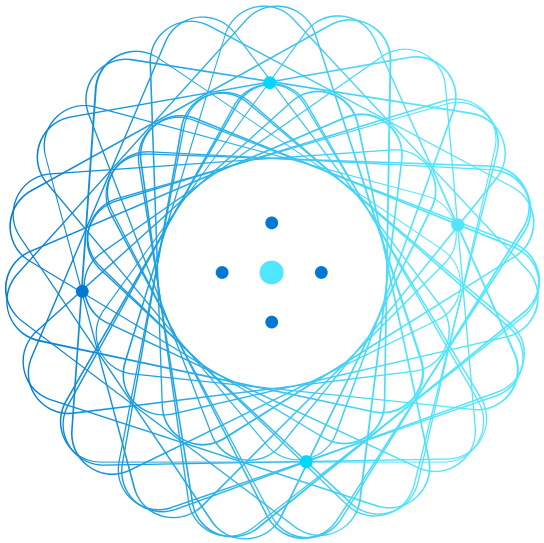
Microsoft Azure

Azure Storage Services



Learn learning path: https://docs.microsoft.com/learn/paths/azure-fundamentals-describe-azure-architecture-services/

Storage - Objective Domain

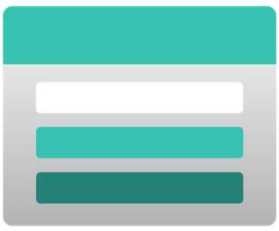
Describe the benefits and usage of:

- Compare Azure storage services.
- Describe storage tiers.
- Describe redundancy options.
- Describe storage account options and storage types.
- Identify options for moving files, including AzCopy, Azure Storage Explorer, and Azure File Sync.
- Describe migration options, including Azure Migrate and Azure Data Box.

https://docs.microsoft.com/learn/modules/describe-azure-storage-services/1-introduction

Storage accounts

- Must have a globally unique name
- Provide over-the-internet access worldwide
- Determine storage services and redundancy options



https://docs.microsoft.com/learn/modules/describe-azure-storage-services/2-accounts

Storage redundancy

Redundancy configuration	Deployment	Durability
Locally redundant storage (LRS)	Single datacenter in the primary region	11 nines
Zone-redundant storage (ZRS)	Three availability zones in the primary region	12 nines
Geo-redundant storage (GRS)	Single datacenter in the primary and secondary region	16 nines
Geo-zone-redundant-storage (GZRS)	Three availability zones in the primary region and a single datacenter in secondary region	16 nines

https://docs.microsoft.com/learn/modules/describe-azure-storage-services/3-redundancy

Determine Storage Account Kinds

Storage Account	Recommended usage
Standard general-purpose v2	Most scenarios including Blob, File, Queue, Table, and Data Lake Storage.
Premium block blobs	Block blob scenarios with high transactions rates, or scenarios that use smaller objects or require consistently low storage latency.
Premium file shares	Enterprise or high-performance file share applications.
Premium page blobs	Premium high-performance page blob scenarios.

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

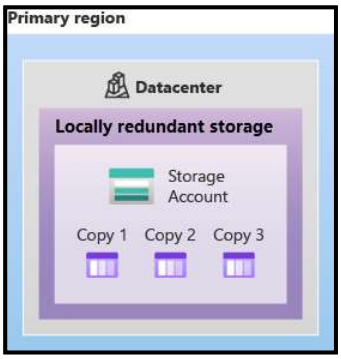
Storage account overview - https://docs.microsoft.com/azure/storage/common/storage-account-overview

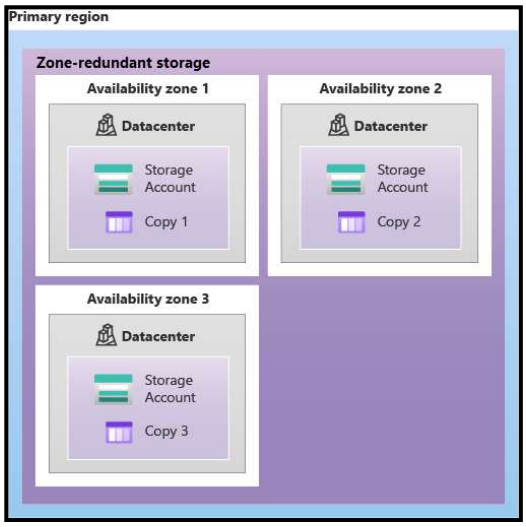
Create an Azure Storage account - https://docs.microsoft.com/azure/storage/common/storage-account-create

Upgrade to a general-purpose v2 storage account - https://docs.microsoft.com/azure/storage/common/storage-account-upgrade

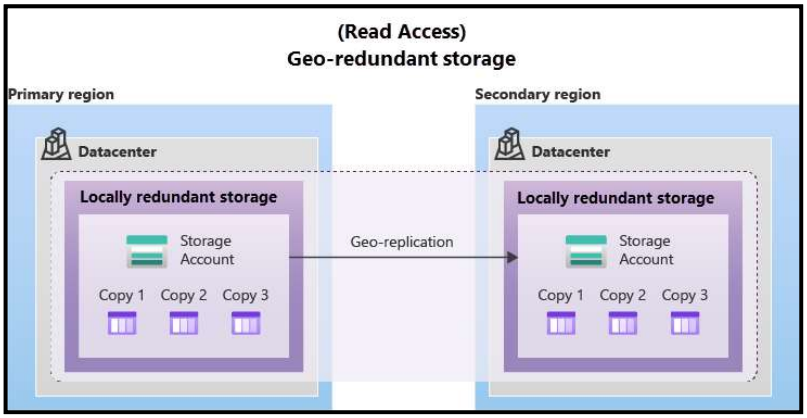
Create an Azure Storage account - https://docs.microsoft.com/learn/modules/create-azure-storage-account/

Storage Redundancy – LRS & ZRS

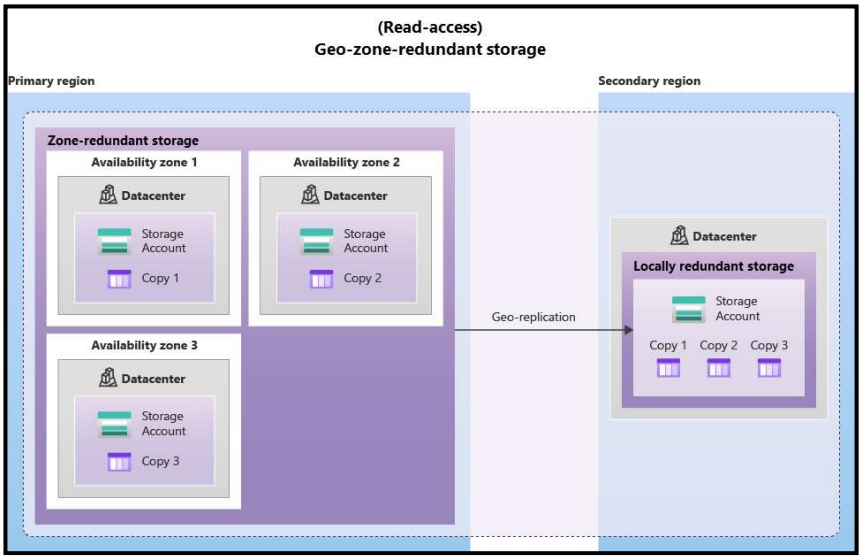




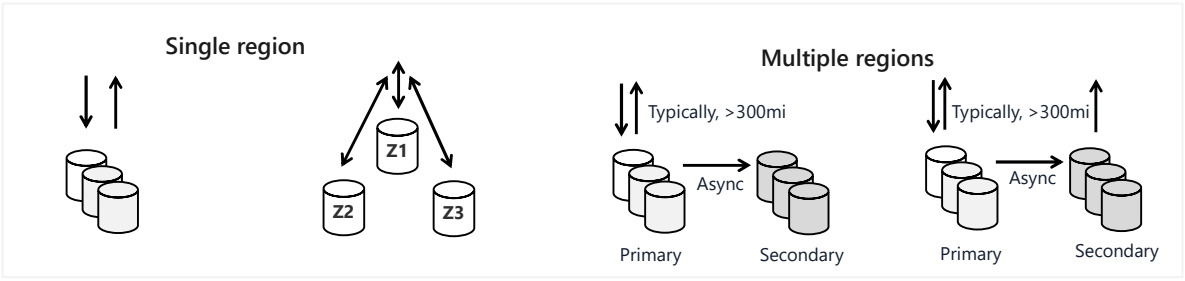
Storage Redundancy – GRS



Storage Redundancy – GZRS (RA-GRS/RA-GZRS)



Determine Replication Strategies (1 of 2)



LRS

- Three replicas, one region
- Protects against disk, node, rack failures
- Write is acknowledged when all replicas are committed
- Superior to dual-parity RAID

ZRS

- Three replicas, three zones, one region
- Protects against disk, node, rack, and zone failures
- Synchronous writes to all three zones

GRS

- Six replicas, two regions (three per region)
- Protects against major regional disasters
- Asynchronous copy to secondary

RA-GRS

- GRS + read access to secondary
- Separate secondary endpoint
- Recovery point objective (RPO) delay to secondary can be queried

Continued next slide

An Azure Storage account always replicates your data to help ensure durability and high availability. Azure Storage copies data so that it's protected from planned and unplanned events, including transient hardware failures, network or power outages, and natural disasters.

You can replicate data within the same datacenter, across zonal datacenters within the same region, or across geographically separated regions.

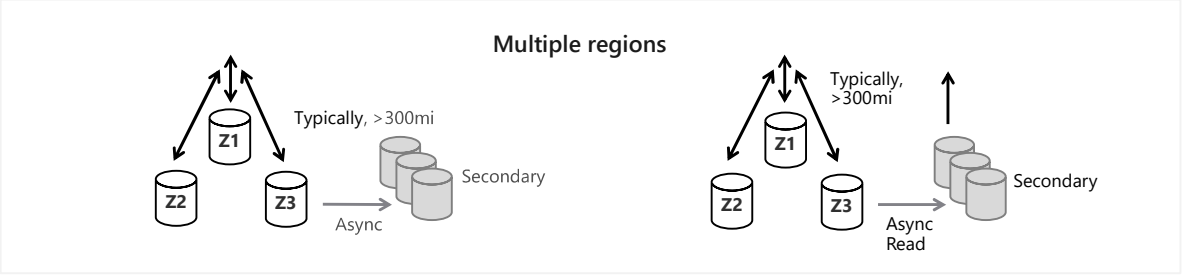
Locally redundant storage (LRS) replicates data three times within a single datacenter. LRS provides at least 99.999999999 (11 nines) percent durability of objects over a given year. LRS is the lowest-cost replication option, and it offers the least durability compared to other options.

Zone-redundant storage (ZRS) replicates data synchronously across three storage clusters in a single region. Each storage cluster is physically separated from the others and is in its own availability zone (AZ).

Geo-redundant storage (GRS) is designed to provide at least 99.99999999999999 (16 nines) percent durability of objects over a given year by replicating data to a secondary region that's hundreds of miles away from the primary region.

Read-access geo-redundant storage (RA-GRS) is based on GRS. RA-GRS replicates data to another datacenter in a secondary region, and it also provides the option to read from the secondary region.

Determine Replication Strategies (2 of 2)



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

RA-GZRS

- GZRS + read access to secondary
- Separate secondary endpoint
- RPO delay to secondary can be queried

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.

Optionally, you can enable read access to data in the secondary region with read-access geographically zone-redundant storage (RA-GZRS) if your applications must read data in the event of a disaster in the primary region.

Azure storage services

Container storage (blob) is optimized for storing massive amounts of unstructured data, such as text or binary data.

Disk storage provides disks for virtual machines, applications, and other services to access and use.

Azure Files sets up a highly available network file shares that can be accessed by using the standard Server Message Block (SMB) protocol.

https://docs.microsoft.com/learn/modules/describe-azure-storage-services/4-describe-azure-storage-services

Access Storage – Service Types

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

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

If you prefer you can configure a custom domain name

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

Secure access to your storage account - https://docs.microsoft.com/learn/modules/secure-azure-storage-account/

✔ A Blob storage account only exposes the Blob service endpoint. And, you can also configure a custom domain name to use with your storage account.

Storage service public endpoints

Storage service	Public endpoint
Blob Storage	https://<storage-account-name>.blob.core.windows.net
Data Lake Storage Gen2	https://<storage-account-name>.dfs.core.windows.net
Azure Files	https://<storage-account-name>.file.core.windows.net
Queue Storage	https://<storage-account-name>.queue.core.windows.net
Table Storage	https://<storage-account-name>.table.core.windows.net

Implement Blob Storage

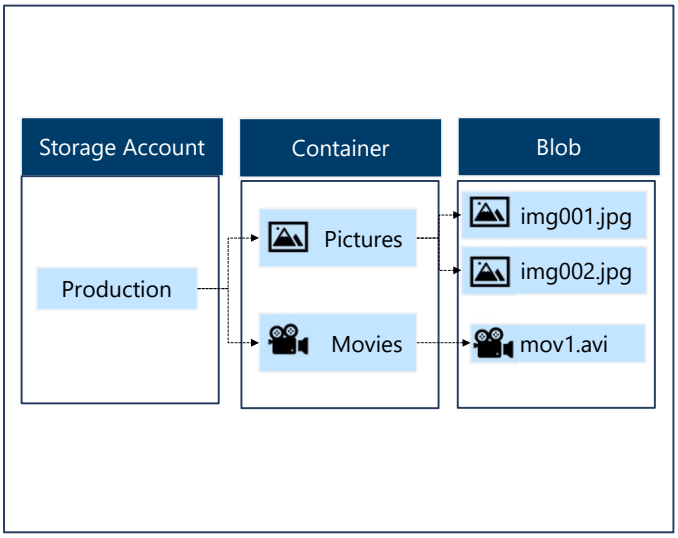
Stores unstructured data in the cloud

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



Azure Blob Storage - https://azure.microsoft.com/services/storage/blobs/

Compare Files to 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

Extra slide at the end for NetApp Files if you want to cover that.

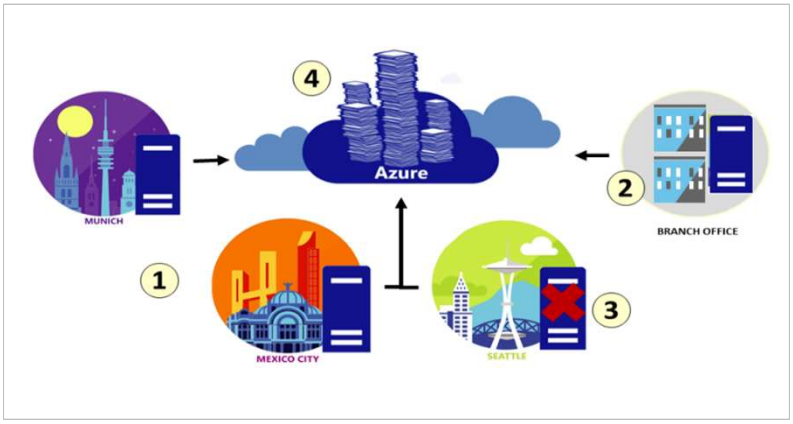
What is Azure Files? - https://docs.microsoft.com/azure/storage/files/storage-files-introduction

✔ When selecting which storage feature to use, you should also consider pricing.

Implement 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

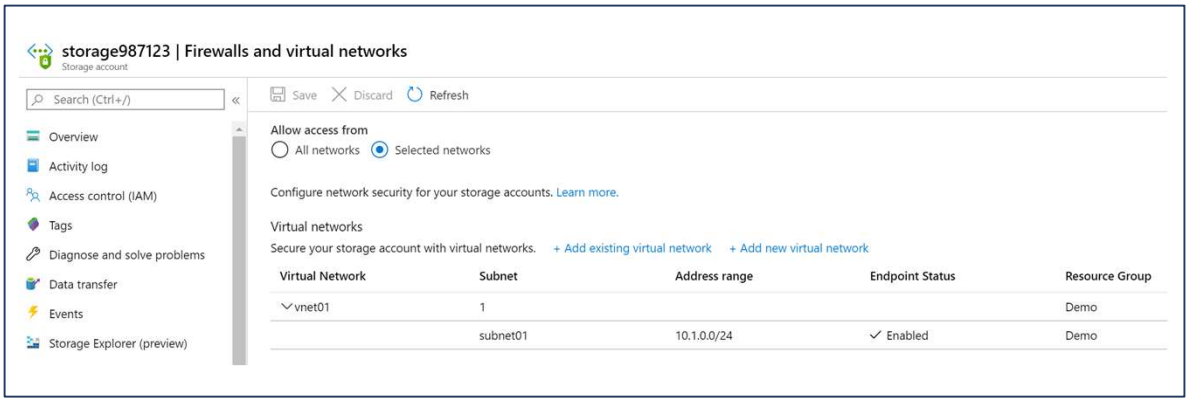
1. Lift and shift
2. Branch Office backups
3. Backup and Disaster Recovery
4. File Archiving



Planning for an Azure File Sync deployment - https://docs.microsoft.com/azure/storage/files/storage-sync-files-planning

✔ Cloud tiering is an optional feature of Azure File Sync in which frequently accessed files are cached locally on the server while all other files are tiered to Azure Files based on policy settings.

Secure Storage 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

Configure Azure Storage firewalls and virtual networks - https://docs.microsoft.com/azure/storage/common/storage-network-security

- It is important to test and ensure the service endpoint is limiting access as expected.

Azure storage access tiers

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.

You can switch between these access tiers at any time.

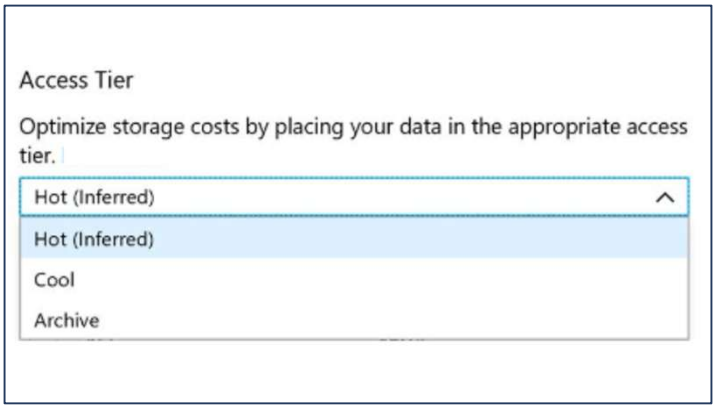
https://docs.microsoft.com/learn/modules/describe-azure-storage-services/4-describe-azure-storage-services

Create 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**

Azure Blob storage: hot, cool, and archive access tiers - https://docs.microsoft.com/azure/storage/blobs/storage-blob-storage-tiers

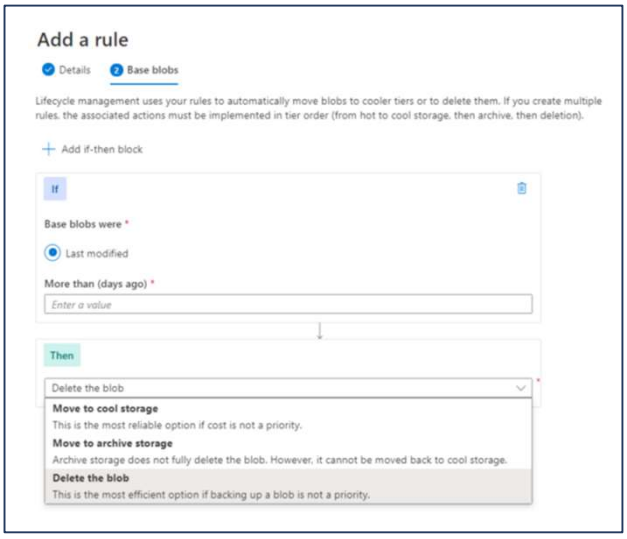
Optimize storage performance and costs using Blob storage tiers - https://docs.microsoft.com/learn/modules/optimize-archive-costs-blob-storage/

Add 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



Store application data with Azure Blob storage - https://docs.microsoft.com/learn/modules/store-app-data-with-azure-blob-storage/

File management options

AzCopy	Azure Storage Explorer	Azure File Sync
Command line utility	Graphical user interface (similar to Windows Explorer)	Synchronizes Azure and on premises files in a bidirectional manner
Copy blobs or files to or from your storage account	Compatible with Windows, MacOS, and Linux	Cloud tiering keeps frequently accessed files local, while freeing up space
One-direction synchronization	Uses AzCopy to handle file operations	Rapid reprovisioning of failed local server (install and resync)

https://docs.microsoft.com/learn/modules/describe-azure-storage-services/7-identify-azure-file-movement-options