

Azure Solution Architect Training

Module 5

Azure Storage

Agenda

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What is Azure Storage

- ❑ Azure Storage provides storage that is highly available, secure, durable, scalable, and redundant.
- ❑ Azure Storage offers below data services:
 - Blob Storage
 - File Storage
 - Queue Storage
 - Table
- ❑ Azure Storage options:
 - **General Purpose v2 (GPv2)**
 - Accounts provide all the latest features, and supports Blobs, Files, Queues, and Tables.
 - This include blob-level tiering, archive storage, higher scale account limits, and storage events.
 - **Blob Storage**
 - Accounts provide all the latest features for block blobs, but only support Block Blobs.
 - **General Purpose v1 (GPv1)**
 - Accounts provide use of all Azure Storage Services, but may not have the latest features or the lowest GB pricing.
 - For example, cool and archive storage are not supported in GPv1.

Azure Storage: General Purpose v2

- ❑ General Purpose v2 (GPv2) are storage accounts which support all features for all storage services, including Blobs, Files, Queues, and Tables.
- ❑ For Block Blobs, You can choose between hot and cool storage tiers at account level, or hot, cool, and archive tiers at the blob level based on access patterns.
- ❑ Store frequently, infrequently, and rarely accessed data in the hot, cool, and archive storage tiers respectively to optimize costs.
- ❑ Importantly, any GPv1 account can be upgraded to a GPv2 account in the portal, CLI, or PowerShell.

Azure Storage: Pricing

- ❑ All storage accounts use a pricing model for blob storage based on the tier of each blob.
- ❑ When using a storage account, the following billing considerations apply:
 - ❑ **Storage costs**
 - The cost of storing data varies depending on the storage tier.
 - The per-gigabyte cost decreases as the tier gets cooler.
 - ❑ **Data access costs**
 - Data access charges increase as the tier gets cooler.
 - For data in the cool and archive storage tier, you are charged a per-gigabyte data access charge for reads.
 - ❑ **Transaction costs**
 - There is a per-transaction charge for all tiers.
 - ❑ **Geo-Replication data transfer costs**
 - This only applies to accounts with geo-replication configured, including GRS and RA-GRS.
 - Geo-replication data transfer incurs a per-gigabyte charge.

Azure Storage: Replication

- ❑ The data in your Microsoft Azure storage account is always replicated to ensure durability and high availability.
- ❑ Replication copies your data, either within the same data center, or to a second data center, depending on which replication option you choose.
- ❑ When you create a storage account, you can select one of the following replication options:
 - Locally redundant storage (LRS)
 - Zone-redundant storage (ZRS)
 - Geo-redundant storage (GRS)
 - Read-access geo-redundant storage (RA-GRS)

Azure Storage: Differences

Replication strategy	LRS	ZRS	GRS	RA-GRS
Data is replicated across multiple datacenters.	No	Yes	Yes	Yes
Data can be read from a secondary location as well as the primary location.	No	No	No	Yes
Designed to provide _ durability of objects over a given year.	at least 99.999999999% (11 9's)	at least 99.9999999999 % (12 9's)	at least 99.999999999 99999% (16 9's)	at least 99.999999999999 999% (16 9's)

Azure Storage: Tiers

- ❑ Azure storage offers three storage tiers for Blob object storage:
 - **Hot storage tier**
 - The Azure hot storage tier is optimized for storing data that is accessed frequently.
 - **Cool storage tier**
 - The Azure cool storage tier is optimized for storing data that is infrequently accessed and stored for at least 30 days.
 - **Archive storage tier**
 - The Azure archive storage tier is optimized for storing data that is rarely accessed and stored for at least 180 days.

Azure Storage: Security

- ❑ Azure Storage provides a comprehensive set of security capabilities.
- ❑ The storage account itself can be secured using Role-Based Access Control and Azure Active Directory.
- ❑ Data can be secured in transit between an application and Azure by using Client-Side Encryption, HTTPS, or SMB 3.0.
- ❑ Data can be set to be automatically encrypted when written to Azure Storage using Storage Service Encryption.
- ❑ OS and Data disks used by virtual machines can be set to be encrypted using Azure Disk Encryption.
- ❑ Delegated access to the data objects in Azure Storage can be granted using Shared Access Signatures.

Azure Blob Storage

What is Azure Blob Storage

- ❑ Azure Blob storage is a service for storing large amounts of unstructured object data, such as text or binary data.
- ❑ You can use Blob storage to expose data publicly to the world, or to store application data privately.
- ❑ Common uses of Blob storage include:
 - Serving images or documents directly to a browser
 - Storing files for distributed access
 - Storing data for backup and restore, disaster recovery, and archiving

Azure Blob: Concept

❑ Storage Account

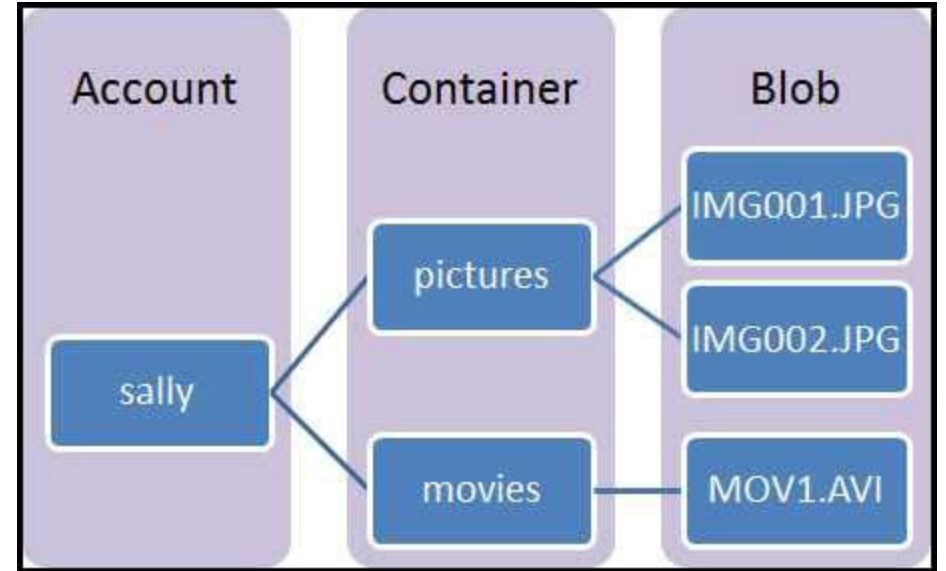
- All access to Azure Storage is done through a storage account.
- This account can be a General-purpose or a Blob storage.

❑ Container

- A container provides a grouping of a set of blobs.
- All blobs must be in a container.
- An account can contain an unlimited number of containers.
- A container can store an unlimited number of blobs.

❑ Blob

- A file of any type and size.
- Azure Storage offers three types of blobs
 - **Block Blobs**
 - **Page Blobs**
 - **Append Blobs**



Azure Blob: Types

❑ Block Blobs

- Each block can be a different size, up to a maximum of 100 MB.
- Used for storing text or binary files, such as documents and media files.
- A single block blob can contain up to 50,000 blocks. Individual block blobs can be up to 4.75 terabytes (TB) in size (100 MB X 50,000).
- With a block blob, you can upload multiple blocks in parallel to decrease upload time.

❑ Append Blobs

- Each block in an append blob can be a different size, up to a maximum of 4 MB.
- Are similar to block blobs in that they are made up of blocks, but they are optimized for append operations, so they are useful for logging scenarios.
- A single append blob can contain up to 50,000 blocks, for a total size of slightly more than 195 GB (4 MB X 50,000).

❑ Page Blobs

- Page blobs are a collection of 512-byte pages optimized for random read and write operations.
- Can be up to 8 TB in size, and are more efficient for frequent read/write operations.
- Azure Virtual Machines use page blobs as OS and data disks.

Azure Blob: Container

- ❑ You can store blobs directly in the root container of the storage account or create custom containers in which to store blobs.
- ❑ Users can access the Blob through a unique URL.
- ❑ Example
 - “myblob.jpg” in a container named “mycontainer” in a storage account named “myaccount” by using the
 - <http://myaccount.blob.core.windows.net/mycontainer/myblob.jpg>

Azure Blob: Access Level

- ❑ When you create a container, you must give it a name and choose the level of access that you want to allow from the following options:
 - **Private**
 - This is the default option. The container does not allow anonymous access.
 - **Public Blob**
 - This option allows anonymous access to each blob within the container; however, it prevents browsing the content of the container.
 - In other words, it is necessary to know the full path to the target blob to access it.
 - **Public Container**
 - This option allows anonymous access to each blob within the container, with the ability to browse the container's content.

Azure File Storage

What is Azure Files Storage

- ❑ Azure Files offers fully managed file shares in the cloud that are accessible via Common Internet File System (CIFS).
- ❑ Azure File shares can be mounted concurrently by cloud or on-premises deployments of Windows, Linux, and macOS.
- ❑ Additionally, Azure File shares can be cached on Windows Servers with Azure File Sync for fast access near where the data is being used.
- ❑ The maximum size for an Azure File share is 5 TiB.
- ❑ Azure Storage account, can store multiple shares with a total of 500 TiB stored across all shares.
- ❑ Azure Files supports two data redundancy options:
 - Locally redundant storage (LRS)
 - Geo-redundant storage (GRS)

Azure Files: Use Cases

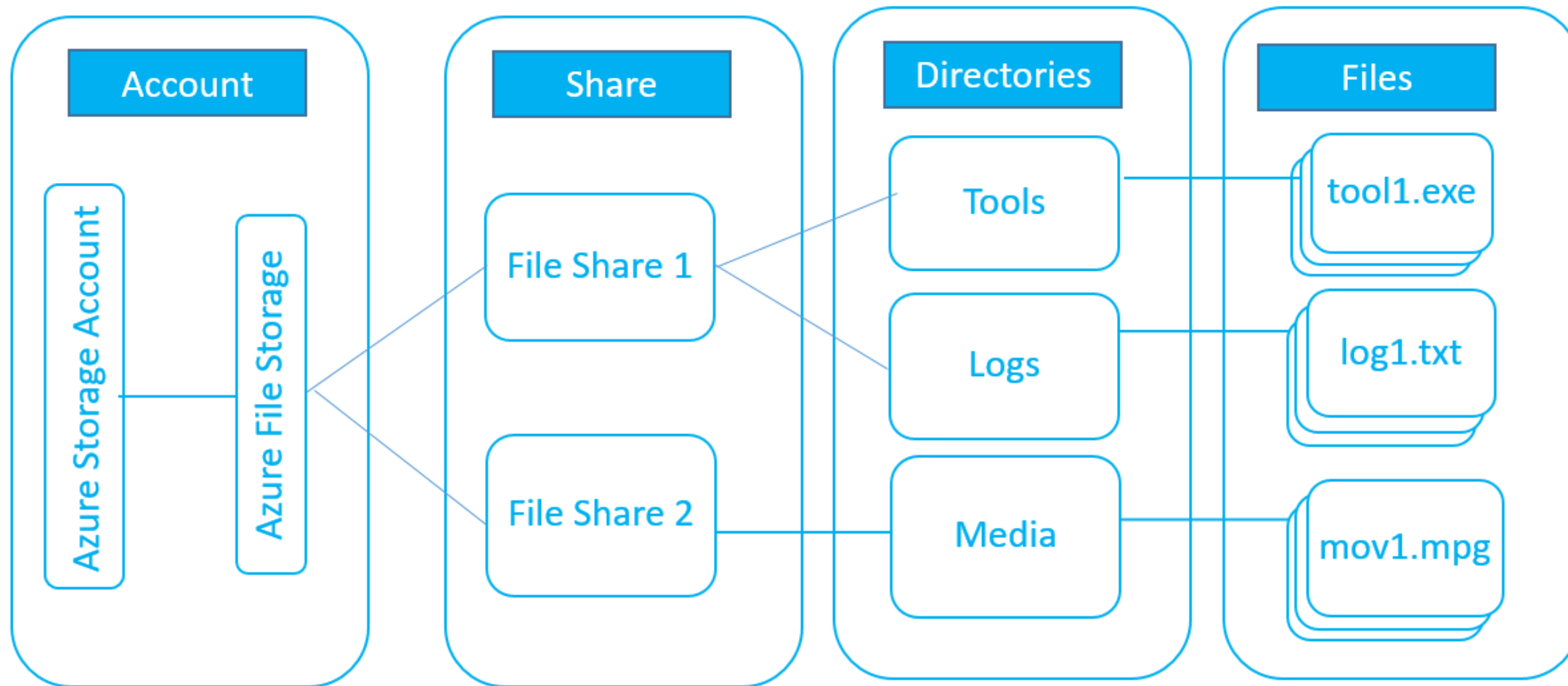
☐ **Replace or supplement on-premises file servers**

- Azure Files can be used to completely replace or supplement traditional on-premises file servers or NAS.

☐ **"Lift and shift" applications**

- Azure Files makes it easy to "lift and shift" applications to the cloud that expect a file share to store file application or user data.

Azure Files: Constructs



Azure Files: Management

- ❑ An account can contain an unlimited number of shares, and a share can store an unlimited number of files, up to the 5 TiB total capacity of the file share.
- ❑ A file in the share. A file may be up to 1 TiB in size.
- ❑ **URL format**
 - For requests to an Azure File share made with the File REST protocol, files are addressable using the following URL format:
 - <https://<storage account>.file.core.windows.net/<share>/<directory>/directories/<file>>

Azure Files: Data Access Method

- ❑ Azure Files offers two data access methods that you can use separately, or in combination with each other, to access your data:
 - **Direct Cloud Access**
 - Azure File share can be mounted by Windows, macOS, and/or Linux.
 - **Azure File Sync**
 - With Azure File Sync, shares can be replicated to Windows Servers on-premises or in Azure.
 - Users would access the file share through the Windows Server
 - Data may be replicated between multiple Windows Server endpoints.
 - Data tiered to Azure Files, but the Server does not have a full copy of the data.
 - Rather, data is seamlessly recalled when opened by your user.

Azure Table Storage

What is Azure Table Storage

- ❑ You can use the Azure Table storage service to store partially structured data in tables.
- ❑ Within each storage account, you can create multiple tables, and each table can contain multiple entities.
- ❑ Because table storage does not mandate a schema, the entities in a single table do not need to have the same set of properties.
- ❑ Example
 - One Product entity might have a Size property, while another Product entity in the same table might have no Size property at all.
 - Each property consists of a name and a value.
- ❑ Similar to blobs, applications can access each table through a URL.
- ❑ Example:
 - To access a table named “mytable” in a storage account named “myaccount”, applications would use the:
 - <http://myaccount.table.core.windows.net/mytable>

Azure Table: Components

❑ Storage Account

❑ Table

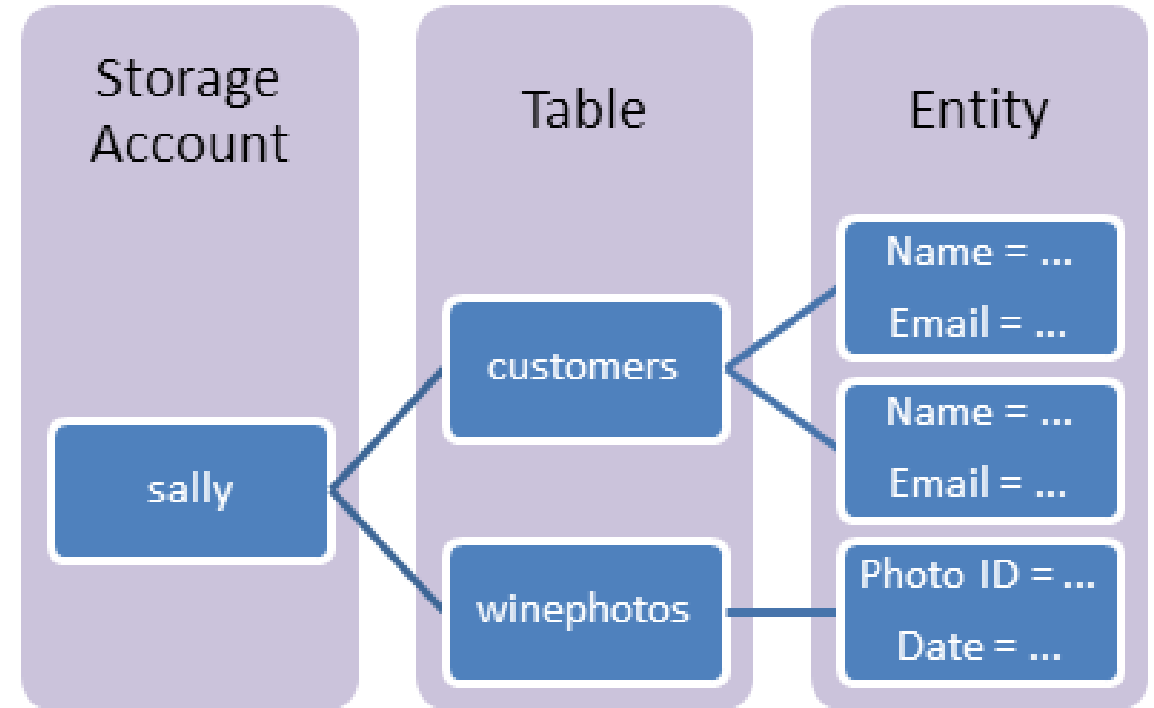
- A table is a collection of entities.
- The number of tables that a storage account can contain is limited only by the storage account capacity limit.

❑ Entity

- An entity is a set of properties, similar to a database row.
- An entity can be up to 1MB in size.

❑ Properties

- A property is a name-value pair.
- Each entity also has three system properties that specify a partition key, a row key, and a timestamp.



Azure Table: Service

- ❑ The Table service uses a tabular format to store data.
- ❑ In table, each row of the table represents an entity, and the columns store the various properties of that entity.
- ❑ Every entity also has three designated properties: a partition key, a row key, and a timestamp.
- ❑ You can use the partition key to group similar entities based on their common characteristic, but with unique row key values.

Azure Queue Storage

What is Azure Queue Storage

- ❑ The Azure Queue storage service provides temporary messaging store.
- ❑ Developers frequently use queues to facilitate reliable exchange of messages between individual components of multitier or distributed systems.
- ❑ These components add and remove messages from a queue by issuing commands over the HTTP / HTTPS protocols.
- ❑ Similar to other Azure storage service types, each queue is accessible from a URL.
- ❑ Example
 - To access a queue named “myqueue” in a storage account named “myaccount”, applications would use:
 - <http://myaccount.queue.core.windows.net/myqueue>
- ❑ You can create any number of queues in a storage account and any number of messages in each queue up to the 500 TB limit for all the data in the storage account.
- ❑ Each message can be up to 64 kilobytes (KB) in size.

Azure Queue Storage: Components

❑ URL format

- Queues are addressable using the following URL format:
`http://<storage account>.queue.core.windows.net/<queue>`

❑ Storage account

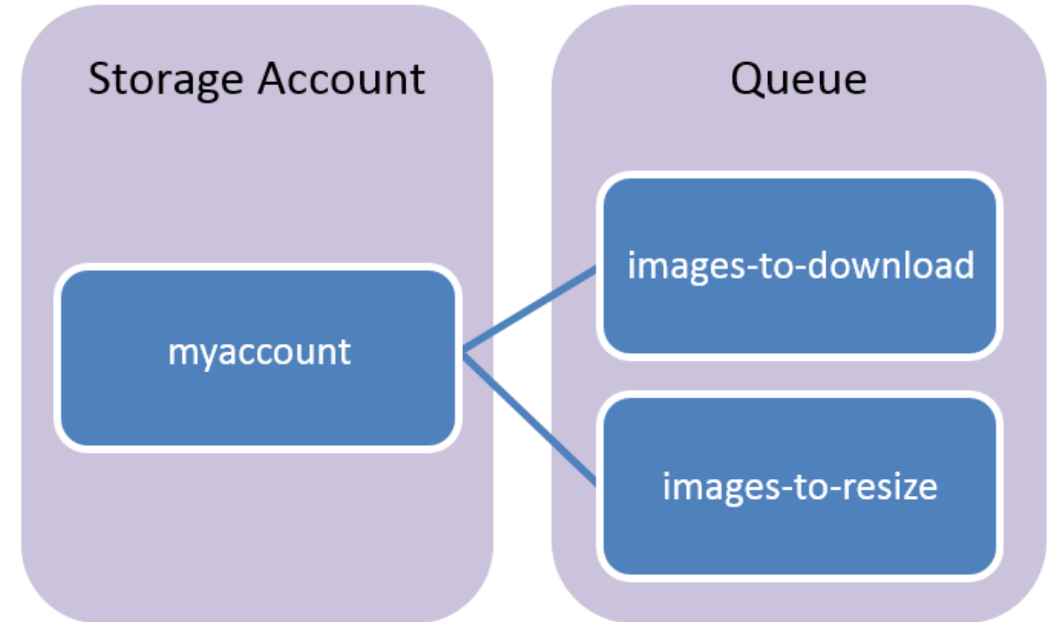
- All access to Azure Storage is done through a storage account.

❑ Queue

- A queue contains a set of messages.
- All messages must be in a queue.

❑ Message

- A message, in any format, of up to 64 KB.
- The maximum time that a message can remain in the queue is seven days.



Hands-On Lab

Hands-On Lab

- ☐ Create storage account
- ☐ Create blob & container
- ☐ Upload & access data
- ☐ Configure security for data access

- ☐ Create file share
- ☐ Connect and mount on server & desktop

- ☐ Create table storage
- ☐ Update & query table

Thank You