QUIZ 2 (Version 1)

Question 1:

Describe the benefits of AVD. What is the role of "Multi-Session Windows" in AVD?

Benefits:

- Centralised security management for user desktops
- built-in security measures such as multi-factor authentication (MFA)
- Role-Based Access Control (RBACs)

Windows 10/11 Enterprise Multi-Session is a unique feature of Azure Virtual Desktop that allows multiple concurrent users to run their own desktop sessions on a single virtual machine.

Question 2:

Briefly describe ACL. What container orchestration capabilities are provided by ACI?

Azure Container Instances (ACI) is a service that enables you to run containers directly in the Azure cloud without managing any virtual machines.

ACI allows you to run multiple containers together in a "container group." Containers in the same group share the same network and storage resources and can communicate with each other directly.

You can schedule containers to run on-demand with ACI, providing the ability to run short-lived or burst workloads without provisioning or managing a full cluster of virtual machines.

Each container group in ACI is securely isolated from others, ensuring that containers do not interfere with each other.

ACI allows you to deploy containers within an Azure Virtual Network (VNet), giving your containers secure access to resources in your private network, such as databases or other services.

Provides the facitlity to restart a container (multiple modes available to do that such as restart on failure, restart on normal exit or dont restart.

Question 3:

Compare VMs vs Containers.

VMs in Azure:

- **Isolation:** Each VM runs its own full operating system, offering complete isolation.
- **Resource Usage:** More resource-heavy due to running entire OS and additional overhead.
- **Startup Time:** Slower startup since the entire OS must boot.
- **Portability:** Less portable, as VMs are tightly coupled to the underlying OS.

- **Use Case:** Ideal for running legacy applications, monolithic systems, or when full OS control is needed.

Containers in Azure:

- **Isolation:** Containers share the host OS kernel, but each runs isolated applications.
- **Resource Usage:** Lightweight and efficient, as they only contain the app and dependencies.
- **Startup Time:** Very fast startup, almost instantaneous.
- **Portability:** Highly portable, easily run on different environments with consistent behavior.
- **Use Case:** Best for microservices, cloud-native apps, and scenarios requiring scalability and agility.

Question 4:

What is the purpose of control plane and nodes in AKS?

Control plane provides the core kubernetes services and orchestration of application workloads

Nodes are underlying VMs that run your applications.

QUIZ 2 (Version 2)

QUIZ 3 (Version 1)

Question 1:

Under what circumstances VPN is used in cloud environments? What are the key requirements to setting up VPN between two sites?

VPN is often used in cloud environments to create secure, encrypted connections between an organization's on-premises network infrastructure and Azure.

Requirements:

- VPN appliance on both sides
- Public IP addresses
- Exchange encryption algorithm, hashing algorithm and Pre-Shared Keys (PSK)
- IP addresses must not overlap or it'll be an unstable network.

Question 2:

What is VNET peering? Explain the requirements to set up virtual network peering?

VNET Peering in Azure is a feature that allows two azure virtual networks (VNETs) to connect with each other and communicate as if they were part of the same network.

Requirements:

- Non-Overlapping IP Address Spaces
- You should own both VNETS i.e should not be third party one

Question 3:

With a subnet mask of 27, how many bits are usable in an IP address? And what is the available range of IP addresses?

32 – 27 = 5 => 5 usable bits in the IP address.

2^5 = 32 => 32 possible IP addresses can be made.

Range of IP Addresses => 0 – 31 (32 IP addresses)

Question 4:

You have mistakenly configured a newly created VM on a virtual network named VNET_TEST. You need to move it to VNET_PROD now. Explain how you would move a VM to a new VNET?

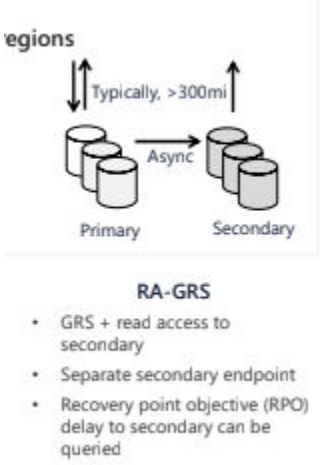
You cannot move a VM from VNET_TEST to VNET_PROD. You will have to delete the previous VM and create a new VM using VNET_PROD to achieve the goal.

Quiz 4 **Introduction to Cloud Computing – Fall 2024** **October 6th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** **WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS** *****

1. **Draw a figure to show storage account configured as RA-GRS**



2. **What is required in DNS to create a custom domain for a storage account?**
   CNAME record is needed.

3. **Name the four services provided by azure on top of storage.**
   Container service
   Table service
   Queue service
   File service

4. **What is the purpose of blob lifecycle management rules?**
   Transitioning of blobs to a cooler storage tier to optimize for performance and cost

   Delete blobs at the end of their lifecycle

   Apply rules to filtered paths in the Storage Account

Quiz 4 **Introduction to Cloud Computing – Fall 2024** **October 6th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Briefly provide the purpose of azcopy and azure file sync.**

   AzCopy:
   Command line utility
   Copy blobs or files to or from your storage Account
   One-direction synchronization

   Azure File Sync:
   Synchronizes Azure and on premises files in a bidirectional manner
   Cloud tiering keeps frequently accessed files local while freeing up space.
   Rapid reprovisioning of failed local server (install and resync)

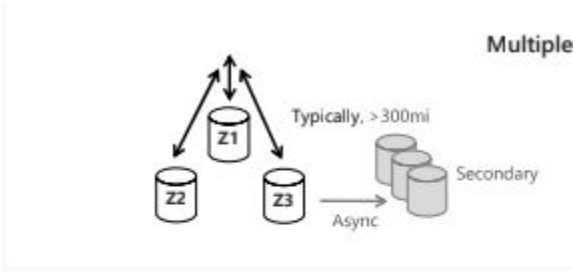
2. **Briefly describe the usage of blob access tiers**

   Hot tier – Optimized for frequent access of objects in the storage account
   Cool tier – Optimized for storing large amounts of data that is infrequently accessed and stored for at least 30 days
   Archive – Optimized for data that can tolerate several hours of retrieval latency and will remain in the Archive tier for at least 180 days

3. **Why azure requires globally unique names for storage accounts?**

   Since the name becomes part of the URL it needs to be unique.

4. **Draw a figure to demonstrate storage account with GZRS configuration.**



GZRS

- Six replicas, 3+1 zones, two regions
- Protects against disk, node, rack, zone, and region failures
- Synchronous writes to all three zones and asynchronous copy to secondary

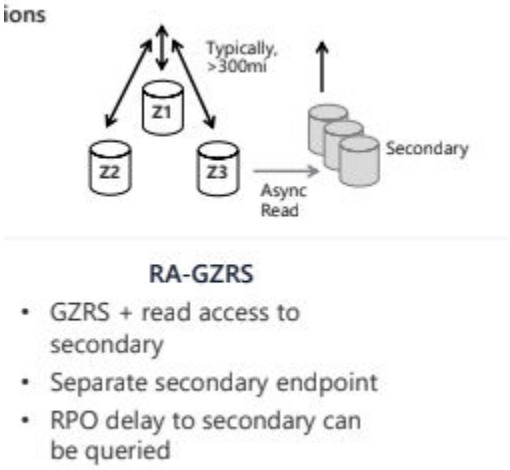
Quiz 4 **Introduction to Cloud Computing – Fall 2024** **October 6th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Briefly describe the usage of azure blob and azure files. Which protocol is used by Azure files?**
   Container storage (blob) is optimized for storing massive amounts of unstructured data, such as text or binary data, along with file streaming videos/audios.
   Azure Files sets up a highly available network file shares that can be accessed by using the standard Server Message Block(SMB) protocol.
   Protocols used are SMB or NFS.

2. **Draw a figure to show storage account configured as RA-GZRS.**



3. **List and briefly describe azure storage access tiers.**
   Hot tier – Optimized for frequent access of objects in the storage account
   Cool tier – Optimized for storing large amounts of data that is infrequently accessed and stored for at least 30 days
   Archive – Optimized for data that can tolerate several hours of retrieval latency and will remain in the Archive tier for at least 180 days

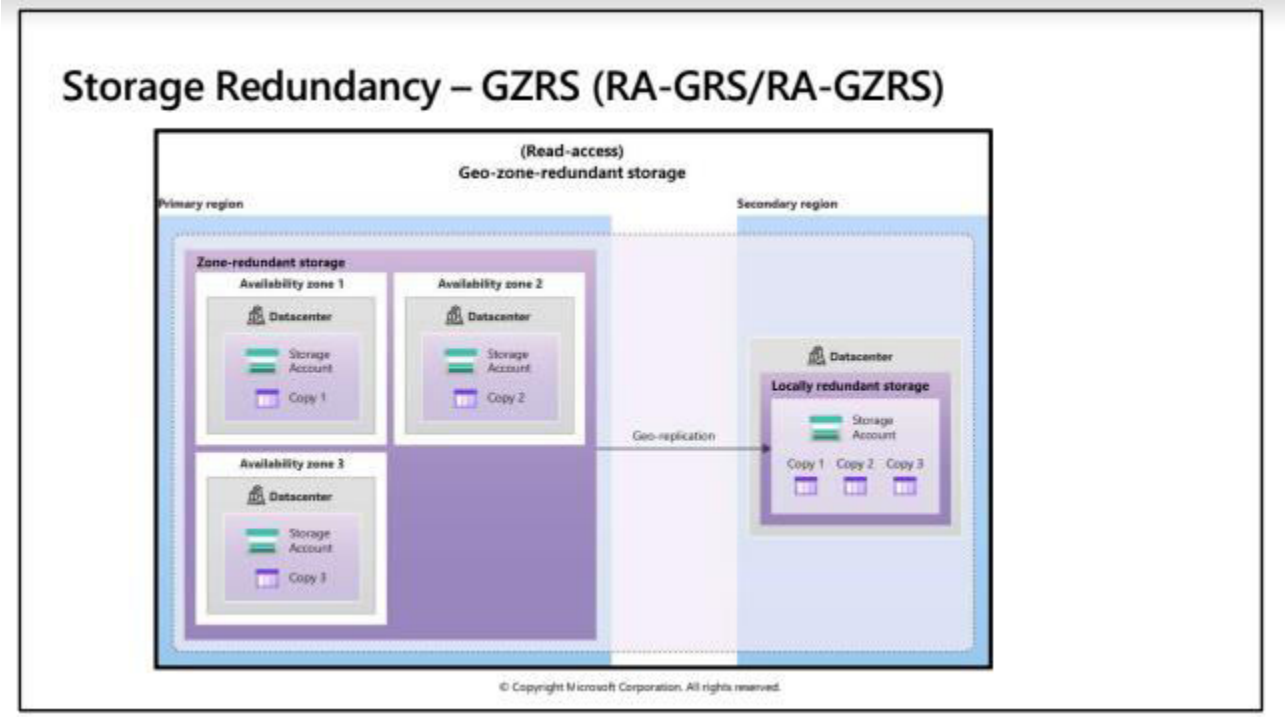
4. **What is the purpose of disk storage in azure storage services?**
   Disk storage provides disks for virtual machines, applications, and other services to access and use.

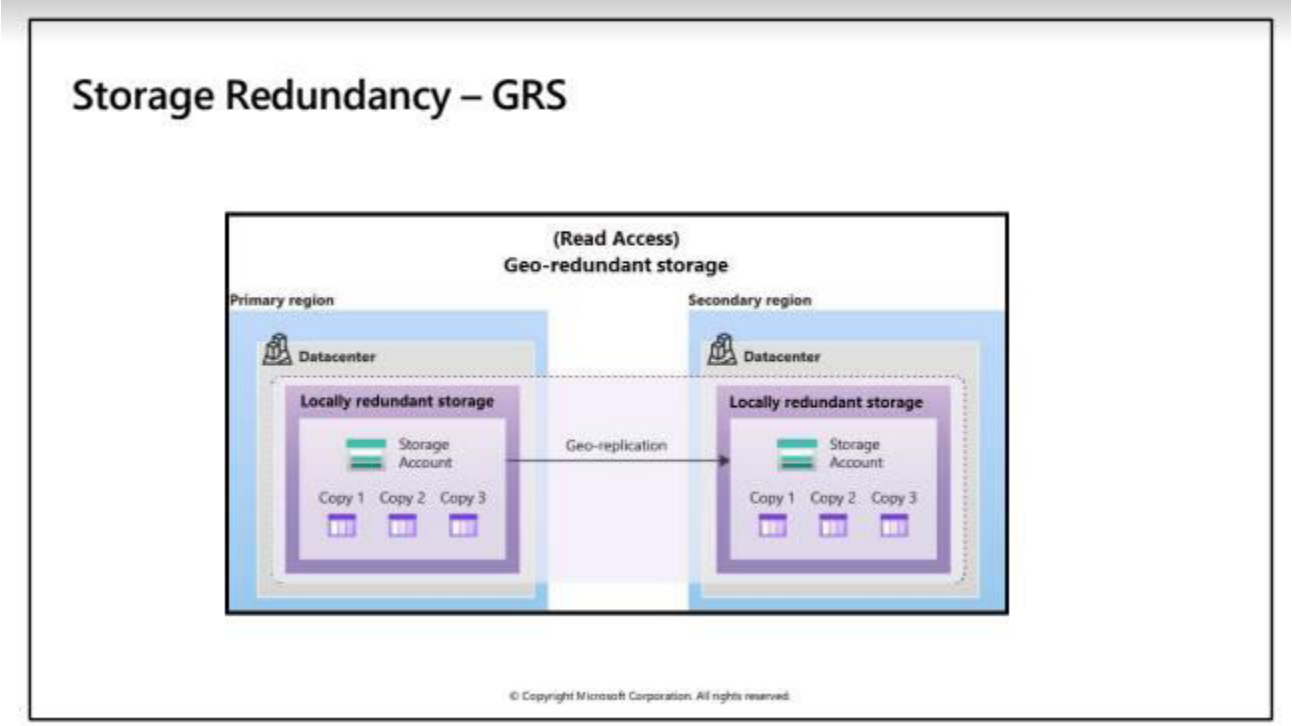
Quiz 4 **Introduction to Cloud Computing – Fall 2024** **October 6th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

Other Possible Diagrams:





Quiz 5 **Introduction to Cloud Computing – Fall 2024** **October 28th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Briefly state the following:**
   a. **What is the relationship between Azure App Service and App Service Plan (ASP)?**
   Azure App Service is a fully managed platform for hosting web applications, RESTful APIs, and mobile backends. An App Service Plan defines the underlying compute resources that your Azure App Services run on. The App Service runs within the App Service Plan.

   b. **What is the minimal ASP which allows you to have deployment slots?**
   Standard ASP

2. **Briefly describe the functionality and usage of deployment slots**
   Deployment slots in Azure App Service are live environments that let you deploy different versions of your app (e.g., staging, testing) without affecting the production environment. You can swap slots (e.g., staging to production) for zero-downtime updates and quick rollbacks. This enables safe testing, version control, and seamless deployments.

3. **In app service plan, what is the difference between dedicated compute and isolated compute?**

   Dedicated Compute: Dedicated compute (Basic, Standard, Premium). Run apps in the same plan in dedicated Azure VMs

   Isolated Compute: Isolated. Runs apps on dedicated Azure VMs in dedicated Azure virtual networks

4. **Explain persistent volume claim and persistent volume in AKS. When would you attach managed disk vs azure files to containers?**
   Persistent Volume (PV) is a storage resource created and managed by the Kubernetes API that can exist beyond the lifetime of an individual pod.
   A persistent volume claim (PVC) requests storage of a particular storage class, access mode, and size
   PV defines the actual storage while PVC is the configuration of the storage.
   Managed disk is used when you don't need to share files between containers and azure files is used when you do.

5. **Briefly state how containers isolation differs from VM isolation? how fault tolerance is managed in containers vs virtual machines.**
   Container isolation : Typically provides lightweight isolation from the host and other containers but doesn't provide as strong a security boundary as a virtual machine

   VM isolation: Provides complete isolation from the host operating system and other VMs. This is useful when a strong security boundary is critical, such as hosting apps from competing companies on the same server or cluster

   Container Fault Tolerance: If a cluster node fails, any containers running on it are rapidly recreated by the orchestrator on another cluster node

   VM Fault Tolerance: VMs can fail over to another server in a cluster, with the VM's operating system restarting on the new server

Quiz 5 **Introduction to Cloud Computing – Fall 2024** **October 28th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Explain the difference between isolated compute and dedicated compute?**

   Dedicated Compute: Dedicated compute (Basic, Standard, Premium). Run apps in the same plan in dedicated Azure VMs

   Isolated Compute: Isolated. Runs apps on dedicated Azure VMs in dedicated Azure virtual networks

2. **When would you attach managed disk vs azure files to containers? Explain persistent volume claim and persistent volume in AKS.**

   Persistent Volume (PV) is a storage resource created and managed by the Kubernetes API that can exist beyond the lifetime of an individual pod.
   A persistent volume claim (PVC) requests storage of a particular storage class, access mode, and size
   PV defines the actual storage while PVC is the configuration of the storage.
   Managed disk is used when you don't need to share files between containers and azure files is used when you do.

3. **In AKS, what is the role of a) horizontal pod scaler & b) cluster auto-scaler.**
   Horizontal Pod autoscaler : Kubernetes uses the horizontal pod autoscaler (HPA) to monitor the resource demand and automatically scale the number of pods. By default, the HPA checks the Metrics API every 15 seconds for any required changes in replica count, and the Metrics API retrieves data from the Kubelet every 60 seconds. So, the HPA is updated every 60 seconds. When changes are required, the number of replicas is increased or decreased accordingly. HPA works with AKS clusters that deployed the Metrics Server for Kubernetes version 1.8 and higher

   Cluster autoscaler: To respond to changing pod demands, the Kubernetes cluster autoscaler adjusts the number of nodes based on the requested compute resources in the node pool. By default, the cluster autoscaler checks the Metrics API server every 10 seconds for any required changes in node count. If the cluster autoscaler determines that a change is required, the number of nodes in your AKS cluster is increased or decreased accordingly.

4. **For the auto-scale functionality, which is the minimal app service plan that can be used?**
   Standard ASP

5. **What is the purpose of mountPath attribute in AKS manifest file?**

   In an **AKS manifest file**, the `mountPath` attribute specifies the **directory inside the container** where a volume (e.g., Persistent Volume or Azure File share) will be **mounted**. It defines where the container can access the volume's data.

   Purpose: To allow containers to **read from or write to** external storage at the specified path, enabling **data persistence** and sharing between pods.

Quiz 5 **Introduction to Cloud Computing – Fall 2024** **October 28th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **For the auto-scale functionality, which is the minimal app service plan that can be used?**
   Standard ASP

2. **In app service plan, what is the difference between dedicated compute and isolated compute?**

   Dedicated Compute: Dedicated compute (Basic, Standard, Premium). Run apps in the same plan in dedicated Azure VMs

   Isolated Compute: Isolated. Runs apps on dedicated Azure VMs in dedicated Azure virtual networks

3. **When would you attach managed disk vs azure files to containers? Explain persistent volume claim and persistent volume in AKS.**
   Persistent Volume (PV) is a storage resource created and managed by the Kubernetes API that can exist beyond the lifetime of an individual pod.
   A persistent volume claim (PVC) requests storage of a particular storage class, access mode, and size.

   PV defines the actual storage while PVC is the configuration/definition of the storage.
   Managed disk is used when you don't need to share files between containers and azure files is used when you do

4. **Briefly describe the functionality and usage of deployment slots. What is the minimal ASP which allows you to have deployment slots?**
   Deployment slots in Azure App Service are live environments that let you deploy different versions of your app (e.g., staging, testing) without affecting the production environment. You can swap slots (e.g., staging to production) for zero-downtime updates and quick rollbacks. This enables safe testing, version control, and seamless deployments.
   Standard ASP

5. **When creating a custom domain for the web app, which DNS record is needed and why?**
   CNAME record is needed

Quiz 6 **Introduction to Cloud Computing – Fall 2024** **October 30th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Briefly explain the concept of zero trust.**
   Zero Trust is a security model that assumes **no implicit trust** in any user, device, or network—whether inside or outside the organization. It enforces **continuous verification** and grants access based on strict **identity, device, and context checks**, minimizing the risk of breaches by always verifying "**never trust, always verify**."

2. **Active Directory Domain Services are used to store which kind of objects? Which container in ADDS is used to store these objects?**
   User accounts, computer accounts, and groups.
   Domain container.

3. **Which services is used to synchronize information between ADDS and Entra ID? Which objects are synchronized?**
   Entra ID Connect or Azure AD
   User accounts, computer accounts, and groups.

4. **Explain options for password hash sync between ADDS and Entra ID.**
   Option 1: No Sync
   Option 2: One-way Sync, no changes on cloud allowed.
   Option 3: Two-way sync, changes on cloud allowed.

5. **Which service allows an administrator to block user access if he is outside his country of residence?**
   Conditional access.

6. **How would you configure Entra ID to allow only admins to login with MFA but not the regular users?**
   By enabling conditional access.

7. **How and why secure score is calculated by defender for cloud?**
   Defender for Cloud continually assesses your resources for security issues; then aggregates all the findings into a single score so that you can tell your current security situation.

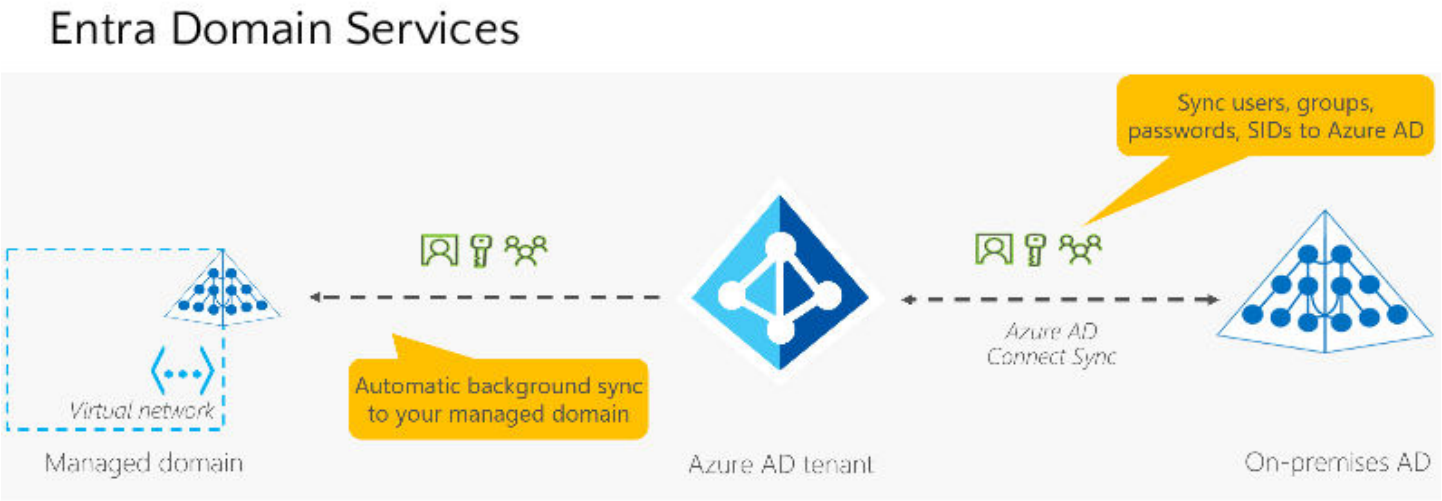
Quiz 6 **Introduction to Cloud Computing – Fall 2024** **October 30th, 2024**

Name: **Roll Number:** **Circle your section:** **BDS-7A | BCS-9A**

***** WRITE BRIEF AND PRECISE ANSWERS. CONCENTRATE ON YOUR OWN WORK. ALL QUESTIONS CARRY EQUAL MARKS *****

1. **Briefly describe functionality and usage of Microsoft Entra ID service.**
   Microsoft Entra ID (formerly Azure AD) is a cloud-based identity and access management service. It provides authentication, single sign-on (SSO), and access control for users and applications. It's used to manage user identities, enforce multi-factor authentication, and protect resources with conditional access policies, enhancing security for cloud and hybrid environments.

2. **Draw & briefly explain the process of synchronization of AD objects to Entra Domain Services.**



3. **Briefly explain the concept and principles of zero trust.**
   Zero Trust is a security model that assumes **no implicit trust** in any user, device, or network—whether inside or outside the organization. It enforces **continuous verification** and grants access based on strict **identity, device, and context checks**, minimizing the risk of breaches by always verifying "**never trust, always verify**."

4. **How and why secure score is calculated by defender for cloud?**
   Defender for Cloud continually assesses your resources for security issues; then aggregates all the findings into a single score so that you can tell your current security situation.

5. **What are the different options to sync password hash between ADDS and Entra ID.**
   Option 1: No Sync
   Option 2: One-way Sync, no changes on cloud allowed.
   Option 3: Two-way sync, changes on cloud allowed.

6. **As an administrator, you want to block user access if a user is outside his country of residence. How would you accomplish that?**
   By enabling Conditional access.

7. **Which objects are stored in ADDS? Which container type in ADDS is used to store these objects?**
   User accounts, computer accounts, and groups.
   Domain container.

Quiz 7 **Introduction to Cloud Computing – Fall 2024** **October 30th, 2024**

Name: **Roll Number:** **Circle your section: BDS-7A | BCS-9A**

1. **How are data warehouses designed differently than OLTP databases? And for what reason?**

   OLTP is typically a *live* system in which data storage is optimized for both *read* and *write* operations in order to support *transactional* workloads

   Data warehouses are an established way to store data in a relational schema that is optimized for read operations – primarily queries to support reporting and data visualization. The data warehouse schema may require some *denormalization* of data in an OLTP data source (introducing some duplication to make queries perform faster)

2. **What are DDL commands in Structured Query Language?**

   Data Definition Language (DDL) is used to manage objects such as tables in the database. For example, you can CREATE new objects, and ALTER or DROP existing objects.

3. **Under what circumstances you should pick SQL Server on Azure VMs? Briefly mention the selection criteria and benefits.**

   SQL Server on Azure Virtual Machines is an infrastructure-as-a-service (IaaS) solution in which a full instance of SQL Server is installed in a virtual machine that is hosted in Azure. This makes it a good candidate for migration projects, where 1:1 compatibility with an existing on-premises SQL Server instance is required or for hybrid scenarios with a mix of cloud-based and on-premises databases that must maintain compatibility. Because it's an IaaS solution, you have full control of the configuration of the database; which also means you have responsibility to manage administrative tasks – just as you would for a SQL Server instance in your own data center. Costs for the service are based on SQL Server licensing and the cost of running the VM in Azure.

4. **What are the drivers for IaaS based migration?**

   Drivers: Timelines, threats & business model
   Expiring contracts, security/resilience/scalability & CAPEX to OPEX
   Move workloads “as-is”

5. **Briefly explain automatic index management in cosmos database.**

   Automatic and synchronous indexing of all ingested content - hash, range, geo-spatial, and columnar
   No schemas or secondary indices ever needed
   Resource governed, write optimized database engine with latch free and log structured techniques
   Online and in-situ index transformations

6. **Mention 4 types of NoSQL databases supported by Cosmos Database.**

   such as documents, graphs, key-value stores, and column family stores.

7. **How does cosmos db support lift and shift migration of mongo db?**

   MongoDB is a popular open source database in which data is stored in Binary JSON (BSON) format. The Azure Cosmos DB MongoDB API enables developers to use MongoDB client libraries to and code to work with data in Azure Cosmos DB.

Quiz 7 **Introduction to Cloud Computing – Fall 2024** **October 30th, 2024**

Name: **Roll Number:** **Circle your section: BDS-7A | BCS-9A**

1. **What is the design difference between standard OLTP databases vs data warehouse workloads? What is each workload optimized for?**

   OLTP is typically a *live* system in which data storage is optimized for both *read* and *write* operations in order to support *transactional* workloads

   Data warehouses are an established way to store data in a relational schema that is optimized for read operations – primarily queries to support reporting and data visualization. The data warehouse schema may require some *denormalization* of data in an OLTP data source (introducing some duplication to make queries perform faster)

2. **List the types of databases than can be used through cosmos db.**
   Relational, documents, graphs, key-value stores, and column family stores.

3. **You can use lift and migration to replace apache cassandra with cosmos db. What functionality in cosmos db allows such migration?**

   The Cassandra API is compatible with Apache Cassandra, which is a popular open source database that uses a column-family storage structure. Column families are tables, similar to those in a relational database, with the exception that it's not mandatory for every row to have the same columns.
   NoSQL wire protocol

4. **Explain the motivation and drivers for PaaS based modernization.**
   Drivers: Productivity, cost optimization & business insights
   Application Innovations(TTM), reduced resources and lock-in, data analytics (AI)
   Update the application stack

5. **What is the usage of SQL commands in DCL category?**

   Data Control Language (DCL) is used to manage access to objects in a database. You can GRANT, DENY, or REVOKE specific permissions for specific users (and groups of users). The example on the slide grants **user1** permission to use SELECT, INSERT, and UPDATE statements on the **Product** table.

6. **Describe the benefits and selection criteria between SQL MI vs Azure SQL DB?**

   Azure SQL Managed Instance is a platform-as-a-service (PaaS) service that enables you to pre-provision compute resources and deploy several individual SQL Server managed instances up to your pre-provisioned compute level. Core administrative tasks are automated while providing a high-degree of compatibility with on-premises SQL Server. You can choose to deploy a single managed instance that supports multiple databases, or you can create a pool of instances that share underlying infrastructure resources for cost-efficiency. SQL Managed Instance is a great choice for most migration scenarios, where you need to move an on-premises SQL Server database to the cloud with minimal changes.

   Azure SQL Database is another platform-as-a-service (PaaS) solution that offers the lowest-cost Azure SQL option. You have minimal administrative control over the service beyond creating the database schema, importing and exporting data, and configuring access controls. Azure SQL Database enables you to deploy a single database or an *elastic pool* that shares resources across multiple databases. Azure SQL Database is a great choice for new applications that require a low-cost relational data store with minimal administrative overhead.

7. **What is the synchronous auto-indexing in cosmos db?**
   Automatic and synchronous indexing of all ingested content - hash, range, geo-spatial, and columnar
   No schemas or secondary indices ever needed
   Resource governed, write optimized database engine with latch free and log structured techniques
   Online and in-situ index transformations

National University of Computer and Emerging Sciences

Lahore Campus

Intro to Cloud Computing (CS4037) BCS9A, BDS7A

Date: November 12th, 2024

Course Instructor(s): Ali Khawaja

Sessional-II Exam

Total Time (Hrs.): 1

Total Marks: 100

Total Questions: 11

_____ _____ _____

Roll No Section Student Signature

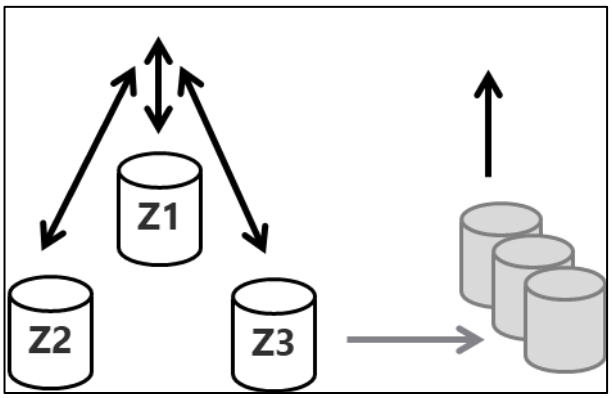
Do not write below this line

Attempt all the questions. Provide concise and brief answers. Please answer only what is being asked.

CLO 1. Describe the basics of cloud computing and related services

Q1: (a) Draw a figure with brief explanation to show storage account configured as RA-GZRS. (b) Why storage accounts need to have globally unique names? (10)

(a)



Geographically zone-redundant storage (GZRS) combines the high availability of ZRS with the protection from regional outages that GRS provides. A GZRS storage account replicates data across three Azure AZs in the primary region, and to a secondary geographic region for protection from regional disasters.

(b) Storage account name is part of the URL to access that storage account, and URLs must be globally unique for them to be accessible [since each URL has its own specific DNS entry]

CLO 1. Describe the basics of cloud computing and related services

Q2: (a) Briefly describe the usage of blob access tiers. (b) What is the purpose of blob lifecycle management rules? (10)

 Hot	 Cool	 Archive
Optimized for storing data that is accessed frequently.	Optimized for storing data that is infrequently accessed and stored for at least 30 days.	Optimized for storing data that is rarely accessed and stored for at least 180 days with flexible latency requirements.

(b)

Transitioning of blobs to a cooler storage tier to optimize for performance and cost
Delete blobs at the end of their lifecycle
Apply rules to filtered paths in the Storage Account

CLO 1. Describe the basics of cloud computing and related services

Q3: (a) Briefly describe the usage of azure blob and azure files. (b) Briefly provide the purpose of **azcopy** and **azure file sync**. (10)

Feature	Description	When to use
Azure Files	SMB interface, client libraries, and a REST interface that allows access from anywhere to stored files	• Lift and shift an application to the cloud • Store shared data across multiple virtual machines • Store development and debugging tools that need to be accessed from many virtual machines
Azure Blobs	Client libraries and a REST interface that allows unstructured data (flat namespace) to be stored and accessed at a massive scale in block blobs	• Support streaming and random-access scenarios • Access application data from anywhere

AzCopy	Azure File Sync
Command line utility	Synchronizes Azure and on premises files in a bidirectional manner
Copy blobs or files to or from your storage account	Cloud tiering keeps frequently accessed files local, while freeing up space
One-direction synchronization	Rapid reprovisioning of failed local server (install and resync)

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q4: (a) What is the **relationship** between Azure App Service and App Service Plan (ASP)? (b) What is the minimal ASP which allows you to have deployment slots and autoscaling? (c) When copying setting between deployment slots, how do you ensure a specific setting is not copied to the other slot (10 Points)

(a) App Service Plan provides the **compute** and **features** for Azure app service.
(b) Standard
(c) You select an option (slot setting) to mark that setting as slot specific setting so it does not get copied.

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q5: (a) When creating a custom domain for the web app, when would you create (i) CNAME record? (ii) A record? (b) Briefly explain the difference between isolated and dedicated compute. (10)

Note: this question is not what is CNAME or A record is. Its specifically asking when you would create either one when dealing with web apps. We covered this point in the class as well as in the review session.

(a) Non-Isolated ASPs: CNAME, Isolated Plan: A record
(b) Isolated Plan has dedicated network as well besides dedicated compute.

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q6: Given the address space: 10.0.0.0/8, (a) Divide the above into /20 subnets and provide the ranges. (b) Divide the above into /16 subnets and provide the ranges.

Note: We covered this in class, and I provided detailed solution to this problem (with different ranges of course) during review.

Given: /8: 2^24: 16,777,216

(a) Dividing /8 into /20 subnets

/20: 2^12: 4096 (size of each subnet)
16777216/4096: 4096 → So we'll have total of 4096 /20 address spaces:

Range of each subnet: 4096/256: 16

10.0.0.0 → 10.0.15.255
10.0.16.0 → 10.0.31.255
10.0.32.0 → 10.0.47.255 (and so on)

(b) Dividing /8 into /16 subnets

/16: 2^16: 65536 (size of each subnet)
16777216/65536: 256 → So we'll have total of 256 /16 address spaces:

Range of each subnet: 65536/256: 256

10.0.0.0 → 10.0.255.255
10.1.0.0 → 10.1.255.255
10.2.0.0 → 10.2.255.255 (and so on)

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q7: (a) Explain persistent volume claim and persistent volume in AKS. (b) When would you attach managed disk vs azure files to containers. (10)

(a) Persistent Volume (PV) is a storage resource created and managed by the Kubernetes API that can exist beyond the lifetime of an individual pod.
A persistent volume claim (PVC) requests storage of a particular storage class, access mode, and size.

(b) Note: This question is asking usage of managed disk vs azure files when dealing with containers. Its NOT asking a generic question regarding managed disk vs azure files. Again, I covered this specifically during class and during review as well.

Containers with managed disk: For container local usage
Containers with Azure Files: Central location for all containers to save application data

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q8: When comparing containers and VMs, briefly explain the difference between (a) Isolation, (b) Operating System, (c) Fault Tolerance (10)

Feature	Containers	Virtual Machines
Isolation	Typically provides lightweight isolation from the host and other containers but doesn't provide as strong a security boundary as a virtual machine	Provides complete isolation from the host operating system and other VMs. This is useful when a strong security boundary is critical, such as hosting apps from competing companies on the same server or cluster
Operating system	Runs the user mode portion of an operating system and can be tailored to contain just the needed services for your app, using fewer system resources.	Runs a complete operating system including the kernel, thus requiring more system resources (CPU, memory, and storage)
Fault tolerance	If a cluster node fails, any containers running on it are rapidly recreated by the **orchestrator** on another cluster node	VMs can fail over to another server in a **cluster**, with the VM's operating system restarting on the new server

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q9: (a) What is the purpose of **mountPath** attribute in AKS manifest file? (d) Briefly explain the purpose of **kubeproxy** and **kubelet** in an AKS node. (5)

- **mountPath**: folder path where mounted storage will be made available
- **Kubeproxy**: Maintains network rules on nodes to implement Services. Used to expose pods on the network.
- **Kubelet**: Ensures that Pods (and the containers defined in them) are running

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

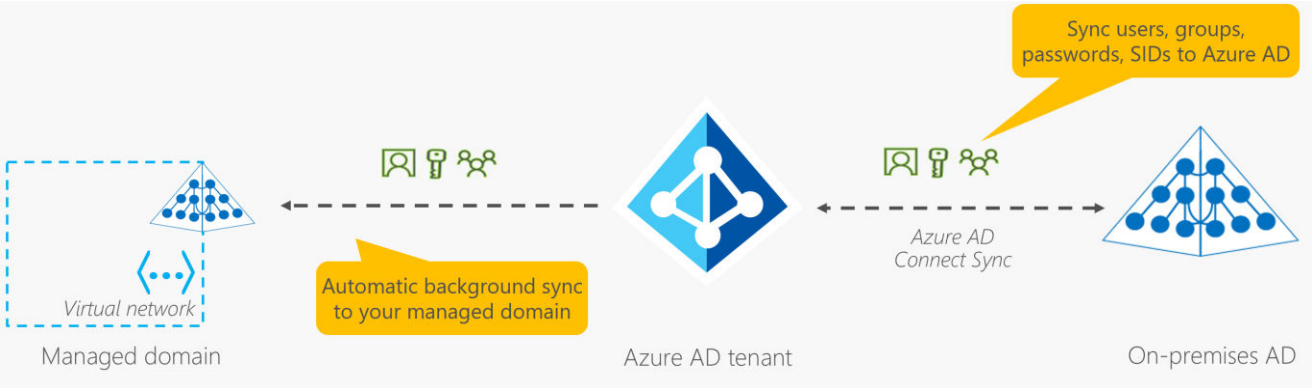
Q10: (a) What are the 3 options when synchronizing password hash between ADDS and Entra ID. (b) How and why secure score is calculated by defender for cloud? (5)

(a) No sync, One way sync, 2 way sync
(b) Score is calculated by giving each found vulnerability a rating/score, and it is done to provide a high level view of how secure the whole environment is on a 1-100 scale.

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q11: (a) What is the purpose of Entra ID and Entra Domain Services? (b) Draw & briefly explain the process of synchronization of ADDS objects from on-premises to Entra Domain Services in Azure. (10)

(a) **Entra ID**: Http[s] based authentication and authorization service; **Entra Domain services**: PaaS Domain Controller to support legacy apps (which require LDAP based authentication)
(b) OnPrem ADDS does bidirectional sync with Entra ID (Old Name: Azure AD), which then does one-way sync with Entra DS PaaS Service (Managed Domain)



BONUS QUESTION

CLO 2. Apply cloud computing knowledge in various real world use cases (situations)

Q12: (a) Briefly explain the concept of zero trust. (b) Even after fully authenticated and authorized, which service in Entra ID allows an administrator to block user access if he is not in a specific geographic location? (10)

(a) Zero Trust is a new security model that assumes breach and verifies each request as though it originated from an uncontrolled network. It is based on the following principles: **(**i) Verify explicitly, (ii) Use least privilege access, (iii) Assume breach
(b) Conditional Access