2. What is ADAL?

Ans. ADAL is **Active Directory Authentication Library** provided by Microsoft that allows Client Applications to Authenticate itself using Tokens.

ADAL supports automatic refreshing of tokens.

ADAL provides different editions for supporting languages like C#, JavaScript, Angular Python etc.

Q3. What is the difference between Windows Server AD and Azure AD?

Ans. There are the following differences between Windows Server AD and Azure AD:

- AD is a poor choice for multi-platform environments.
- AD has issues controlling Linux-based user accounts.
- AD struggles significantly when connecting to cloud-based servers and applications.
- Azure AD maintains central directory service for its cloud servers and applications such as Office 365.
- Azure AD has Multi-factor authentication.
- Azure AD is easy to scale for Internet-based application.

Q4. What are the Steps to Register an Angular App with ADAL?

Ans. Following are the steps:

- Register the Angular App in Azure AD & Get a Client ID
- Install ADAL into Angular App
- Configure the Backend Server with the Client ID

Q5. What is JWT Token?

Ans. JWT (JSON Web Toolkit) Token is a Base 64 Encoded String generated using JSON Web Toolkit. It contains information like Header, Payload & Signature to validate, extract claims contained in the token.

Q6. What are the Developer Tools to work with ADAL & Tokens?

Ans. Swagger is one popular web tool which generates the API Endpoint documentation, validation and Allows invoking it.

Postman is another popular desktop tool for Testing the APIs using Tokens.

Q7. What are the 4 Editions of Azure Active Directory?

Ans. The 4 Editions are:

1. Free
2. Basic
3. Premium P1
4. Premium P2

Q8. What protocols Azure AD support?

Ans. Azure AD supports the following protocols:

- WS Federation
- SAML-P 2.0
- OAuth 2.0
- OpenID Connect

Q9. In Azure AD, which authentication scenarios is used in which case?

Ans. Azure AD supports the following authentication scenarios:

- WS Federation or SAML-P 2.0

    - Web Browser to Web Application
- OAuth 2.0 or OpenID Connect
    - Single Page Application (SPA)
    - Native Application to Web API
    - Web Application to Web API
    - Service Application to Web API

Q10. Case Study: You are working on a Campus Automation project with 1 Million Users. The requirement is to have Single-Sign-On, Multi-Factor Authentication, Self-service Password Reset, Self-service Group etc. Which Edition would you recommend?

Ans. Azure Free edition only supports up to 500000 users. Hence Basic Edition is required at a minimum.

Single-Sign-On is supported by all editions. But, Multi-Factor Authentication, Self-Service Password Reset, Self-service Group features requires Azure Active Directory P1 edition.

11

Azure Backup and Insights

Q1. How to take Backup & Restore data in Azure?

Ans. Azure provides a service named Azure Backup for the purpose of Backup & Restore of Data, VM etc. Azure Backup is an alternative for On-Premise backup solutions.

Azure Backup can be performed through Porta, PowerShell and CLI.

Q2. What are the features of Azure Backup?

Ans. Azure Backup provides features like Automatic Storage Management, Unlimited Scaling, Incremental Backup, Geo-Redundant Storage, Unlimited Data Transfer, Long Term Retention, Security etc. at Competitive Prices.

Q3. What are the Components in Azure Backup?

Ans. Azure Backup consists of the following components:

- Backup Agent
- Backup Server

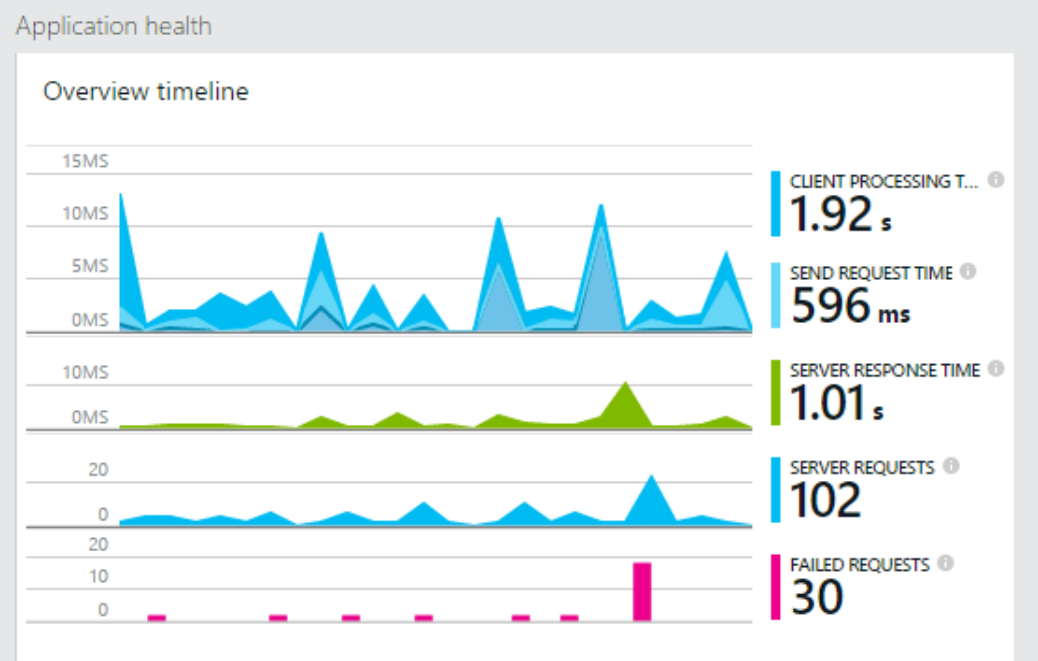
Q4. What are the Disaster Recovery Mechanisms in Azure?

Ans. Azure provides the following Disaster Recover mechanisms:

- **Multiple Data Center Regions** and Geo-Replication ensure that our data is protected in case of Outage in a particular region.
- **Azure Site Recovery** provides Simple Replication of VMs between regions.
- **Azure Traffic Manager** automatically redirects traffic whenever a single region failure occurs.
- **Automatic Data Replication** is performed on SQL Azure & Storage

Q5. What are Application Insights?

Ans. Application Insights is an Application Performance Management service provided by Azure. It provides information on Request, Response Time, Failures, Exceptions, User Count, Diagnostics, Performance Counters etc.



Q6. How is Application Insights enabled?

Ans. It is first enabled in the Azure Portal. Then an Instrumentation Package is installed to the Application which will send Telemetry data for Monitoring.

Q7. Can we use Application Insights for non .Net Applications?

Ans. Yes, we can use it for J2EE, JavaScript applications too.

Q8. Is Application Insights Free?

Ans. It is **Free** for initial use. After substantial growth in an application, it will be charged

Q9. Will there be Performance Overheads on using Application Insights?

Ans. The performance overheads are minimal as the application insights are executed on separate threads & non-blocking in nature.

12

Cloud Design Patterns

Q1. What are Cloud Design Patterns?

Ans. Cloud Design Patterns are design solutions that address the common problems associated with Cloud-based systems.

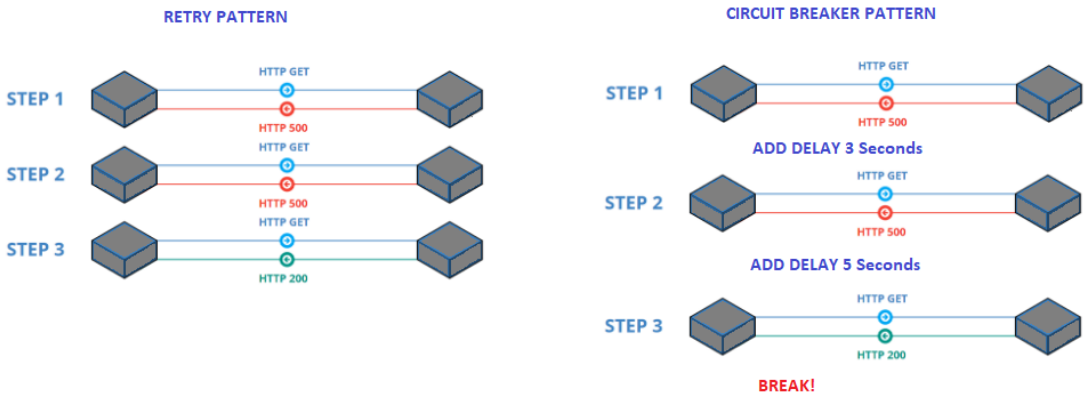
Q2. Tell the name of some of the Cloud Design Patterns?

Ans. The few cloud design patterns are Circuit Breaker, Retry, CQRS, Gatekeeper, Gateway Aggregation, Health Endpoint, Cache-Aside & Throttling.

Q3. What is the difference between Retry & Circuit Breaker pattern?

Ans. Retry pattern repeats the request after a small delay. Applicable for temporary failure scenarios. Example, retry after 3 seconds, then 3 seconds and so.

Circuit Breaker pattern repeats the request after a variable amount of delay. Applicable for unusual failure scenarios. Example, retry after 3 seconds, 30 seconds and so.



Q4. What is Cache-Aside pattern?

Ans. Cache-Aside pattern loads Data into Cache thereby increasing performance & decreasing costs. Example, Redis Cache on SQL Azure is an applicable scenario.

Q5. What is CQRS pattern?

Ans. CQRS means Command Query Responsibility Segregation. The main idea behind CQS is that "A method should either change the state of an object, or return a result, but not both. This pattern can maximize performance, scalability, and security.

Q6. What is the Gatekeeper pattern?

Ans. This pattern protects applications and services by using a dedicated host instance that acts as a broker between clients and the application or service, validates and sanitizes requests, and passes requests and data between them.

Q7. What is Gateway Aggregation pattern?

Ans. It uses a gateway to aggregate multiple individual requests into a single request.

Q8. What is the Publisher/Subscriber pattern?

Ans. This pattern enables an application to announce events to multiple interested consumers asynchronously, without coupling the senders to the receivers.

Q9. What is Sharding?

Ans. A partition referred to as Shard in No SQL database like MongoDB. Sharding divides a data store into a set of horizontal partitions or shards.

Q10. What is Throttling pattern?

Ans. Throttling pattern allows to Control the Consumption of the resources. This is a useful tool for the Subscription model.