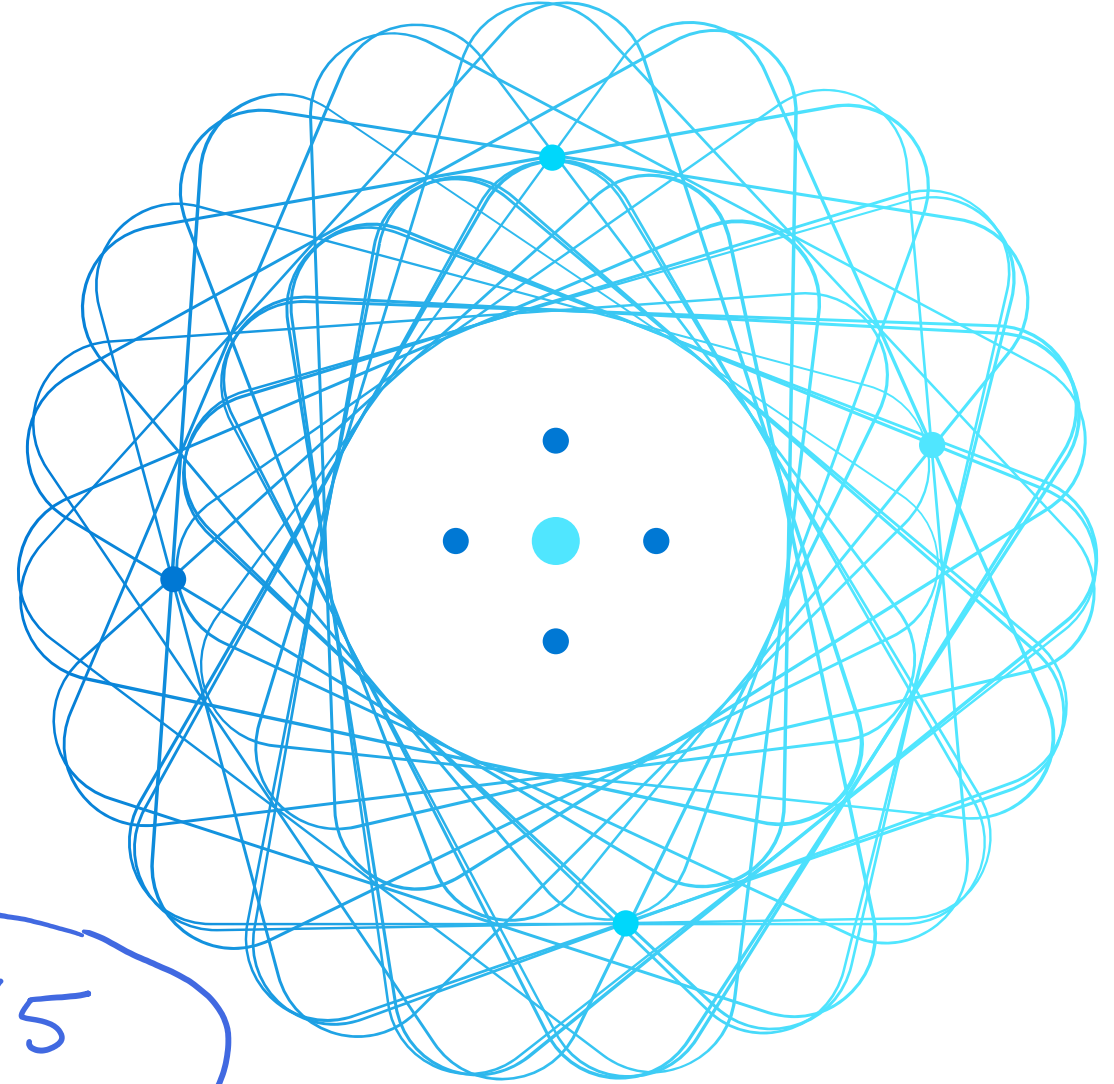# AZ-305

Tag 2

Designing Microsoft Azure Infrastructure Architect

github.com/www42/az-305

AZ-305 Agenda

Module 01 Design a governance solution ✓

Module 02 Design a compute solution ✓

Module 03 Design a non-relational data storage solution ←

Module 04 Design a data storage solution for relational data

Module 05 Design a data integration solution   Big Data   *Cosmos DB*

Module 06 Design an application architecture solution   Queue

Module 07 Design Authentication and Authorization Solutions

Module 08 Design a solution to log and monitor Azure resources

Module 09 Design a network infrastructure solution   Franz

Module 10 Design a business continuity solution   Apache Kafka

Module 11 Design a migration solution

Event Hub

Design a non-relational data storage solution

Introduction

- Design for data storage

- Design for Azure storage accounts

- Design for data redundancy

- Design for Azure blob storage

- Design for Azure files

- Design an Azure disk solutions

- Design for storage security

- Case study

- Summary and resources

AZ-305: Design Data Storage Solutions (25-30%)

Design a Data Storage Solution for Non-relational Data

- Recommend access control solutions to data storage
- Recommend a data storage solution to balance features, performance, and cost
- Design a data solution for protection and durability

Design for data storage

Classify your data storage

To design Azure storage, you first must determine what type of data you have.

- **Structured data** includes relational data and has a shared schema
- **Semi-structured** is less organized than structured data and isn't stored in a relational format
- **Unstructured data** is the least organized type of data

Design for Azure storage accounts

azcopy.exe

az

net use A:
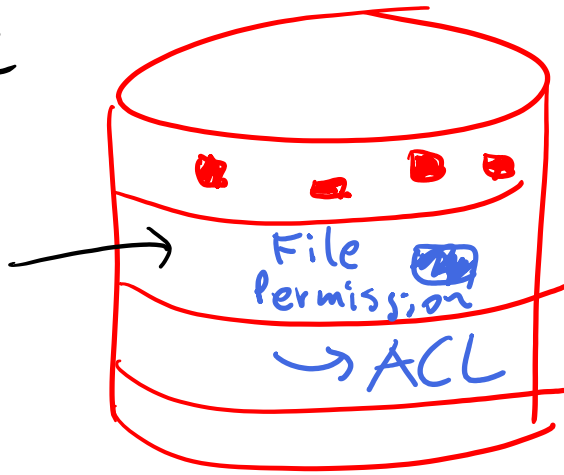
Blobs — URL
Files — SMB 3.1 — ||———\share
File Permission
→ ACL
Queues
Table

Share Permission
→ Roles

GP v2
Tiering

Windows 365
Lizenz

Ludwig

Profile
Session

SH vhd FSLogix

Azure Virtual Desktop AVD

On Prem   RDS   Farm   VDI
Terminal Server

Determine the best storage account type

Select an account type based on supported services, usage cases, and SLA.

Account Type	Supported services	Usage
Standard general-purpose v2 (default)	Blobs / Data Lake, Queues, Tables, Azure Files	Recommended for most scenarios
Premium block blobs	Blob storage, Data Lake	High transactions rates, single digit storage latency, or large numbers of small transactions
Premium file shares	Azure Files	Enterprise or high-performance scale applications - supports both SMB and NFS file shares
Premium page blobs	Page blobs only	High performance and low latency storage scenarios

Considerations for storage accounts

It is important to plan your storage accounts.

GRS-RA
GRS

Region 2
async
Region

LRS

ZRS

Avail
Zone

NLP

Location
For performance reasons locate the data close to users. One storage account for each location.

Compliance
Regulatory guidelines for keeping data in a specific location / Internal requirements for auditing or storing data.
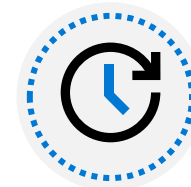
Cost
The settings for the account do influence the cost of services in the account.

Replication
Data storage could have different replication strategies.
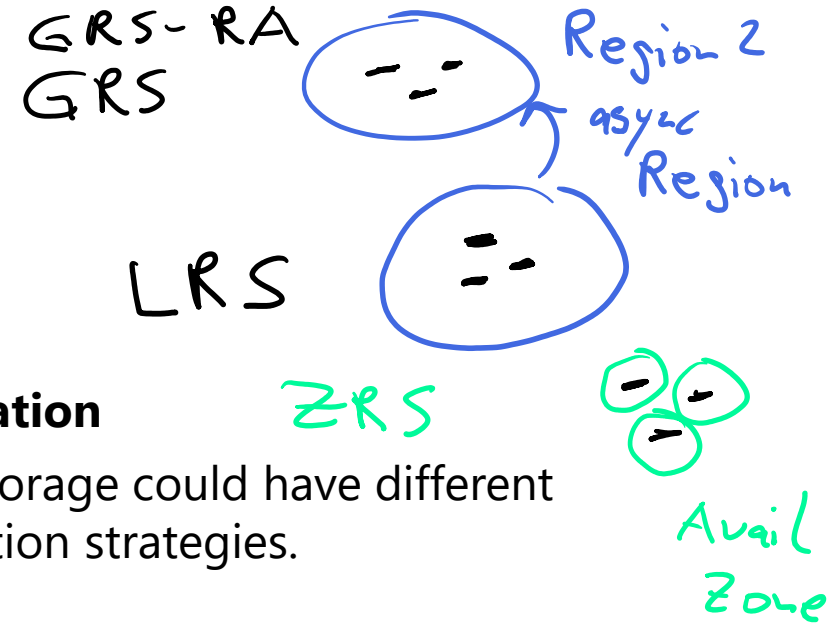
Administrative overhead
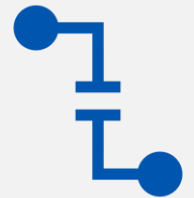Each storage account requires some time and attention from an administrator to create and maintain.

Security - Data sensitivity
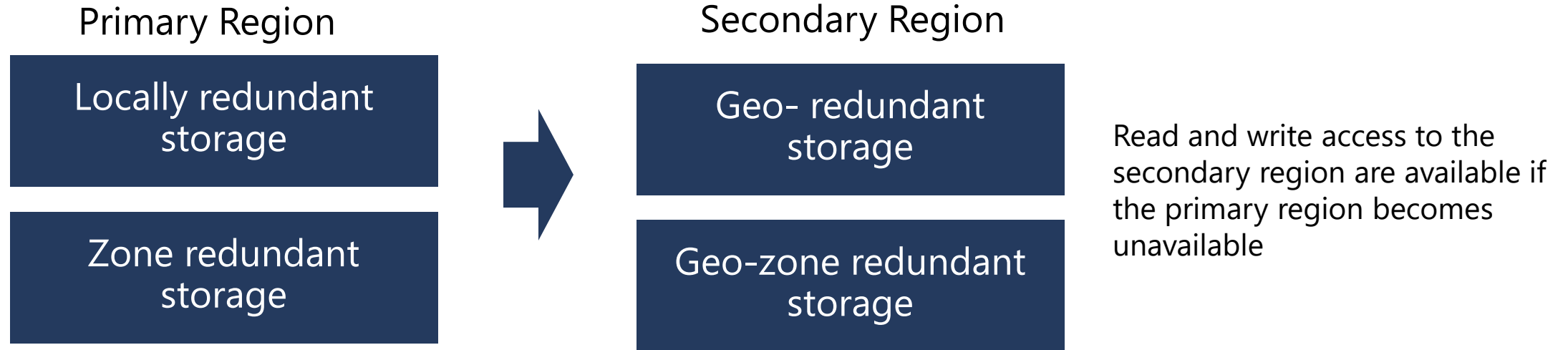Data plane security and data storage security.

Design for data redundancy

Select a storage replication strategy

What level of redundancy do you need?

Primary Region

Locally redundant storage

Zone redundant storage

Secondary Region

Geo- redundant storage

Geo-zone redundant storage

Read and write access to the secondary region are available if the primary region becomes unavailable

- A node within a data center becomes unavailable

- An entire data center (zonal or non-zonal) becomes unavailable

- A region-wide outage occurs in the primary region

Design for Azure blob storage

Determine the storage tier

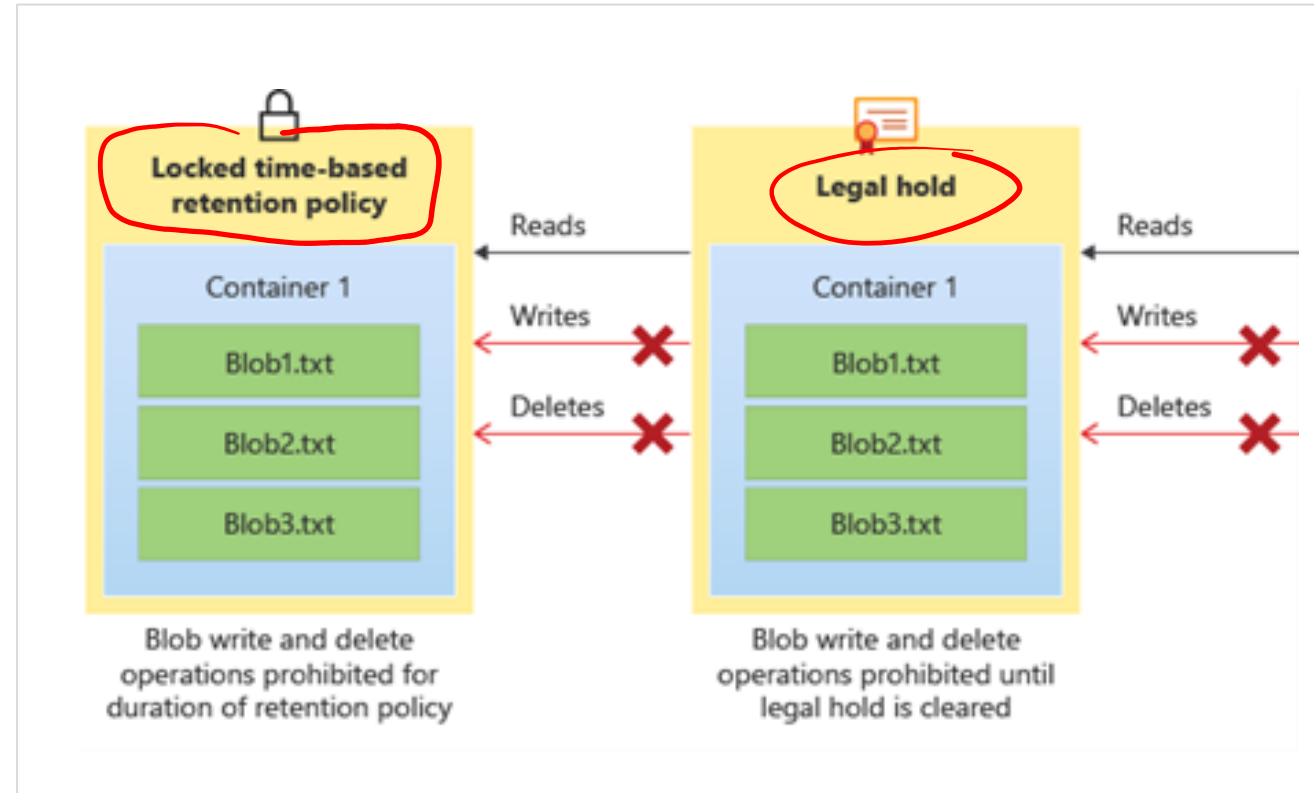## Blob storage is an object store used for storing vast amounts of unstructured data.

Tier	Storage Costs	Retrieval/Read Costs	Storage Duration	Usage cases
Premium	High	Lowest	N/A	• High throughout and large numbers of I/O operations per second
Standard Hot	Medium	Low	N/A	• Active and frequent use • Data staged for processing
Standard Cool	Low	Medium	> 30 days	• Short-term backup • Older media infrequently viewed • Large data sets
Standard Archive	Lowest	High	> 180 days	• Long-term backup • Original (raw) data • Compliance or archival data

- Use lifecycle rules to transition blob data to the appropriate access tiers

- Consider a data lifecycle rule to expire or delete data

Consider immutable storage policies

Determine regulatory compliance, secure document retention, and legal hold policies.

- Apply immutable storage policies at the container level

- Use **time-based retention policies** for business-critical data

- Use **legal-hold policies** for sensitive information to ensure a tamper proof state

- Policies apply only to new content

- Audit logs are available

Locked time-based retention policy

Reads

Writes ✖

Deletes ✖

Container 1

Blob1.txt

Blob2.txt

Blob3.txt

Blob write and delete operations prohibited for duration of retention policy

Legal hold

Reads

Writes ✖

Deletes ✖

Container 1

Blob1.txt

Blob2.txt

Blob3.txt

Blob write and delete operations prohibited until legal hold is cleared

Design for Azure files

Compare Azure files to Azure blobs

The technology you choose depends on the use case, protocol, and performance.

Category	Azure Files	Azure Blob Storage
Use cases	• Replace or supplement traditional on-premises file servers or NAS devices • Access files shares from anywhere • Lift and shift content to the cloud • Replicate and cache with Azure File Sync • Share stored application settings	• Large scale analytical data • Throughput sensitive high-performance computing • Backup and archive • Autonomous driving, media rendering, or genomic sequencing data
Available protocols	• SMB • REST • NFS 4.1	• NFS 3.0 • REST • Data Lake Storage Gen2
Performance (Per volume)	• Better IOPS	• Better throughput

Select a file storage tier (activity)

Tailor your file tiers to the performance and price you need
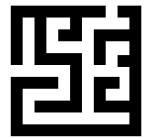
File storage tiers
Premium
Transaction optimized
Hot
Cool

You have highly I/O-intensive workloads, with high throughput and low latency

You need storage optimized for general purpose file sharing scenarios such as team shares and Azure File Sync

You need cost-efficient storage optimized for online archive storage scenarios

You have transaction heavy workloads and applications that require file storage and backend storage

Design for NetApp files

The Azure NetApp Files service is enterprise-class, high-performance, metered file storage.

- Ease of migration

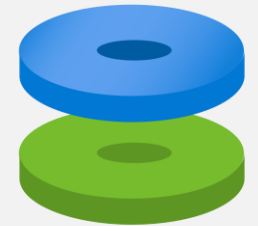- Workload scale

- Flexibility

- Storage technology

Migration (Windows Apps & SQL Server | Linux OSS Apps & Databases | SAP on Azure)

Specialized workloads (HPC | VDI | AVS)

Azure Platform Services (AKS, Azure Batch, …)

Azure NetApp Files (Enterprise NAS)

Design an Azure disk solution

Select an Azure disk solution

Azure disks are block-level storage volumes used with Azure virtual machines.

UM

- Consider disk type, scenario, throughput, and IOPS

- Always use managed disks

- Optimize read and write access with disk caching

- Use Azure Disk Encryption

- Enhance performance with multiple disks

- Use the network acceleration feature
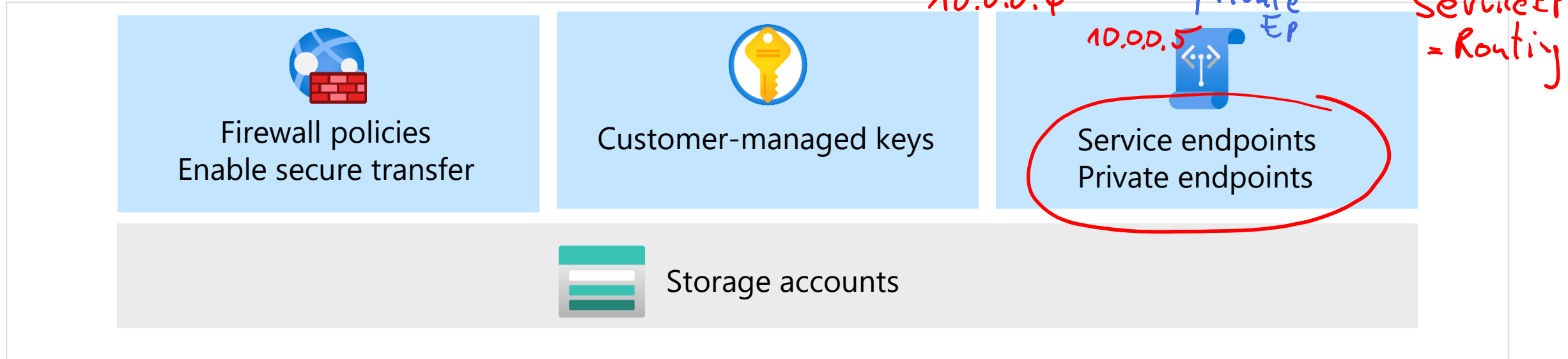
- Share disks across multiple VMs

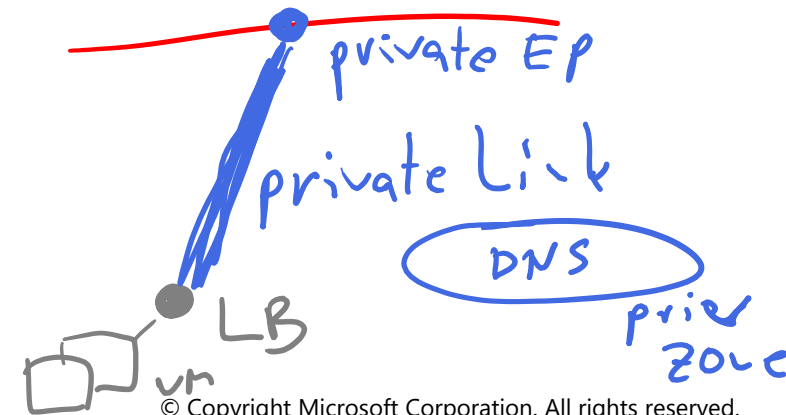| Disk type	Usage cases
Ultra-disk SSD	IO-intensive workloads such as SAP HANA, top tier databases (SQL, Oracle), and other transaction-heavy workloads
Premium SSD v2	Production and performance-sensitive workloads that consistently require low latency and high IOPS and throughput
Premium SSD	Production and performance sensitive workloads
Standard SSD	Web servers, lightly used enterprise applications and dev/test
Standard HDD	Backup, non-critical, infrequent access

Design for storage security

Considerations for storage security
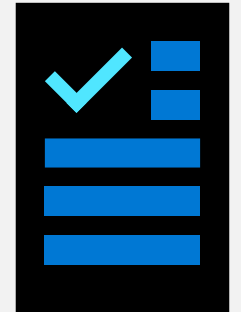
Use a layered security model to secure and control access.

**Firewall policies
Enable secure transfer**

Customer-managed keys

**Service endpoints
Private endpoints**

Storage accounts

- Grant limited access to Azure Storage resources
- Enable firewall rules to limit access to access - IP addresses or subnets
- Use private endpoints and private links for clients
- Use virtual network service endpoints to provide direct connection
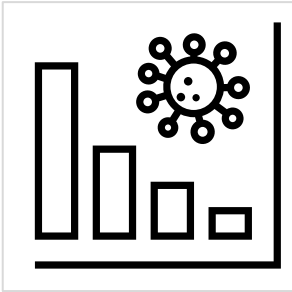- Use customer managed encryption keys

Handwritten annotations:

VM — PiP — Public EP

SA — SA

NIC — NIC — VNet sub

10.0.0.4 — Private EP

10.0.0.5

Service EP = Routing

On Prem Azure

LB — vn

private EP

private Link

DNS

priv zone

Case study and review

Case study – Non-relational data

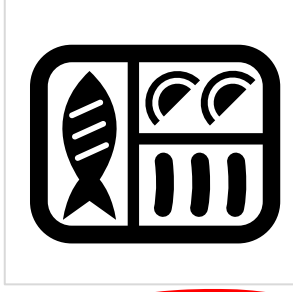| Media files	Marketing literature	Corporate documents
• Product photos and feature videos • JPEG and MP4 are most common formats	• Customer stories, sales flyers, sizing charts, and eco-friendly manufacturing information • PDF format is the most common	• Internal documents – some sensitive • Mostly Office formats like Word and Excel

Case study discussion

- Design a storage solution for Tailwind Traders.
  - What type of data is represented?
  - What factors will you consider in your design?
  - What type of storage accounts are needed?
  - Will you use blob access tiers?
  - Will you use immutable storage?
  - How will the content be securely accessed?
- Your solution should consider the media, marketing literature, and corporate documents.
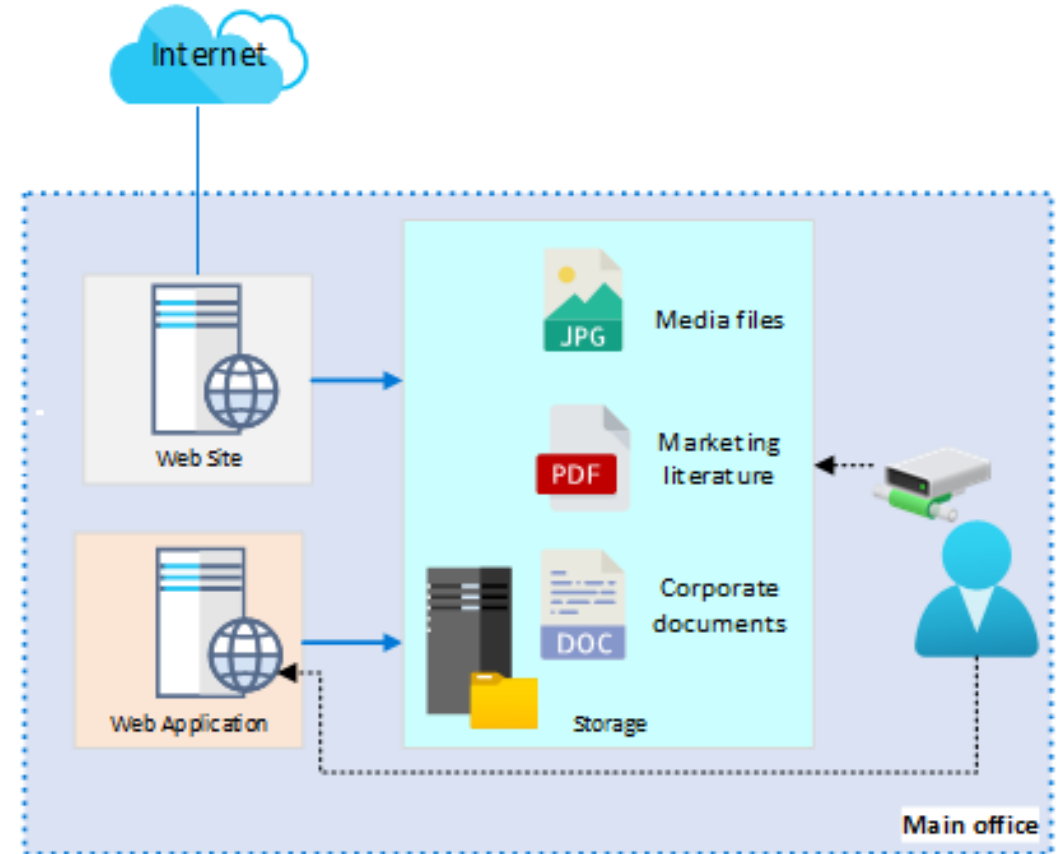
Instructor Solution Diagram - Completed
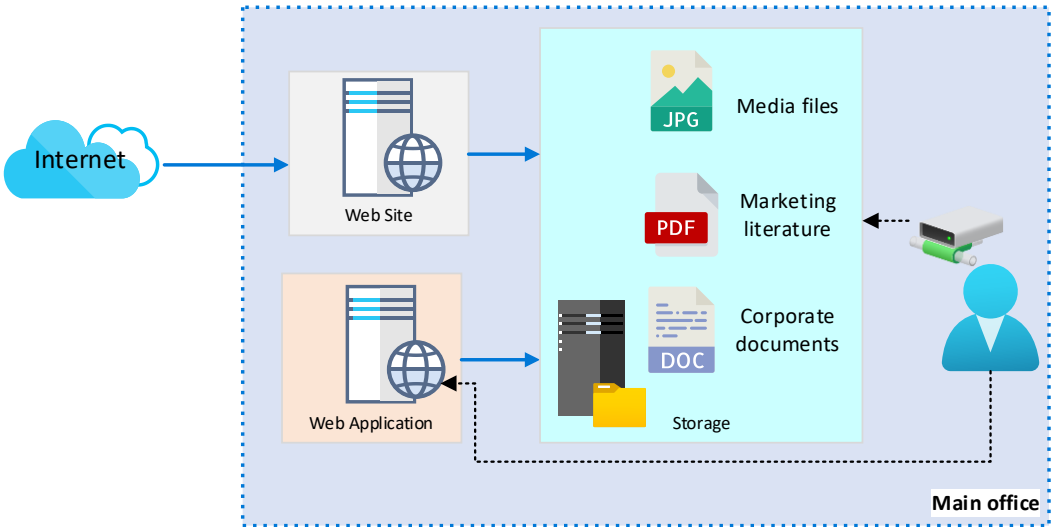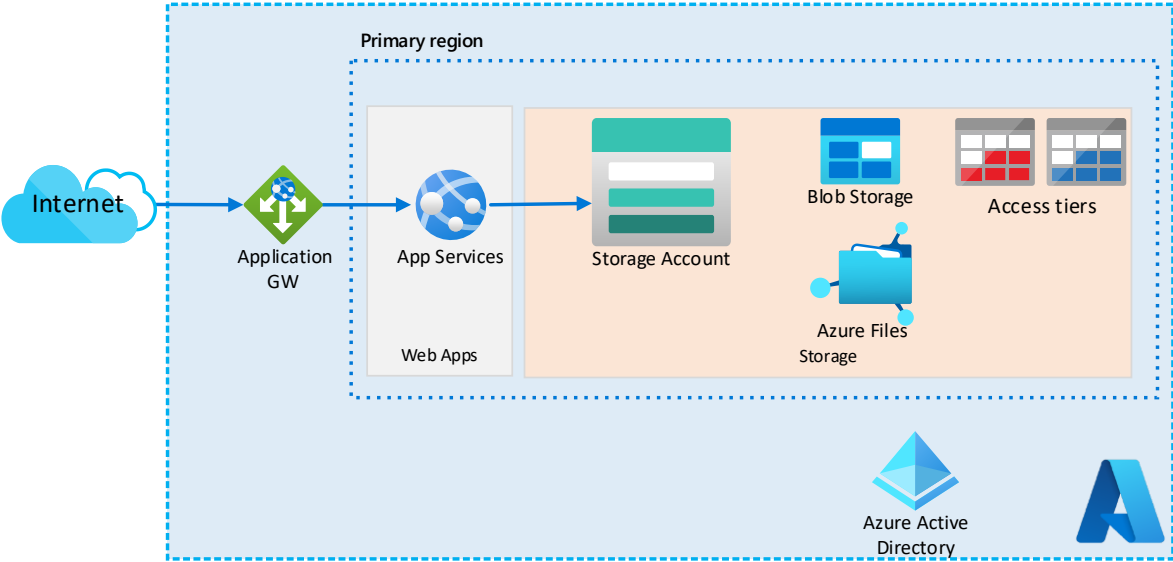
Summary and resources

Check your knowledge	Microsoft Learn Modules (docs.microsoft.com/Learn)
	[Choose the right disk storage for your virtual machine workload](#)
	[Configure blob storage](#)
	[Optimize performance and costs by using Azure Disk Storage](#)
	[Caching and performance in Azure storage disks](#)
	[Secure your Azure virtual machine disks](#)
	[Introduction to securing data at rest on Azure](#)
	[Introduction to Azure NetApp Files](#)

Optional hands-on exercise - [Create a storage account using the Azure portal](#)

Instructor resources (hidden)

End of presentation