Microsoft Azure

AZ-104T00A Module 07: Azure Storage

Module Overview

Lesson 01: Storage Accounts

Storage accounts overview

- Azure Storage
- Azure Storage Services
- Storage Account Kinds
- Replication Strategies
- Accessing Storage
- Securing Storage Endpoints
- Demonstration – Securing a Storage Endpoint

Azure Storage

A service that you can use to store files, messages, tables, and other types of information

Durable, secure, scalable, managed, accessible

Storage for virtual machines, unstructured data and structured data

Two tiers: Standard (HDD magnetic drives) and Premium (SSD)

Azure Storage Services

Azure Containers: A massively scalable object store for text and binary data

Azure Files: Managed file shares for cloud or on-premises deployments

Azure Tables: Ideal for storing structured, non-relational data

Azure Queues: A messaging store for reliable messaging between application components

Containers
Scalable, cost-effective storage for unstructured data
Learn more

File shares
Serverless SMB file shares
Learn more

Tables
Tabular data storage
Learn more

Queues
Effectively scale apps according to traffic
Learn more

Storage Account Kinds

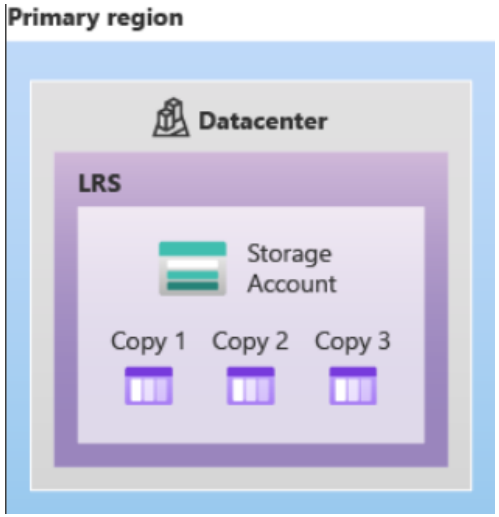
Storage account type	Supported services	Supported tiers	Replication options
BlobStorage	Blob (block blobs and append blobs only)	Standard	LRS, GRS, RA-GRS
Storage (general purpose v1)	Blob, File, Queue, Table, and Disk	Standard, Premium	LRS, GRS, RA-GRS
StorageV2 (general purpose v2)	Blob, File, Queue, Table, and Disk	Standard, Premium	LRS, GRS, RA-GRS, ZRS, GZRS RA-GZRS
Block blob storage	Blob (block blobs and append blobs only)	Premium	LRS, ZRS (limited regions)
File Storage	Files only	Premium	LRS, ZRS (limited regions)

✓ **All storage accounts are encrypted using Storage Service Encryption (SSE) for data at rest**

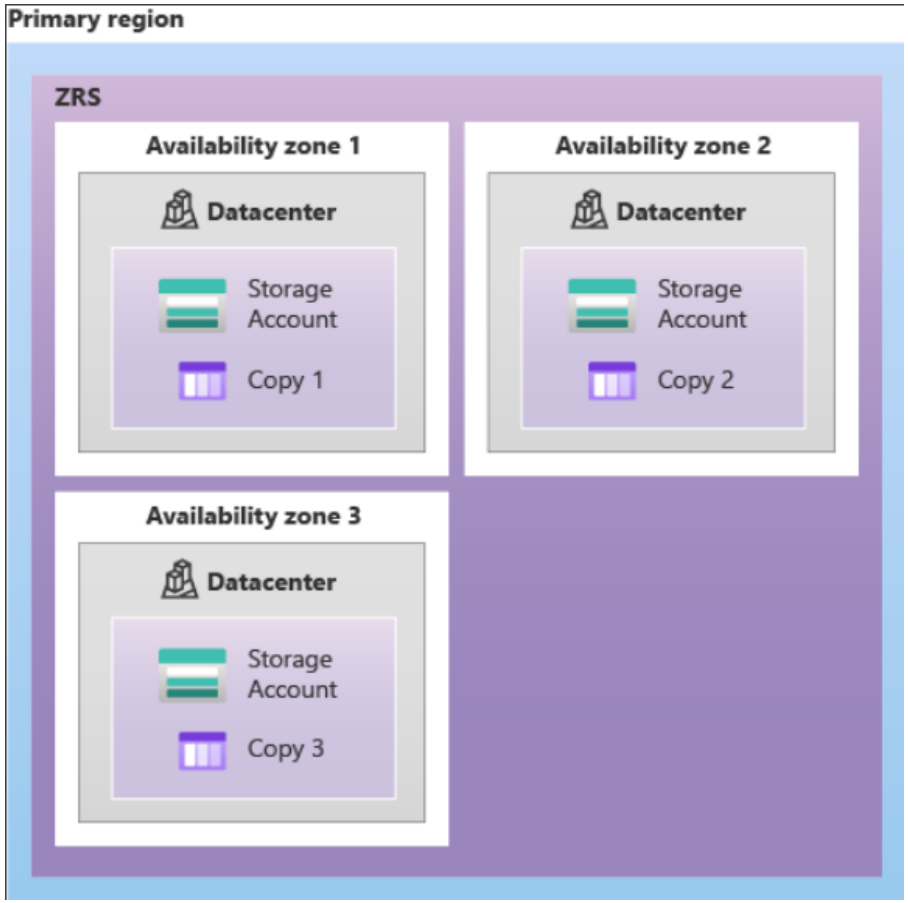
Replication Strategies

Data Replication Options	Description
Locally redundant storage (LRS)	Data is replicated three times within a single facility in a single region
Zone-redundant storage (ZRS)	Data is replicated across multiple Availability Zones within one region
Geo-redundant storage (GRS)	Data is replicated three times within the primary region and replicated three times to the regions pair.
Read access geo-redundant storage (RA-GRS)	Data is replicated three times within the primary region and replicated with read-access to the region pair
Geo-zone-redundant storage (GZRS)	Data is replicated across three Availability Zones and replicated to the region pair
Read-access Geo-zone-redundant storage (RA-GZRS)	Data is replicated across three Availability Zones and replicated with read-access to the region pair

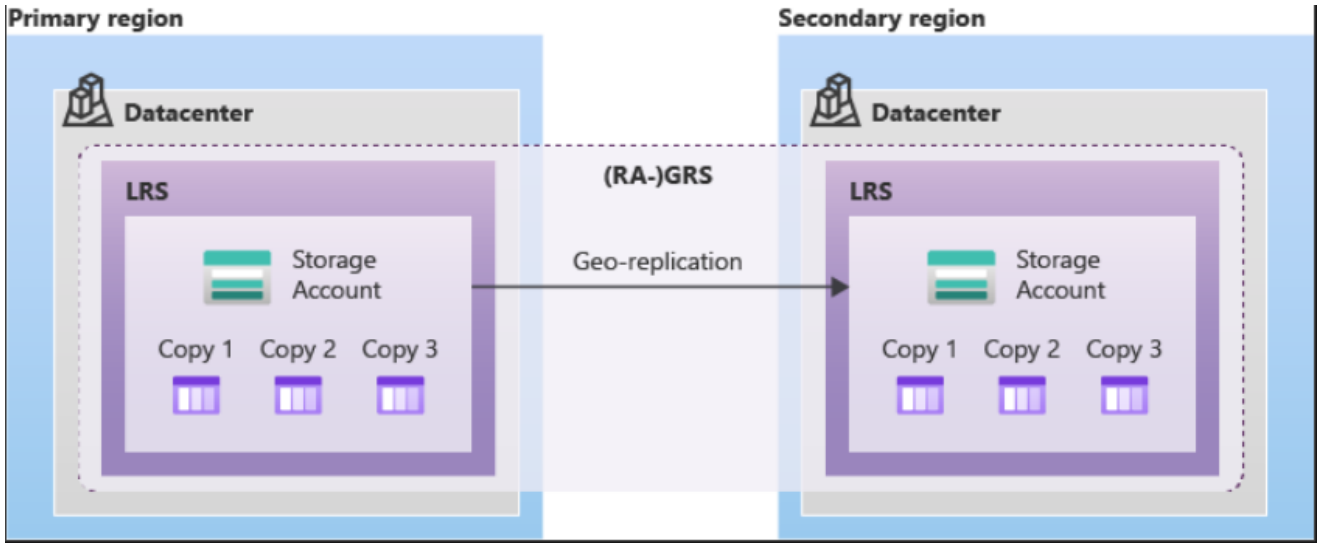
Locally Redundant Storage (LRS)



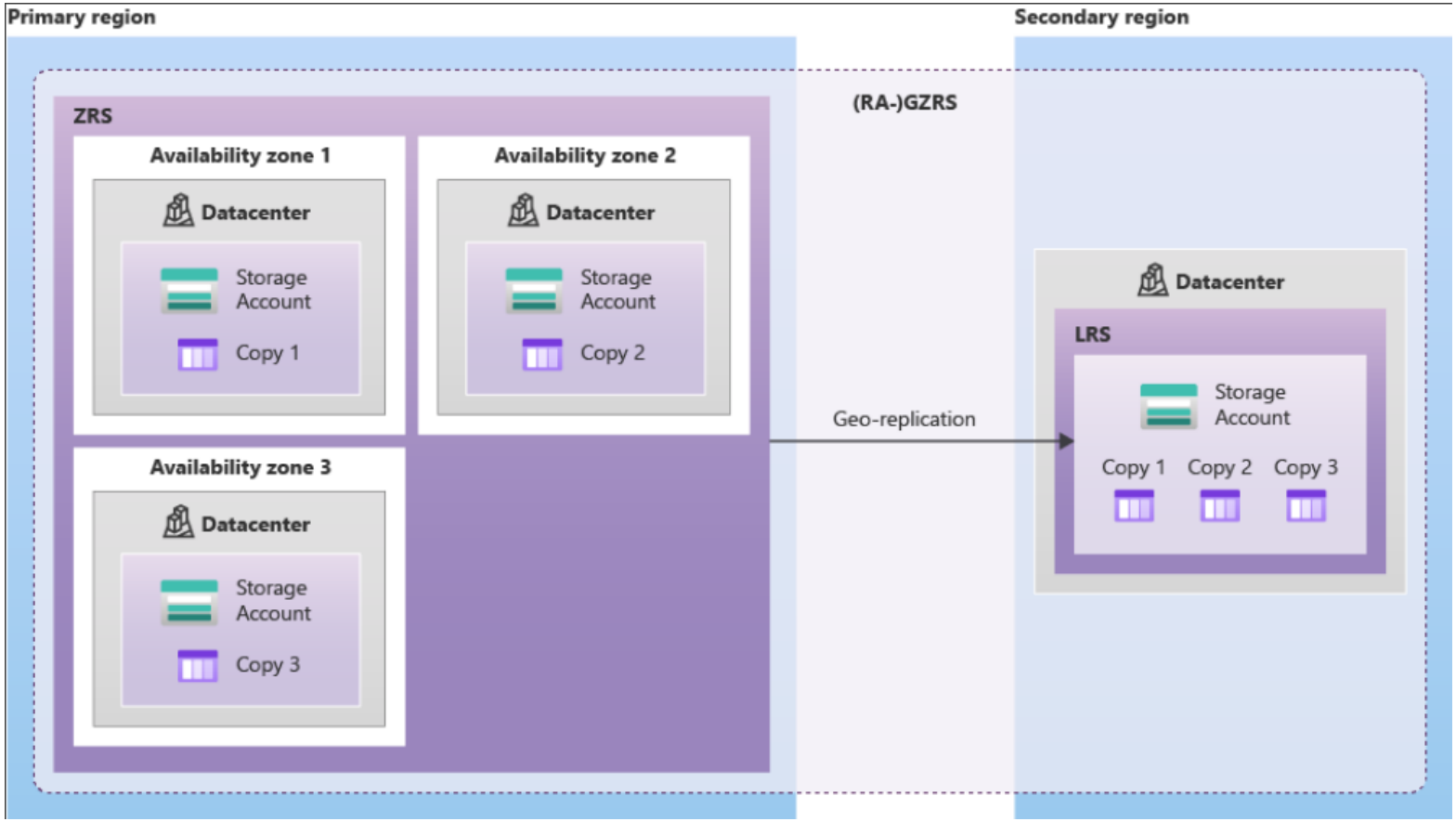
Zone-Redundant Storage (ZRS)



Geo-Redundant Storage (GRS)



Geo-zone-redundant storage (GZRS)



Accessing Storage

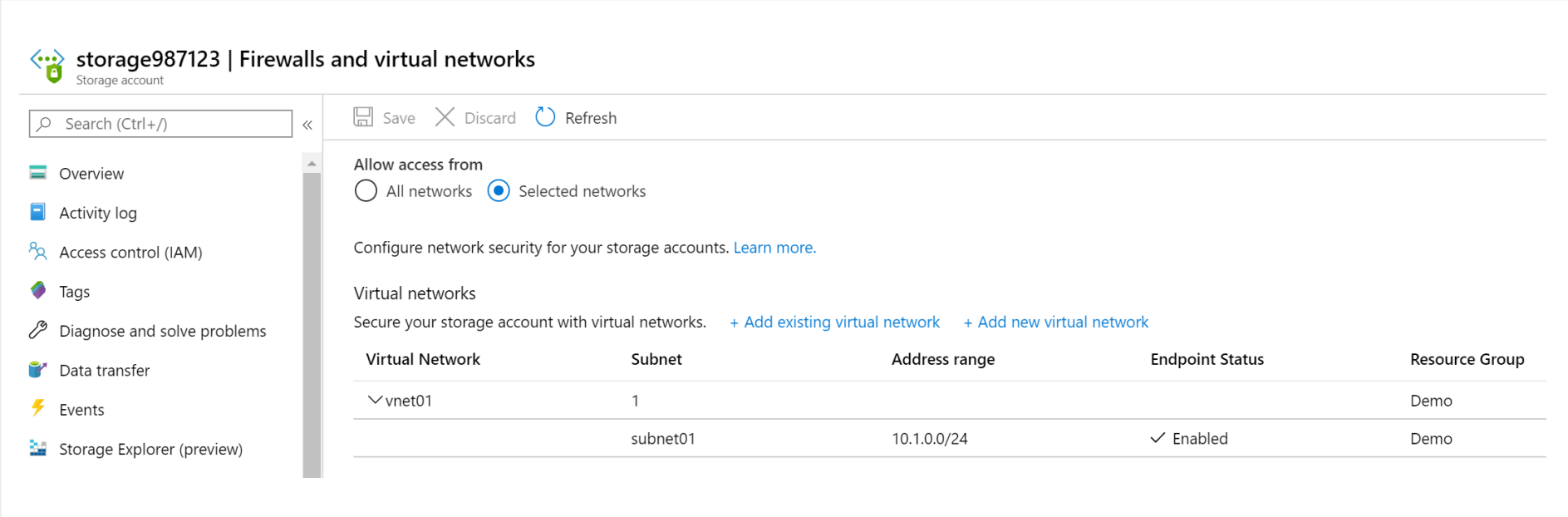
Every object has a unique URL address – based on account name and storage type

CNAME record	Target
blobs.contoso.com	contosoblobs.blob.core.windows.net

Container service: http://*mystorageaccount*.blob.core.windows.net
Table service: http://*mystorageaccount*.table.core.windows.net
Queue service: http://*mystorageaccount*.queue.core.windows.net
File service: http://*mystorageaccount*.file.core.windows.net

If you prefer you can configure a custom domain name

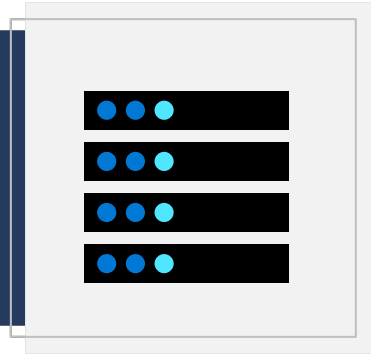
Securing Storage Account Endpoints



Firewalls and Virtual Networks restrict access to the Storage Account from specific Subnets on Virtual Networks or public IP's

Subnets and Virtual Networks must exist in the same Azure Region or Region Pair as the Storage Account

Lesson 02: Blob Storage



Blob Storage Overview

- Blob Storage
- Blob Containers
- Blob Access Tiers
- Blob Lifecycle Management
- Uploading Blobs
- Storage Pricing
- Demonstration – Blob Storage

Binary Large Object (Blob) Storage

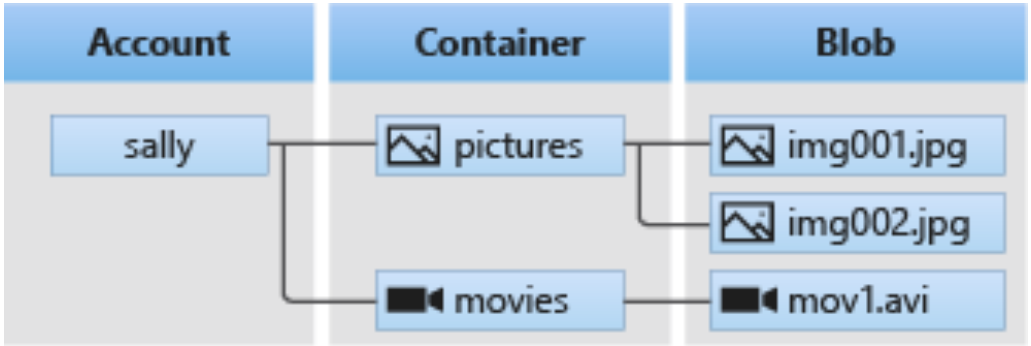
Stores unstructured data in the cloud

Can store any type of text or binary data

Also referred to as *object storage*

Common uses:

- Serving images or documents directly to a browser
- Storing files for distributed access
- Streaming video and audio
- Storing data for backup and restore, disaster recovery, archiving
- Storing data for analysis by an on-premises or Azure-hosted service



Blob Containers

All blobs must be in a container

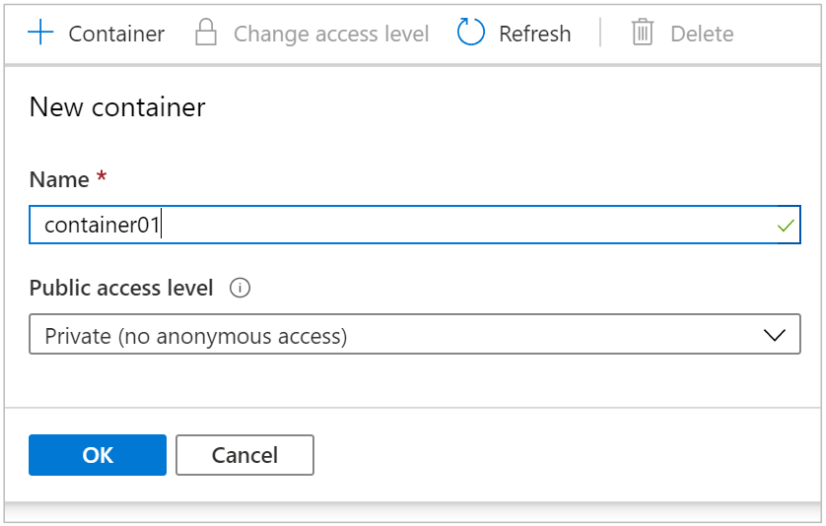
Accounts have unlimited containers

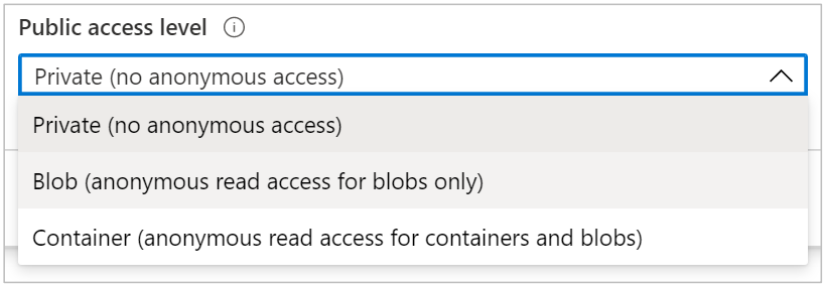
Containers can have unlimited blobs

Private blobs – no anonymous access

Blob access – anonymous public read access for blobs only

Container access – anonymous public read and list access to the entire container, including the blobs



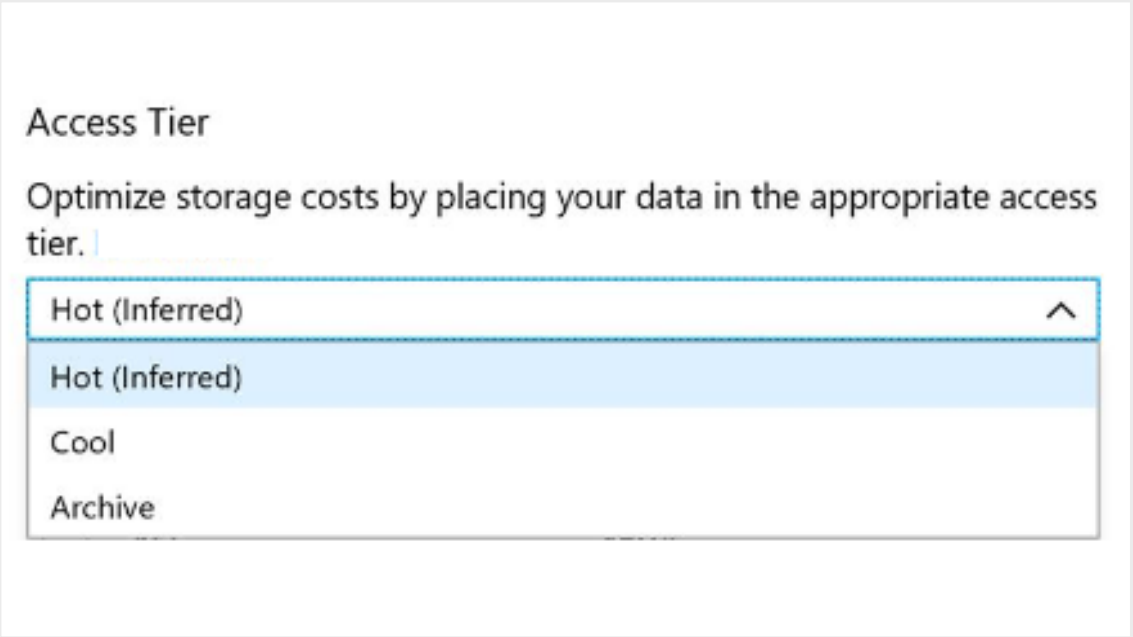


Blob Access Tiers

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



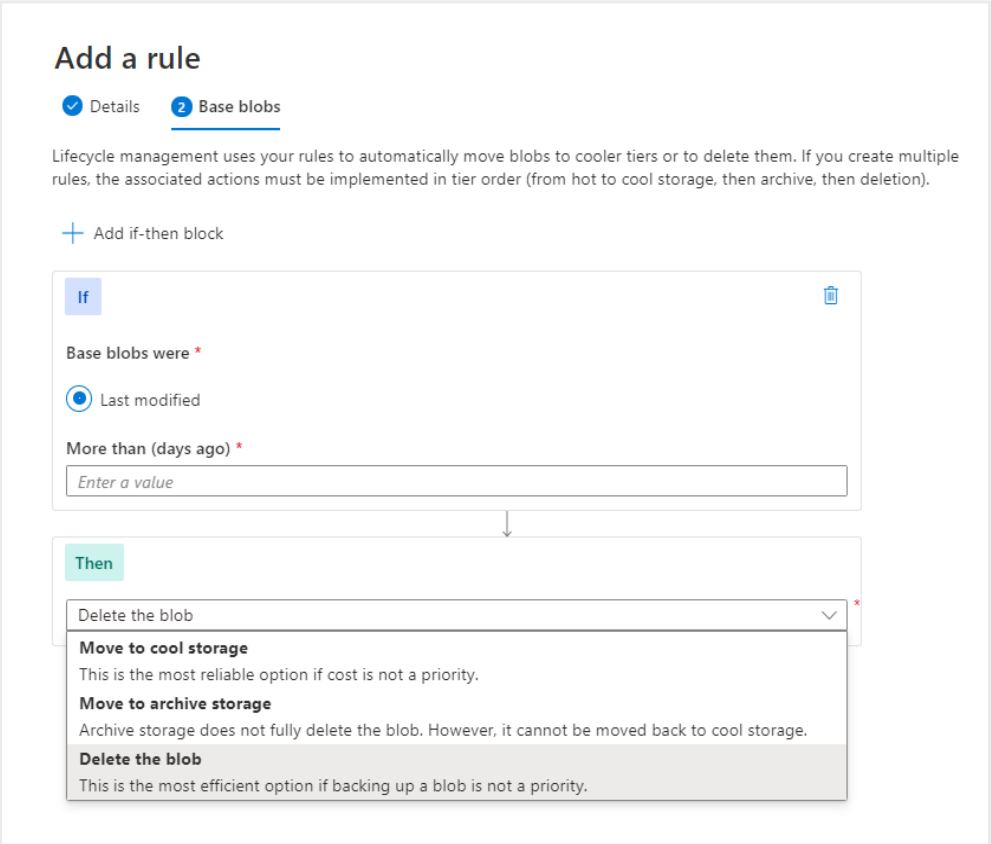
✓ **You can switch between these access tiers at any time**

Blob Lifecycle Management

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



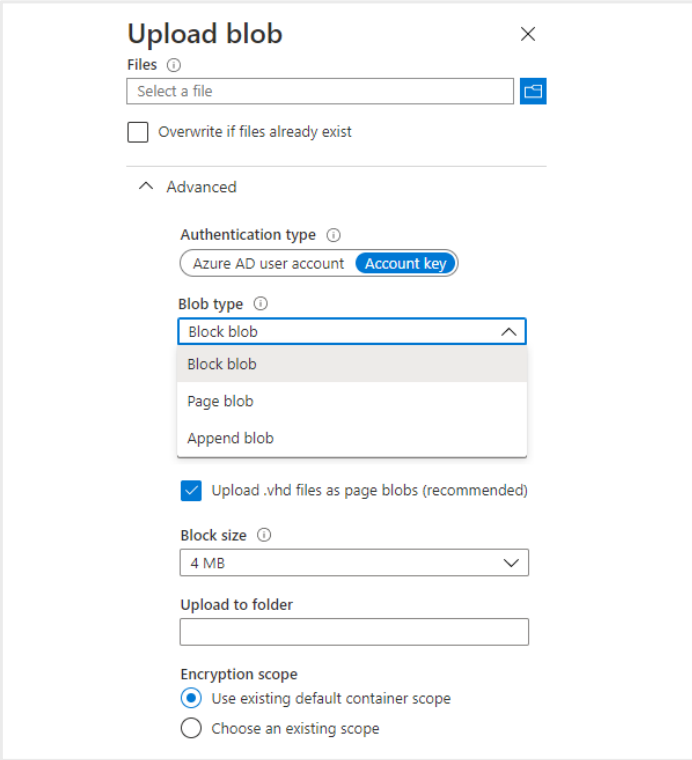
Uploading Blobs

Authentication type – Azure AD user account or Account key

Block blobs (default) – useful for storing text or binary files

Page blobs – more efficient for frequent read/write operations

Append blobs – useful for logging scenarios



You cannot change a blob type once it has been created

Storage Pricing

- Storage costs
- Blob storage
- Data access costs
- Transaction costs
- Geo-Replication data transfer costs
- Outbound data transfer costs
- Changing the storage tier

Block Blobs	Files
Scalable object storage for documents, videos, pictures, and unstructured text or binary data. Choose from Hot, Cool, or Archive tiers.	Fully managed file shares in the cloud, accessible via standard Server Message Block (SMB) protocol. Enables sharing files between applications using Windows APIs or REST API.
Prices for locally redundant storage (LRS) Archive Block Blob start from:	Prices for LRS File storage start from:
$0.002/GB per month	$0.06/GB per month
See Pricing >	See Pricing >

Lesson 03: Storage Security

Storage Security Overview

- Storage Security
- Storage Service Encryption
- Shared Access Signatures
- Customer Managed Keys
- URI and SAS Parameters
- Storage Security Best Practices
- Demonstration – SAS (Portal)

Storage Security

Storage Service Encryption

Authentication with Azure AD and RBAC

Client-side encryption, HTTPS, and SMB 3.0 for data in transit

Azure disk encryption

Shared Access Signatures – delegated access

Shared Key – encrypted signature string

Anonymous access to containers and blobs

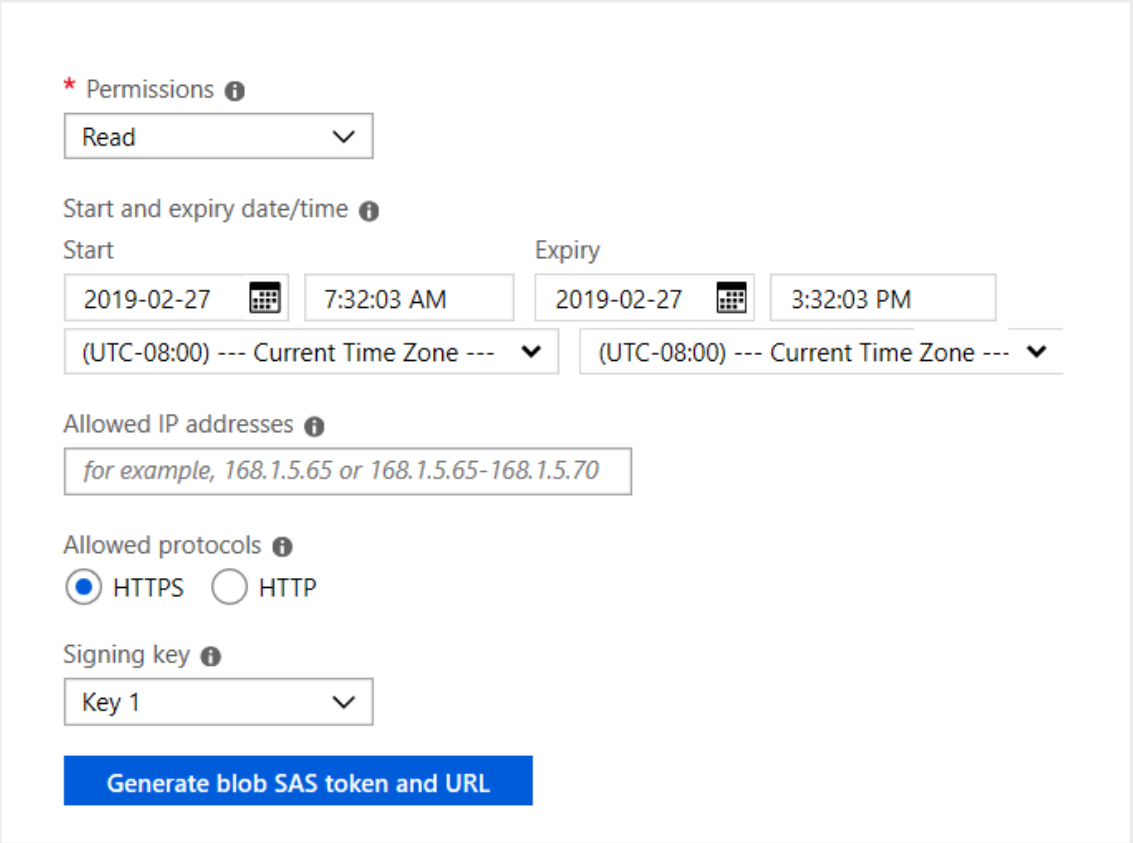
Shared Access Signatures

Provides delegated access to resources

Grants access to clients without sharing your storage account keys

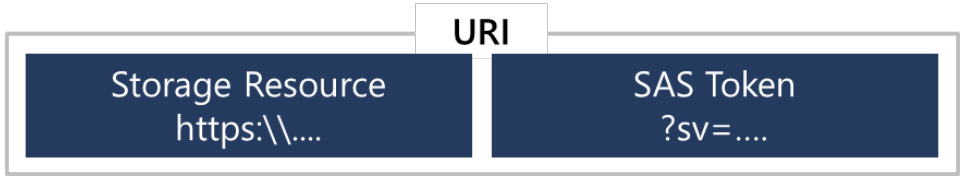
The account SAS delegates access to resources in one or more of the storage services

The service SAS delegates access to a resource in just one of the storage services



URI and SAS Parameters

- A SAS is a signed URI that points to one or more storage resources
- Consists of a storage resource URI and the SAS token




```
https://myaccount.blob.core.windows.net/?sp=r&st=2020-05-
11T18:31:43Z&se=2020-05-12T02:31:43Z&spr=https&sv=2019-10-
10&sr=b&sig=jOqABJZHfUVeBQ3yVn7kWiCKlO0sxCiK1rzEchfAz8U%3D
```

Includes parameters for resource URI, storage services version, services, resource types, start time, expiry time, resource, permissions, IP range, protocol, signature

Storage Service Encryption

Protects your data for security and compliance

Automatically encrypts and decrypts your data

Encrypted through 256-bit AES encryption

Is enabled for all new and existing storage accounts and cannot be disabled

Is transparent to users

You can use your own key (next topic)

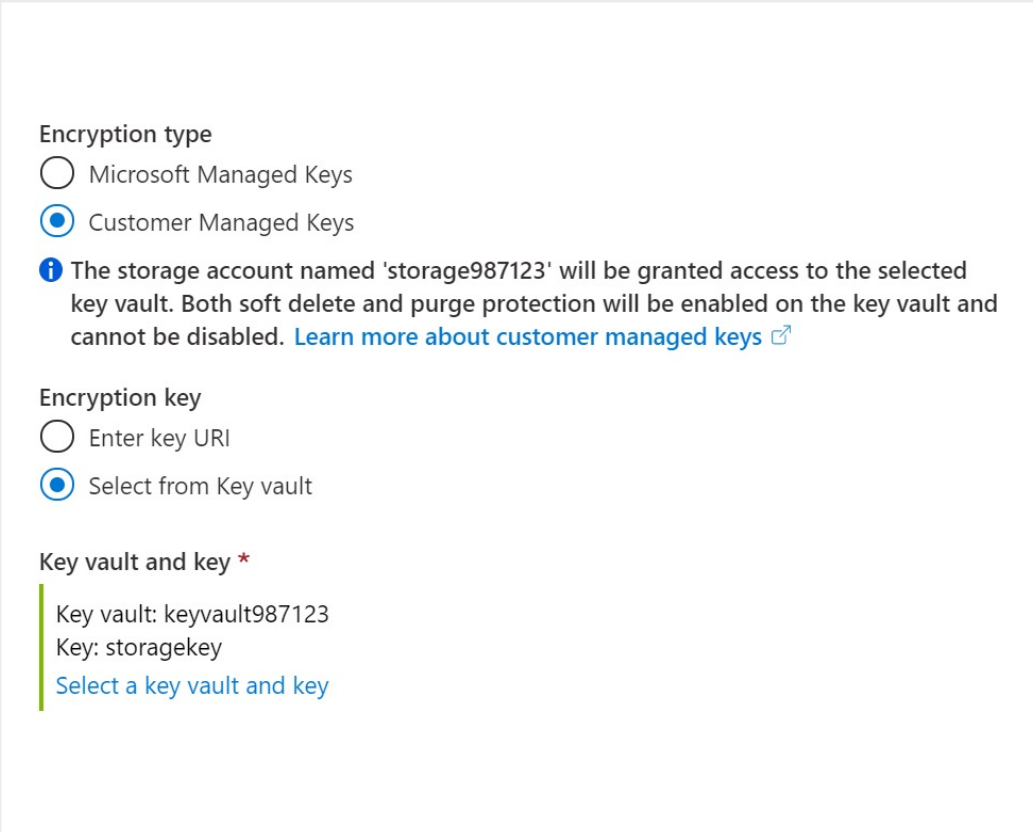
Customer Managed Keys

Use the Azure Key Vault to manage your encryption keys

Create your own encryption keys and store them in a key vault

Use Azure Key Vault's APIs to generate encryption keys

Custom keys give you more flexibility and control



Storage Best Practices

- Always use HTTPS to create or distribute an SAS
- Reference stored access policies where possible
- Use near-term expiration times on an ad hoc SAS
- Use Storage Analytics to monitor your application
- Be careful with SAS start time
- Be specific with the resource to be accessed
- Understand that your account will be billed for any usage
- Validate data written using SAS
- Don't assume SAS is always the correct choice

Lesson 04: Azure Files and File Sync

Azure Files and File Sync Overview

- Files vs Blobs
- Azure File Sync
- Managing File Shares
- Azure File Sync Components
- File Share Snapshots
- File Sync Steps
- Demonstration – File Shares

Files vs Blobs

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

Managing File Shares

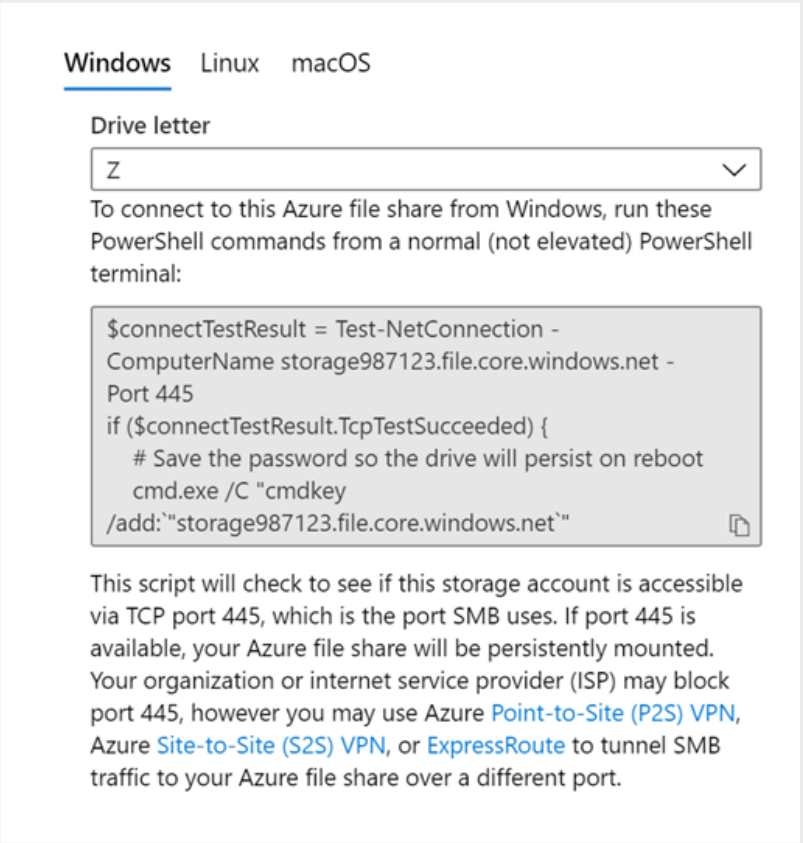
File share quotas

Windows – ensure port 445 is open

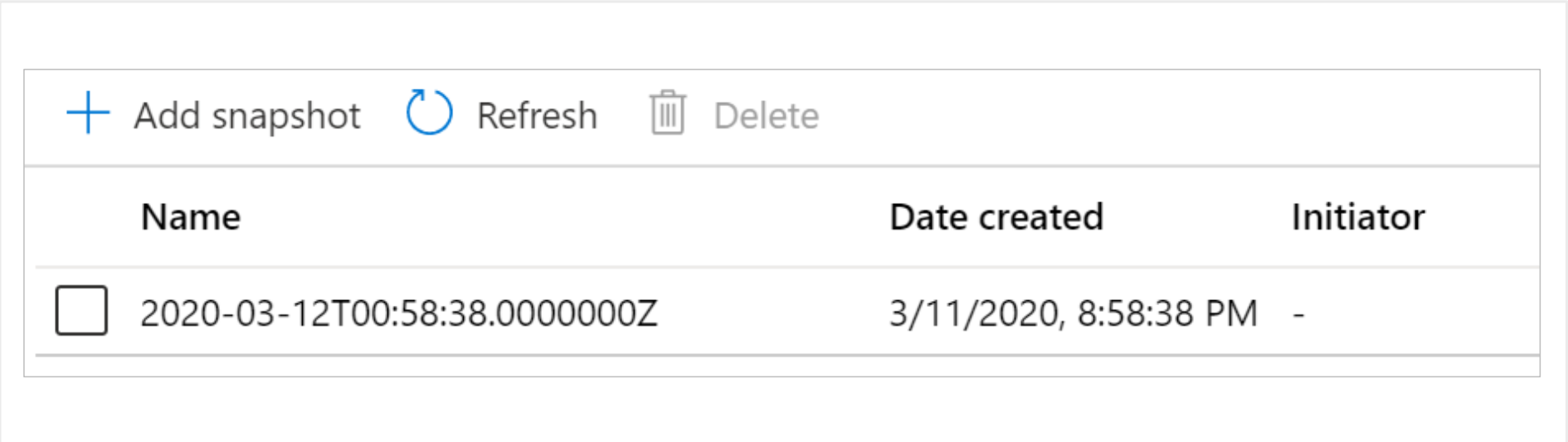
Linux – mount the drive

MacOS – mount the drive

Secure transfer required – SMB 3.0 encryption



File Share Snapshots



Incremental snapshot that captures the share state at a point in time

Is read-only copy of your data

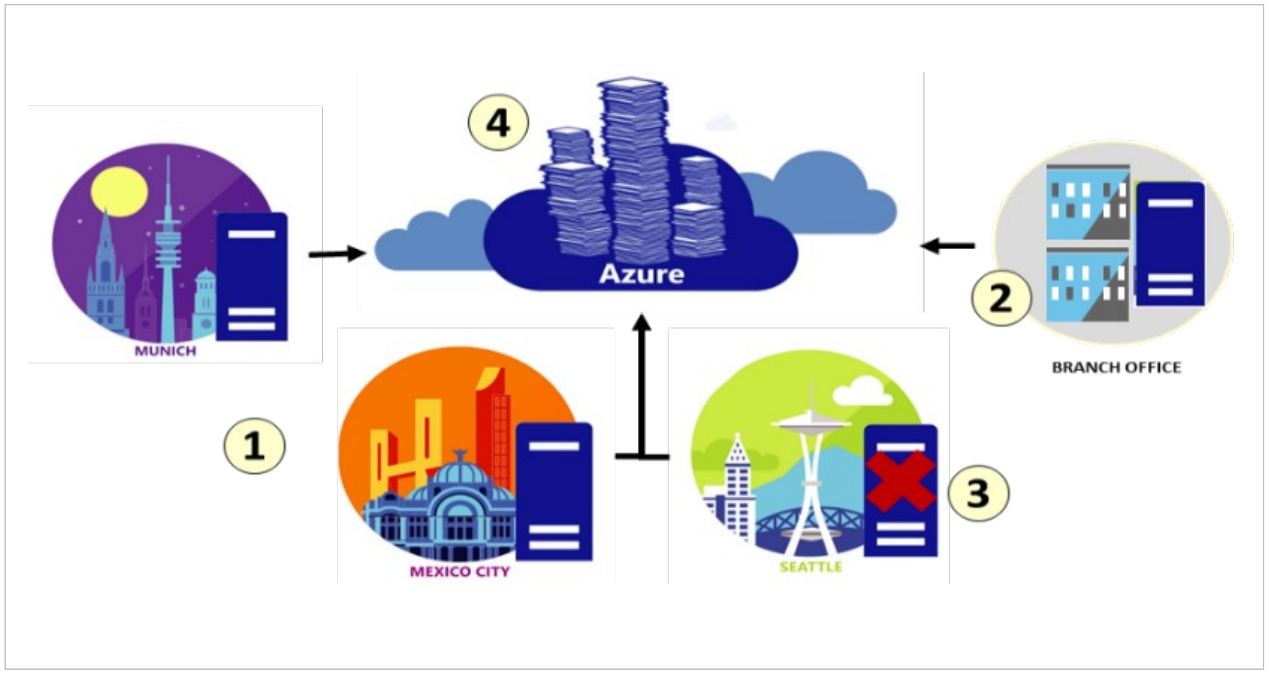
Snapshot at the file share level, and restore at the file level

- Protection against application error and data corruption
- Protection against accidental deletions or unintended changes
- General backup purposes

Azure File Sync

Centralize your organization's file shares in Azure Files, while keeping the flexibility, performance, and compatibility of an on-premises file server

1. Lift and shift
2. Branch Office backups
3. Backup and Disaster Recovery
4. File Archiving



File Sync Components

The **Storage Sync Service** is the top-level resource

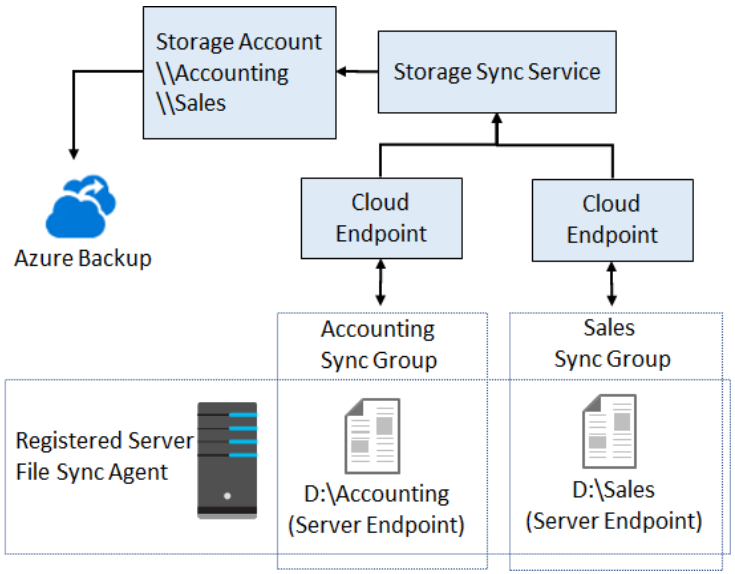
The **registered server** object represents a trust relationship between your server (or cluster) and the Storage Sync Service

The **Azure File Sync agent** is a downloadable package that enables Windows Server to be synced with an Azure file share

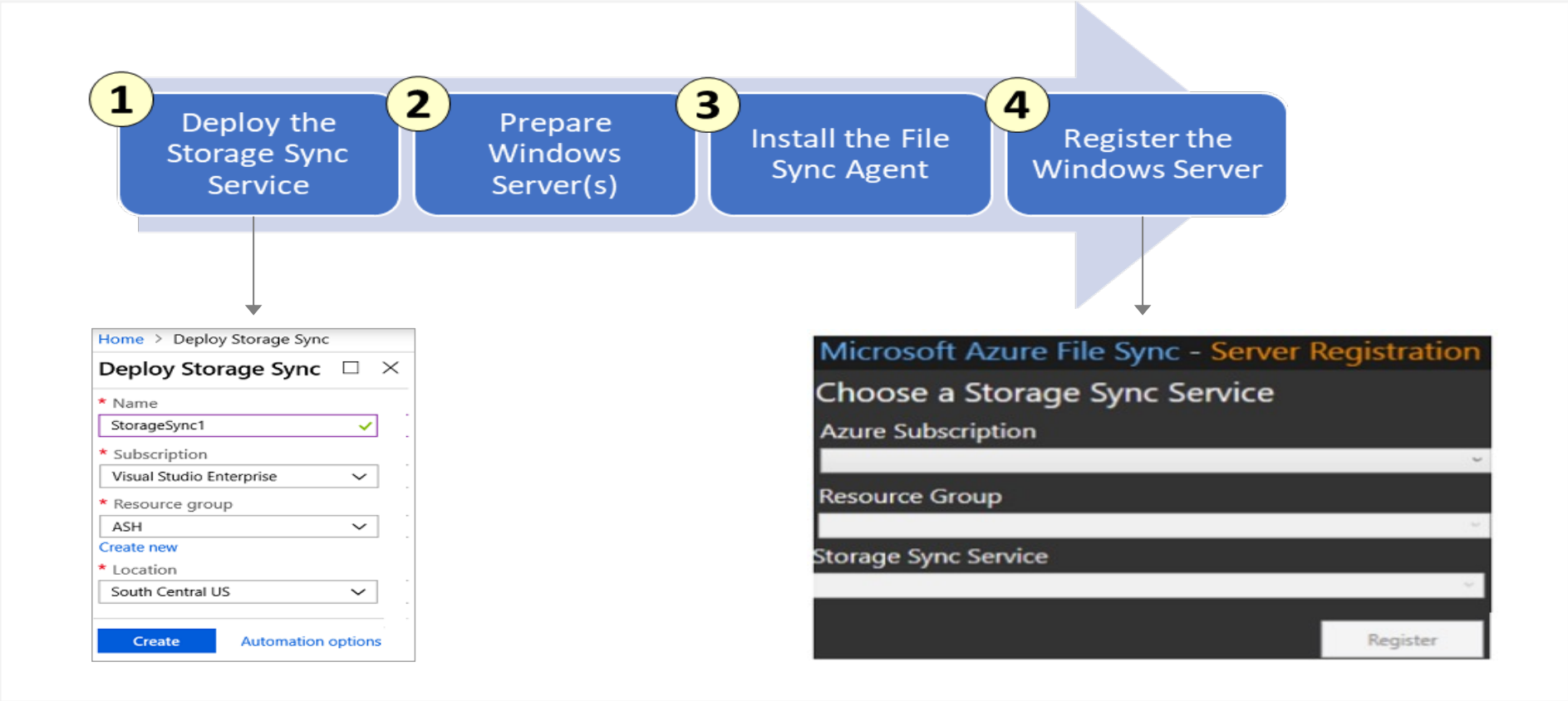
A **server endpoint** represents a specific location on a registered server, such as a folder

A **cloud endpoint** is an Azure file share

A **sync group** defines which files are kept in sync



File Sync Steps



Lesson 05: Managing Storage

Managing Storage Overview

- Storage Explorer
- Import and Export Service
- AzCopy
- Demonstration/Lab – Storage Explorer
- Demonstration/Lab – AzCopy

Storage Explorer

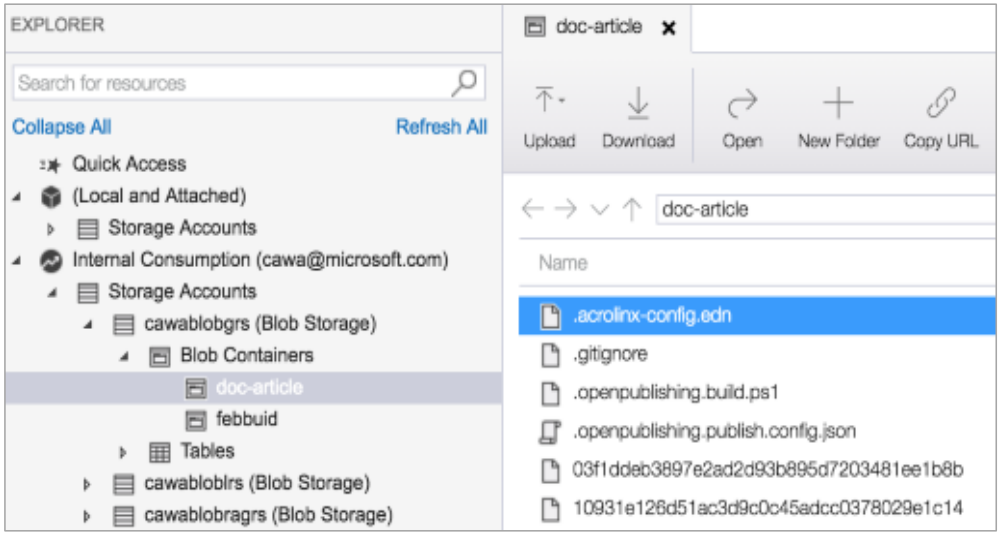
Access multiple accounts and subscriptions

Create, delete, view, edit storage resources

View and edit Blob, Queue, Table, File, Cosmos DB storage and Data Lake Storage

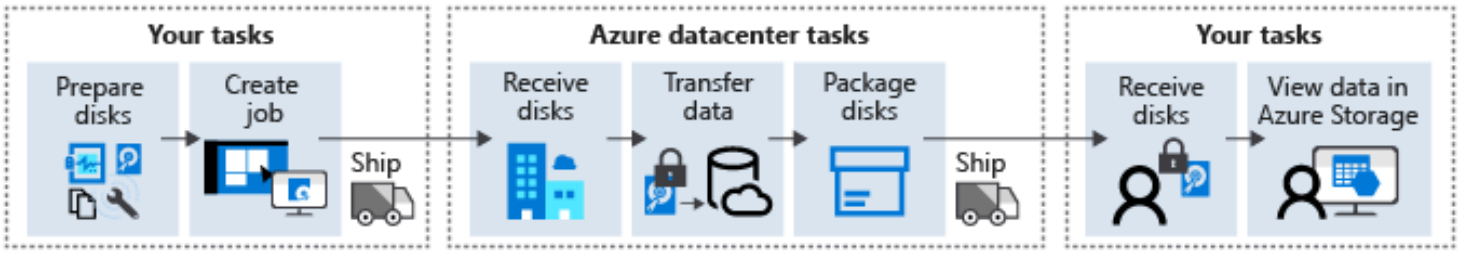
Obtain shared access signature (SAS) keys

Available for Windows, Mac, and Linux

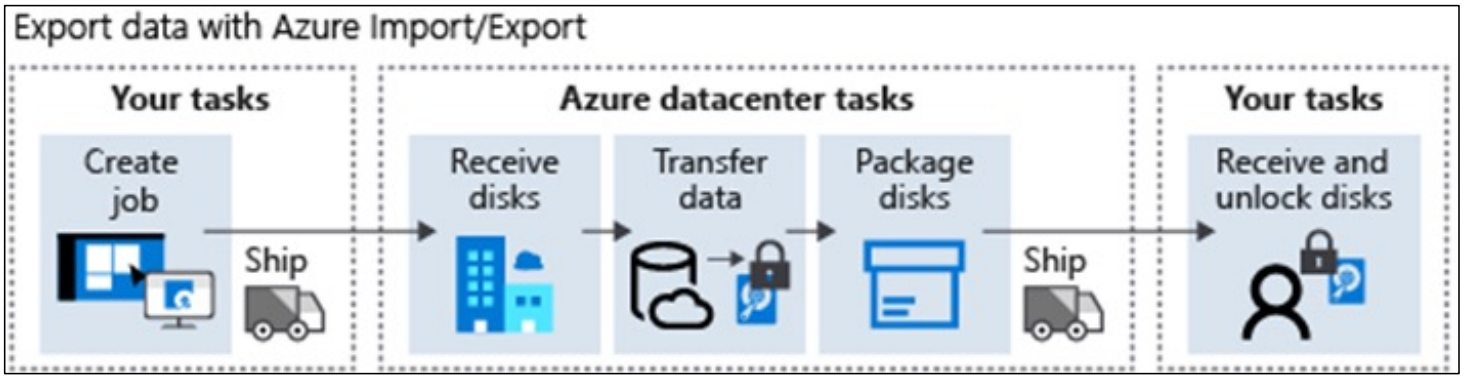


Import and Export Service

Import jobs move large amounts of data to Azure blob storage or files



Export jobs move large amounts of data from Azure Storage (not files)



AzCopy

```
azcopy copy [source] [destination] [flags]
```

Command line utility

Designed for copying data to and from Azure Blob, File, and Table storage

Available on Windows, Linux, and MacOS

Authentication options include Active Directory or SAS token

Lesson 06: Module 07 Labs and Review

Lab 07 – Manage Azure Storage

Lab scenario

You need to evaluate the use of Azure Storage for storing files residing currently in on-premises data stores. While many of these files are not accessed frequently, there are some exceptions. You would like to minimize cost of storage by placing less frequently accessed files in lower-priced storage tiers. You also plan to explore different protection mechanisms that Azure Storage offers, including network access, authentication, authorization, and replication. Finally, you want to determine to what extent Azure Files service might be suitable for hosting your on-premises file shares

Objectives

Task 1:
Provision the lab environment

Task 2:
Create and configure Azure storage accounts

Task 3:
Manage blob storage

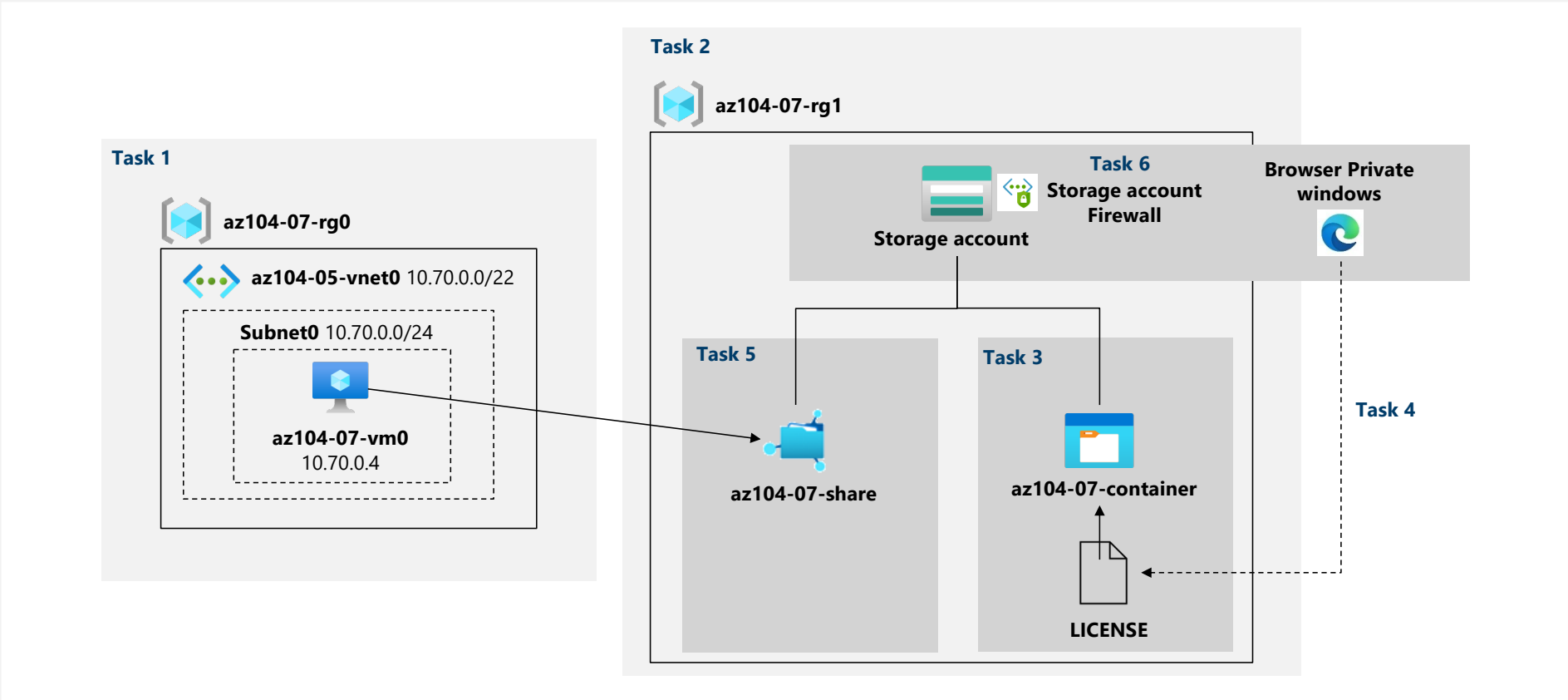
Task 4:
Manage authentication and authorization for Azure Storage

Task 5:
Create and configure an Azure Files shares

Task 6:
Manage network access for Azure Storage

Next slide for an architecture diagram

Lab 07 – Architecture diagram



Module Review

Module Review Questions	Microsoft Learn Modules (docs.microsoft.com/Learn)
	Create an Azure storage account
	Secure your Azure storage
	Optimize storage performance and costs using Blob storage tiers
	Make your application storage highly available with read-access geo-redundant storage
	Copy and move blobs from one container or storage account to another from the command line and in code
	Provide disaster recovery by replicating storage data across regions and failing over to secondary location
	Monitor, diagnose, and troubleshoot your Azure Storage

End of presentation