

Ravindra Kudache

Introduction Azure

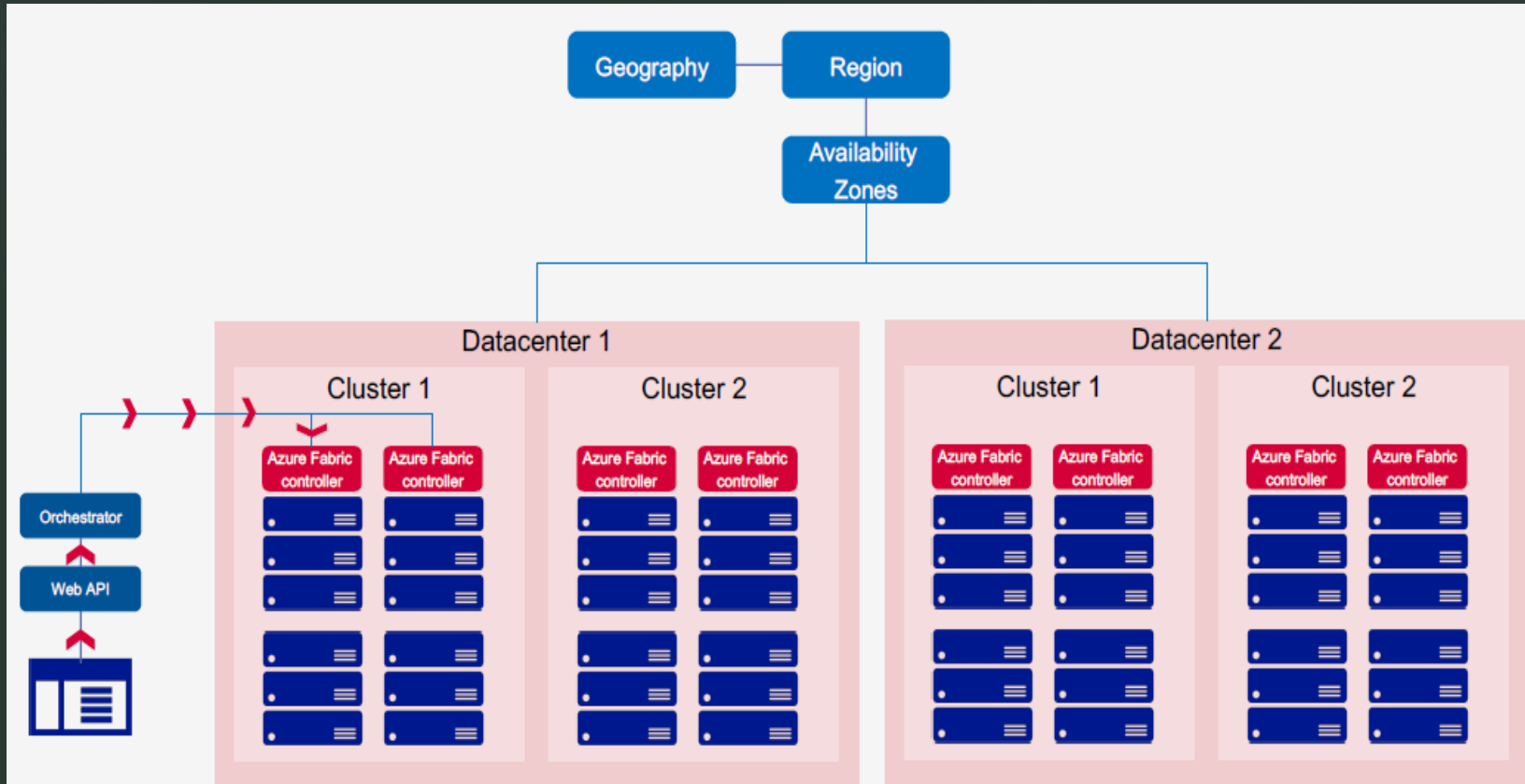


What is Microsoft Azure

Microsoft Azure is an ever-expanding set of cloud services to help your organization meet your business challenges. It is the freedom to build, manage and deploy applications on a massive, global network using your favorite tools and frameworks.

- • Over 100 end to end services
- • 54 global Azure regions (42 available and 12 in pipeline)
- • Over 70 compliance offerings
- • 90% of fortune 500 companies are using Microsoft cloud
- <https://azure.microsoft.com/en-gb/services/>
- <https://docs.microsoft.com/en-us/microsoft-365/compliance/offering-home?view=o365-worldwide>
- <https://azure.microsoft.com/en-gb/global-infrastructure/regions/>

Inside of Azure cloud



- **Geographies**
 - A geography is a discrete market, typically containing two or more regions, that preserves data residency and compliance boundaries.
- **Regions**
 - A region is a set of data centres deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network.
 - Check the availability of the products by region
- **Availability Zones**
 - Availability Zones are physically separate locations within an Azure region. Each Availability Zone is made up of one or more data centres equipped with independent power, cooling and networking.

Inside of Azure cloud

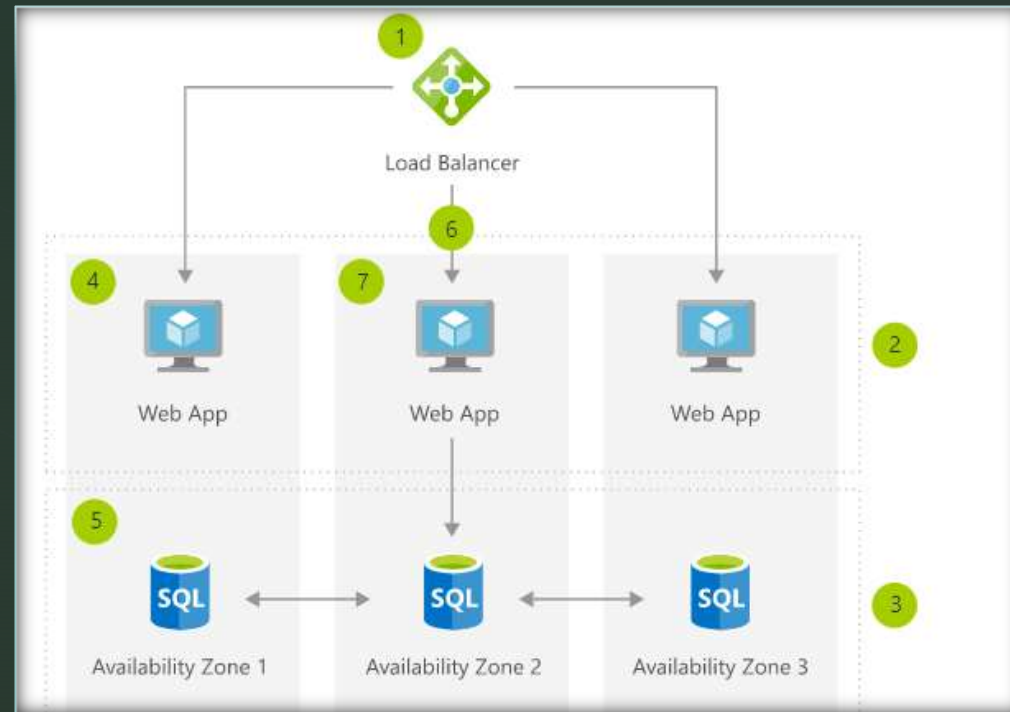
azure regions and geographies

Azure Regional Pairs

Geography	Regional Pair A	Regional Pair B
North America	North Central US	South Central US
North America	West US 2	West Central US
Norway	Norway East	Norway West

Availability Zones

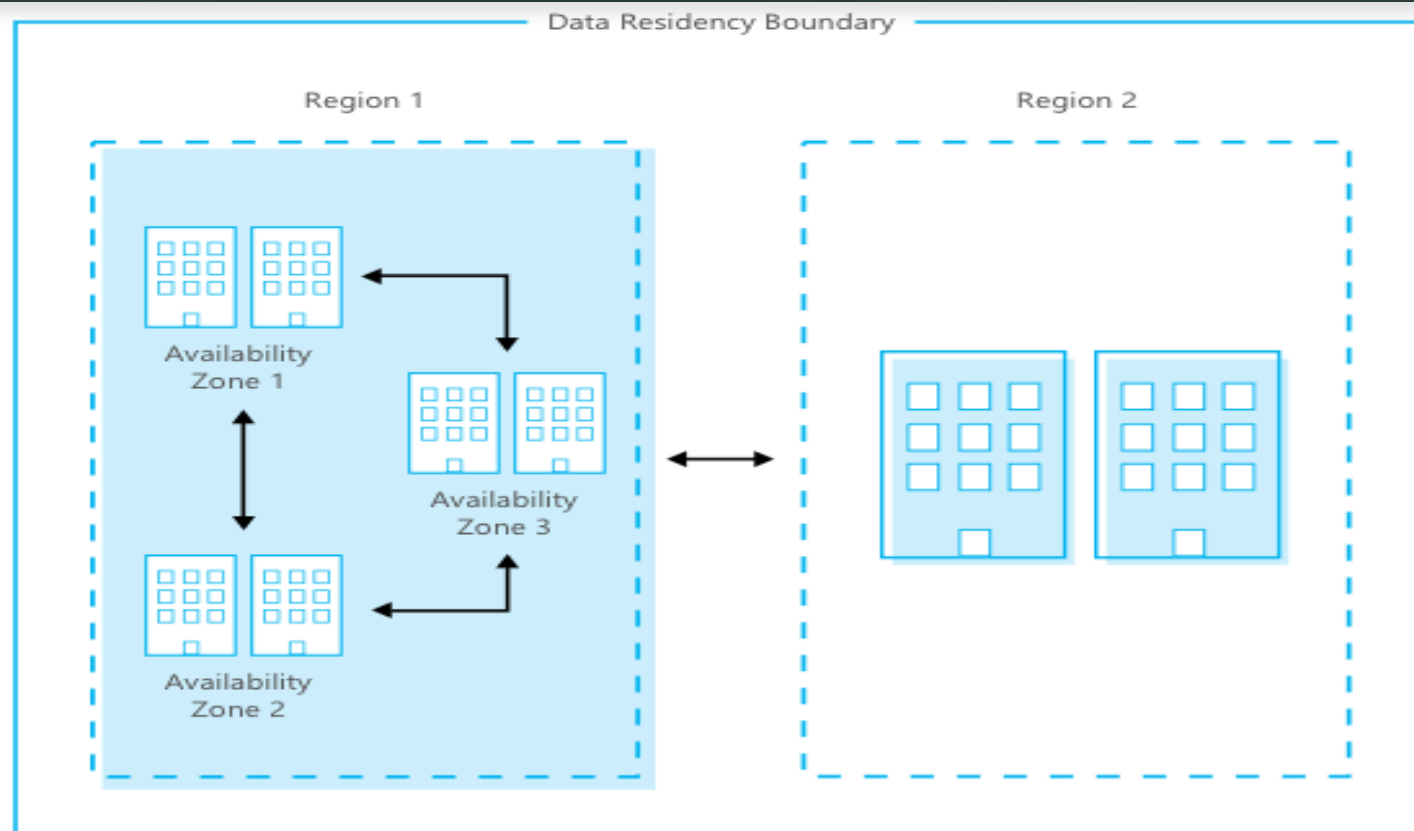
- **Availability Zones** are physically separate **locations** within an **Azure region**. Each **Availability Zone** is made up of one or more datacenters equipped with independent power, cooling and networking. **Availability Zones** allow customers to run mission-critical applications with high **availability** and low-latency replication.



Regions

- A region is a set of datacenters deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network.
- With more global regions than any other cloud provider, Azure gives customers the flexibility to deploy applications where they need to. Azure is generally available in 53 regions around the world, with plans announced for 5 additional regions.

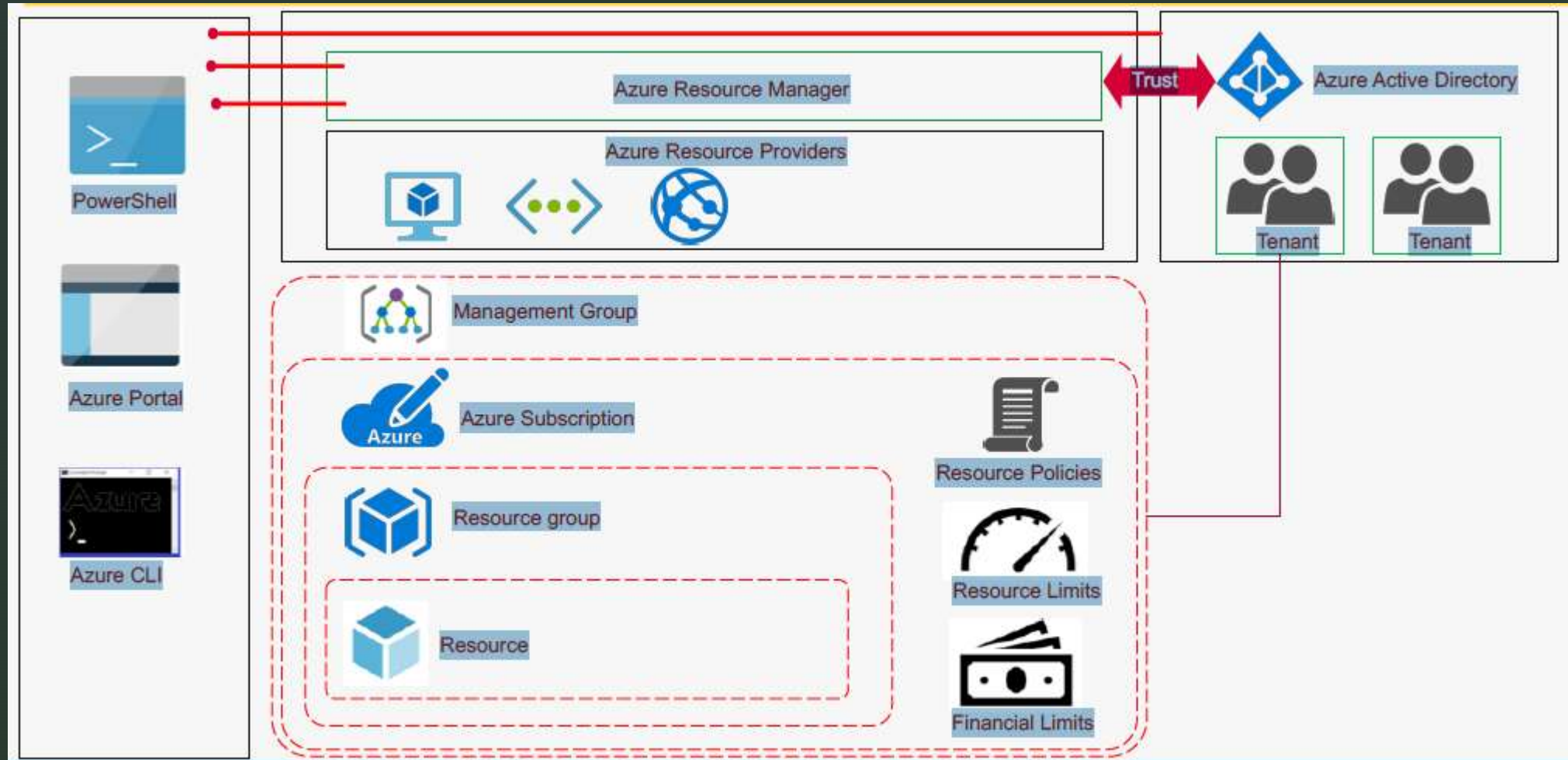
Achieve full resiliency within data residency



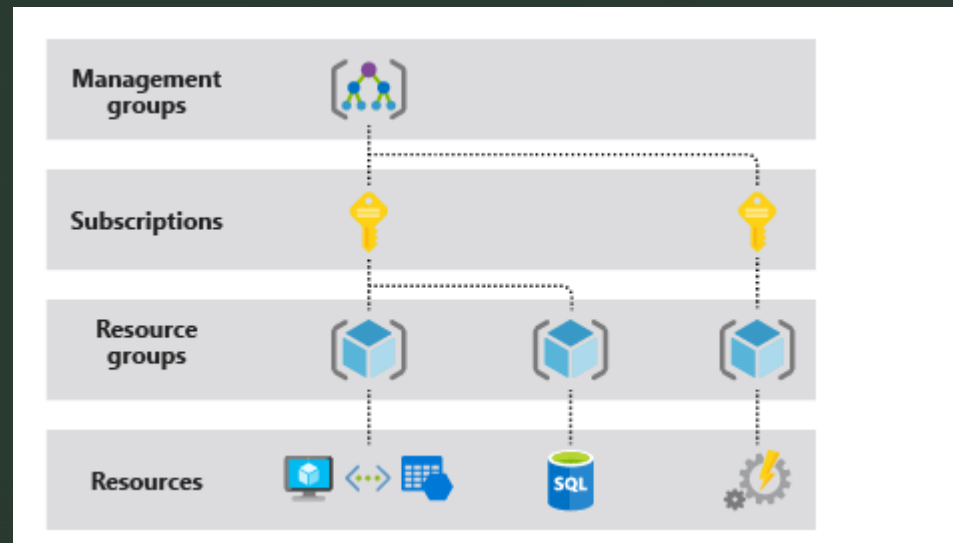
Achieve full resiliency with data residency.

Pair region and Availability Zones within the same data residency boundary for high availability, disaster recovery and backup.

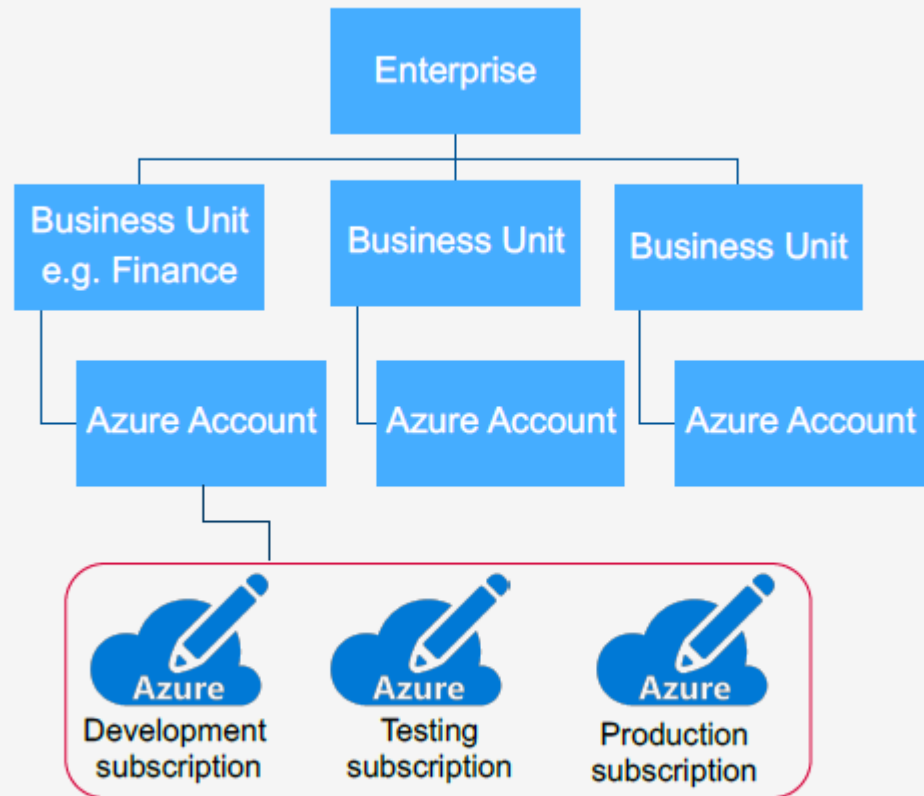
Overview of Azure resources structure



Understand scope



Azure hierarchy





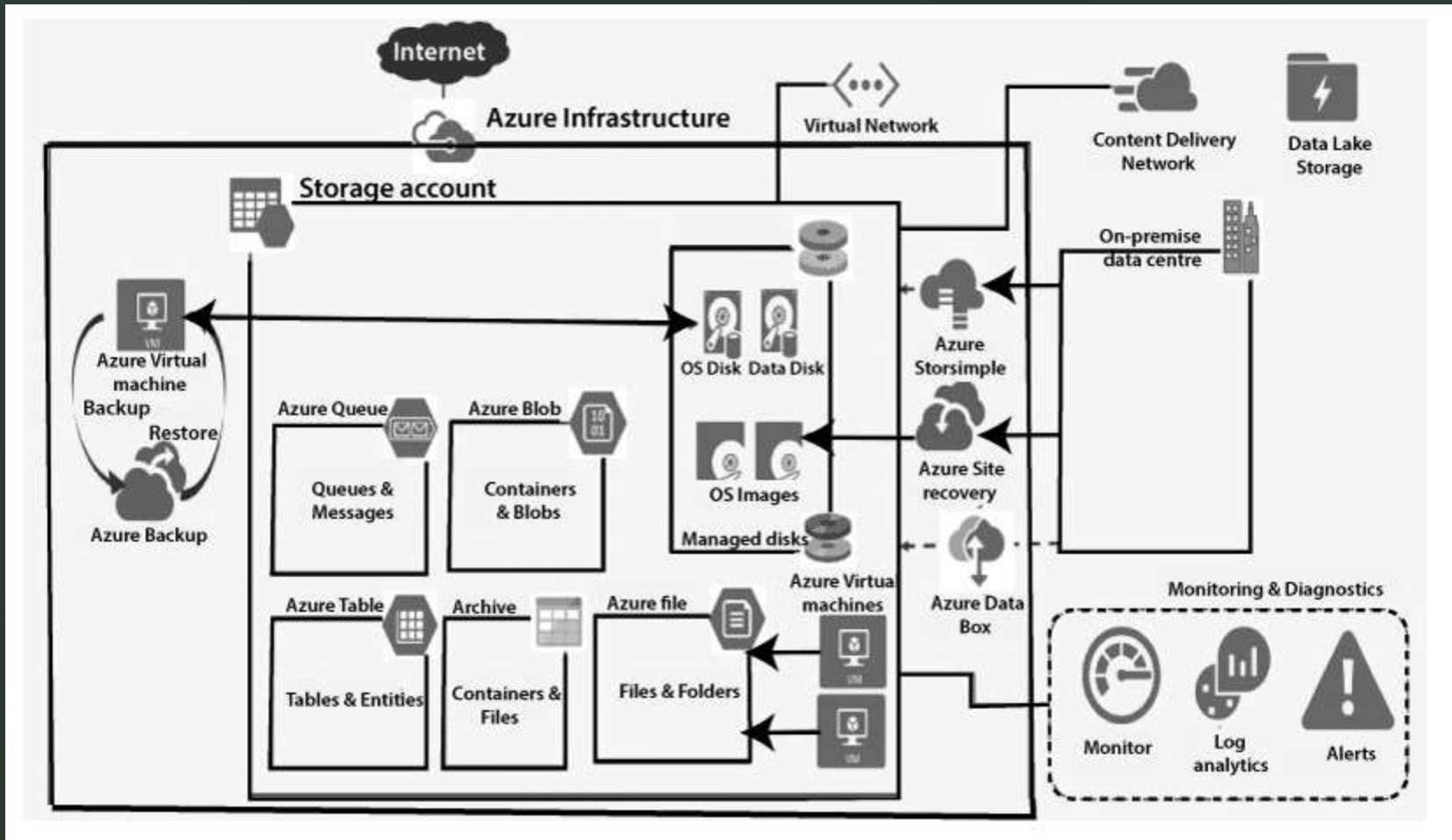
DEMO

- Lab demo: Azure portal overview

Important Link

- <https://docs.microsoft.com/en-gb/azure/active-directory/fundamentals/active-directory-how-subscriptions-associated-directory>
- <https://docs.microsoft.com/en-us/azure/governance/management-groups/>
- <https://docs.microsoft.com/en-gb/azure/cloud-adoption-framework/get-started/what-is-azure>
- <https://docs.microsoft.com/en-us/azure/azure-resource-manager/management/overview>
- <https://docs.microsoft.com/en-gb/azure/active-directory/fundamentals/active-directory-what-is>

Azure Storage Services



Types of storage accounts

- **General-purpose v2 accounts:** Basic storage account type for blobs, files, queues, and tables. Recommended for most scenarios using Azure Storage.
- **General-purpose v1 accounts:** Legacy account type for blobs, files, queues, and tables. Use general-purpose v2 accounts instead when possible.
- **BlockBlobStorage accounts:** Storage accounts with premium performance characteristics for block blobs and append blobs. Recommended for scenarios with high transactions rates, or scenarios that use smaller objects or require consistently low storage latency.
- **FileStorage accounts:** Files-only storage accounts with premium performance characteristics. Recommended for enterprise or high performance scale applications.
- **BlobStorage accounts:** Legacy Blob-only storage accounts. Use general-purpose v2 accounts instead when possible.

Types of storage accounts

Storage account type	Supported services	Supported performance tiers	Supported access tiers	Replication options	Deployment model	Encryption
					1	2
General-purpose V2	Blob, File, Queue, Table, Disk, and Data Lake Gen2	Standard, Premium	Hot, Cool, Archive	LRS, GRS, RA-GRS, ZRS, GZRS (preview), RA-GZRS (preview)	Resource Manager	Encrypted
	6	5	3	4		
General-purpose V1	Blob, File, Queue, Table, and Disk	Standard, Premium	N/A	LRS, GRS, RA-GRS	Resource Manager, Classic	Encrypted
		5				
BlockBlobStorage	Blob (block blobs and append blobs only)	Premium	N/A	LRS, ZRS	Resource Manager	Encrypted
				4		
FileStorage	File only	Premium	N/A	LRS, ZRS	Resource Manager	Encrypted
				4		
BlobStorage	Blob (block blobs and append blobs only)	Standard	Hot, Cool, Archive	LRS, GRS, RA-GRS	Resource Manager	Encrypted
			3			

Types of performance tiers

- **Standard performance** tiers are backed by magnetic drives and provides low cost per GB. They are best for applications that are best for bulk storage or infrequently accessed data
- • **Premium storage performance** are backed by solid state drives and offers consistency and low latency performance. They can only be used with Azure virtual machine disks and are best for I/O intensive workload such as databases.

Storage account access tiers

- Azure storage offers different storage tiers which allow you to store Blob object data in the most cost-effective manner
- **Premium storage (preview)** provides high performance hardware for data that is accessed frequently.
- **Hot storage**: is optimized for storing data that is accessed frequently.
- **Cool storage** is optimized for storing data that is infrequently accessed and stored for at least 30 days.
- **Archive storage** is optimized for storing data that is rarely accessed and stored for at least 180 days with flexible latency requirements (on the order of hours).

Azure storage replication

Azure Storage replication copies your data so that it is protected from planned and unplanned events ranging from transient hardware failures, network or power outages, massive natural disasters, and so on.

Scenario	LRS	ZRS	GRS	RA-GRS
Node unavailability within a data center	Yes	Yes	Yes	Yes
An entire data center (zonal or non-zonal) becomes unavailable	No	Yes	Yes	Yes
A region-wide outage	No	No	Yes	Yes
Read access to your data (in a remote, geo-replicated region) in the event of region-wide unavailability	No	No	No	Yes
Designed to provide __ durability of objects over a given year	at least 99.999999999% (11 9's)	at least 99.999999999% (12 9's)	at least 99.999999999999% (16 9's)	at least 99.999999999999% (16 9's)
Supported storage account types	GPv2, GPv1, Blob	GPv2	GPv2, GPv1, Blob	GPv2, GPv1, Blob
Availability SLA for read requests	At least 99.9% (99% for cool access tier)	At least 99.9% (99% for cool access tier)	At least 99.9% (99% for cool access tier)	At least 99.99% (99.9% for Cool Access Tier)
Availability SLA for write requests	At least 99.9% (99% for cool access tier)	At least 99.9% (99% for cool access tier)	At least 99.9% (99% for cool access tier)	At least 99.9% (99% for cool access tier)

Storage Replication

Redundancy in the primary region

Data in an Azure Storage account is always replicated three times in the primary region. Azure Storage offers two options for how your data is replicated in the primary region:

- **Locally redundant storage (LRS)** copies your data synchronously three times within a single physical location in the primary region. LRS is the least expensive replication option, but is not recommended for applications requiring high availability.
- **Zone-redundant storage (ZRS)** copies your data synchronously across three Azure availability zones in the primary region. For applications requiring high availability, Microsoft recommends using ZRS in the primary region, and also replicating to a secondary region.
- **Geo-redundant storage (GRS)** copies your data synchronously three times within a single physical location in the primary region using LRS. It then copies your data asynchronously to a single physical location in the secondary region.
- **Geo-zone-redundant storage (GZRS)** copies your data synchronously across three Azure availability zones in the primary region using ZRS. It then copies your data asynchronously to a single physical location in the secondary region.

Storage account endpoints

Every object that you store in Azure Storage has an address that includes your unique account name. The combination of the account name and the Azure Storage service endpoint forms the endpoints for your storage account.

For example, if your general-purpose storage account is named `mystorageaccount`, then the default endpoints for that account are:

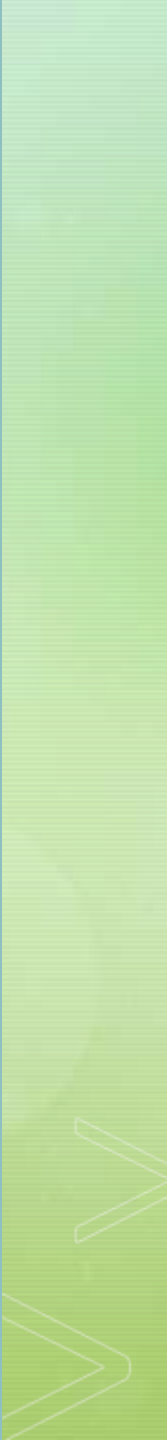
- Blob storage: `http://mystorageaccount.blob.core.windows.net`
- Table storage: `http://mystorageaccount.table.core.windows.net`
- Queue storage: `http://mystorageaccount.queue.core.windows.net`
- Azure Files: `http://mystorageaccount.file.core.windows.net`

Blob Storage

- This is object storage for the cloud.
- Here you can store massive amounts of unstructured data on the cloud.
- This is highly recommended when you want to store images, documents, video and audio files.
- Within the blob service, you create a container that is used to store the blob objects.
- There are three different types of blobs
- **Block blobs** – This is used for storing text and binary data.
- **Append blobs** – This is ideal for logging data.
- **Page blobs** – This is used to store virtual hard disk files for Azure virtual machines



DEMO

- 1)Creation of azure storage
 - 2)Creation azure container
 - 3)File upload
 - 4)Azure storage explore
 - 5) Azure access Tier
 - 6)Access Key
- 

Azure SAS Genreator

Azure SAS Generator

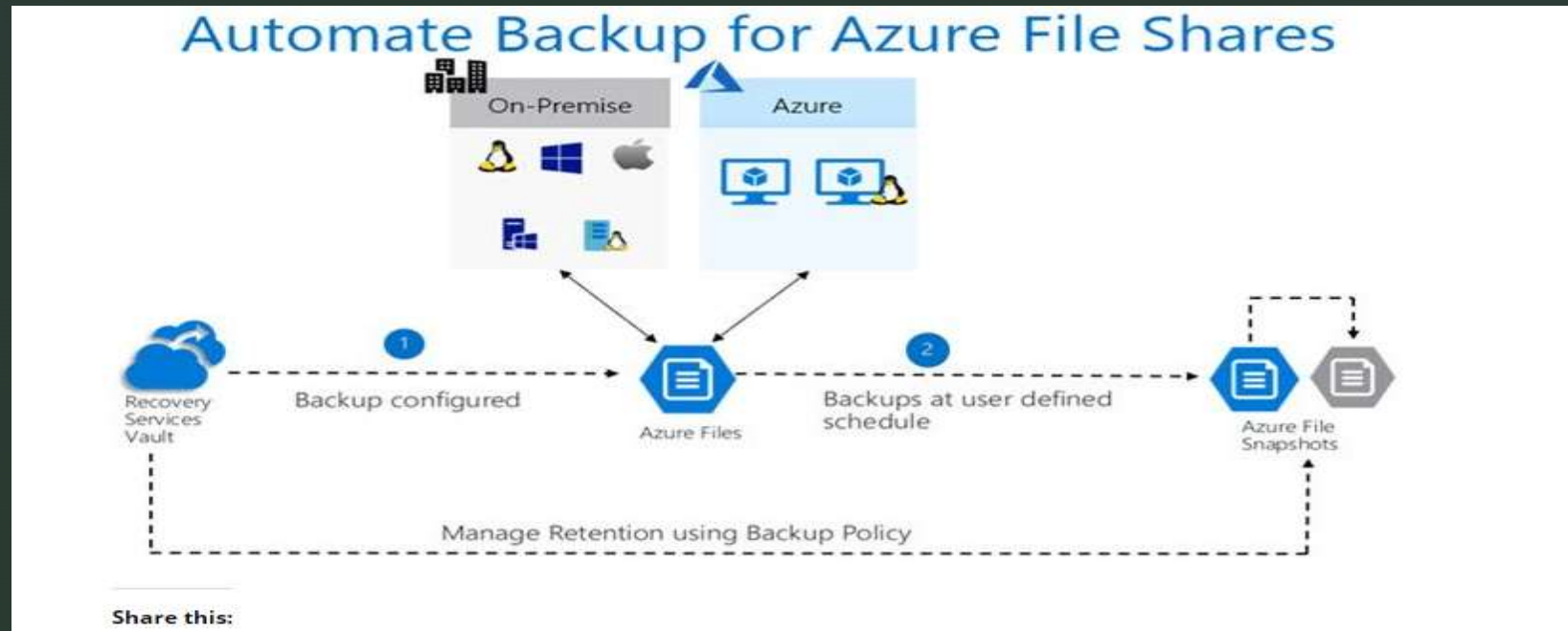
This tool generates Shared Access Signatures (SAS) for Windows Azure storage blob containers, blobs, tables, and queues. These SAS query strings can then be copied to the clipboard so that they can easily be distributed to others granting them secure access to the storage resource. This app does NOT connect to the Internet so you know your storage account information remains secure to you.



SAS DEMO

Demo on File level
Demo On storage level

Azure File share



Azure File share

- **What are the performance requirements for your Azure file share?**

Azure Files offers standard file shares, which are hosted on hard disk-based (HDD-based) hardware, and premium file shares, which are hosted on solid-state disk-based (SSD-based) hardware.

- **What size file share do you need?**

Standard file shares can span up to 100 TiB, however this feature is not enabled by default; if you need a file share that is larger than 5 TiB, you will need to enable the large file share feature for your storage account. Premium file shares can span up to 100 TiB without any special setting, however premium file shares are provisioned, rather than pay as you go like standard file shares. This means that provisioning a file share much larger than what you need will increase the total cost of storage.

- **What are your redundancy requirements for your Azure file share?**

Standard file shares offer locally-redundant (LRS), zone redundant (ZRS), geo-redundant (GRS), or geo-zone-redundant (GZRS) storage, however the large file share feature is only supported on locally redundant and zone redundant file shares. Premium file shares do not support any form of geo-redundancy.

Premium file shares are available with locally redundancy in most regions that offer storage accounts and with zone redundancy in a smaller subset of regions. To find out if premium file shares are currently available in your region, see the [products available by region](#) page for Azure. For information about regions that support ZRS, see [Azure Storage redundancy](#).

Azure File share snapshot

- Azure Files provides the capability to take share snapshots of file shares. Share snapshots capture the share state at that point in time. In this article, we describe what capabilities share snapshots provide and how you can take advantage of them in your custom use case.
- **Protection against application error and data corruption**
- **Protection against accidental deletions or unintended changes**
- **General backup purposes**
- **Limits**
 - The maximum number of share snapshots that Azure Files allows today is 200. After 200 share snapshots, you have to delete older share snapshots in order to create new ones.
 - There is no limit to the simultaneous calls for creating share snapshots. There is no limit to amount of space that share snapshots of a particular file share can consume.
 - Today, it is not possible to mount share snapshots on Linux. This is because the Linux SMB client does not support mounting snapshots like Windows does.



DEMO

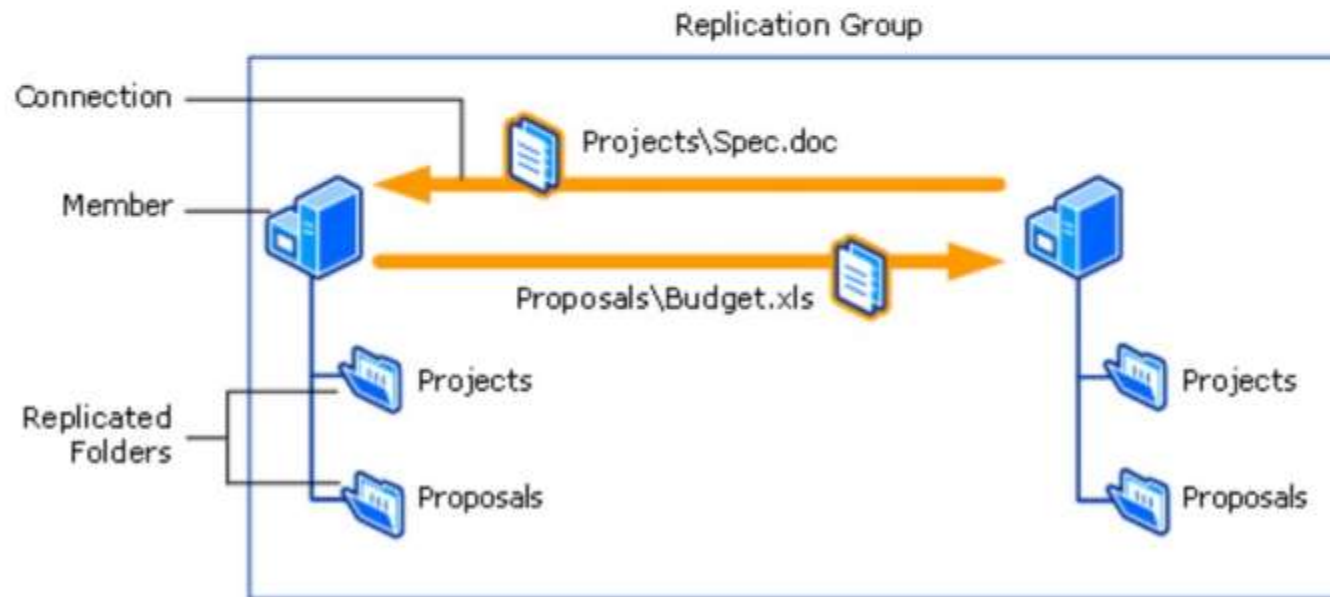
- 1) File Share Creation
- 2) Snapshot

File server architecture

The aim of an open distributed file-sharing system is to provide an environment where a group of geographically distributed users can collaborate to work efficiently on files and be guaranteed that their integrity requirements are enforced. A typical on-premises file server ecosystem that supports a high number of concurrent users and a large number of content items uses Distributed File System Replication (DFSR) for replication scheduling and bandwidth throttling.

DFSR uses a compression algorithm known as Remote Differential Compression (RDC) that can be used to efficiently update files over a limited-bandwidth network. It detects insertions, removals, and rearrangements of data in files. DFSR is enabled to replicate only the changed file blocks when files are updated. There are also file server environments, where daily backups are taken in non-peak timings, which cater to disaster needs. DFSR isn't implemented.

The following diagram illustrates the file server environment with DFSR implemented.



In the previous diagram, multiple file servers called members actively participate in replicating files across a replication group. The contents in the replicated folder are available to all the clients that send requests to either of the members, even if a member goes offline.



Demo

- Recovery Volts

Azure Service EndPoint

- Virtual Network (VNet) service endpoints extend your virtual network private address space. The endpoints also extend the identity of your VNet to the Azure services over a direct connection. Endpoints allow you to secure your critical Azure service resources to only your virtual networks. Traffic from your VNet to the Azure service always remains on the Microsoft Azure backbone network.
- This feature is available for the following Azure services and regions. The *Microsoft.** resource is in parenthesis. Enable this resource from the subnet side while configuring service endpoints for your service:



DEMO

- Azure EndPoint

Data Transfer in azure storage

Transferring data to Azure storage accounts

- › Azure Import/Export service
- › This can be used to securely import large amounts of data to the Azure Blob and Azure File service.
- › Here you can actually store the data that you want to transfer on your own drives. Or you can use disk drives provided by Microsoft.
- › You then ship the drives to an Azure datacenter.
- › The data from the drives are then imported to Azure Blob or Azure File storage.
- › You can also use this service to export data from Azure blobs.

Data Transfer in azure storage

Transferring data to Azure storage accounts

- › Azure Import/Export service – What are the steps involved
- › You need to download the WAImportExport tool to copy data to disk drives. The disk drives need to be encrypted with BitLocker.
- › You then create an import job in Azure. Here you need to associate the job with an Azure storage account. You also need to upload the drive journal files to the job.
- › You also need to mention the return address.
- › Then ship the drives to the Azure data center.

Data Transfer in azure storage

Azure Data Box

- › This is similar to the Azure Import/Export service, but here the device itself sent to you for storing the data is a Microsoft-provided appliance.



Data Box – 100 TB



Data Box Disk – 8 TB



Data Box Heavy - 1 PB

Data Transfer in azure storage

Azure Data Factory

- › This is a cloud service that can be used to perform ETL (Extract-transform-load) , ELT (Extract-load-transform) and data integration projects.
- › In the Azure Data Factory service, you can author various types of activities.
- › Key Components
- › Data set – This is the source of data. It can be an on-premise file server, SQL Database server , Azure SQL Database server. You define a linked service that is used to connect to the data source.
- › You then define the Activity. Examples of activities is ingesting data, cleaning data.



Content Delivery Network

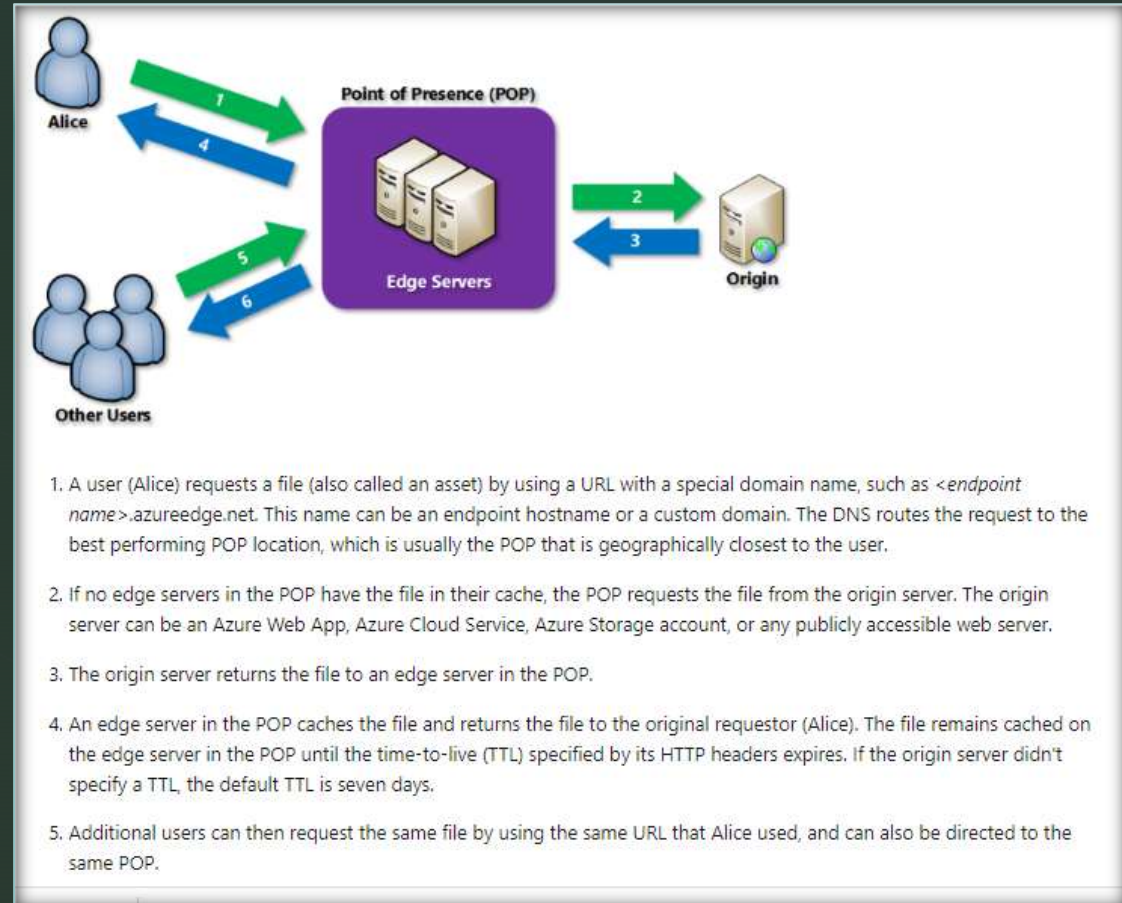
A content delivery network (CDN) is a distributed network of servers that can efficiently deliver web content to users. CDNs store cached content on edge servers in point-of-presence (POP) locations that are close to end users, to minimize latency.

Azure Content Delivery Network (CDN) offers developers a global solution for rapidly delivering high-bandwidth content to users by caching their content at strategically placed physical nodes across the world. Azure CDN can also accelerate dynamic content, which cannot be cached, by leveraging various network optimizations using CDN POPs. For example, route optimization to bypass Border Gateway Protocol (BGP).

The benefits of using Azure CDN to deliver web site assets include:

- Better performance and improved user experience for end users, especially when using applications in which multiple round-trips are required to load content.
- Large scaling to better handle instantaneous high loads, such as the start of a product launch event.
- Distribution of user requests and serving of content directly from edge servers so that less traffic is sent to the origin

Content Delivery Network





END Manage Storage

