

# Data Storage in Azure

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**Storing data in the cloud requires flexible solutions to new and old problems**

**Storage services for specific data types**

**Benefits to Azure data storage solutions**

- Automated backup and recovery
- Replication across the world
- Encryption options
- Security and platform integration
- Development features and support



# Categories of Data

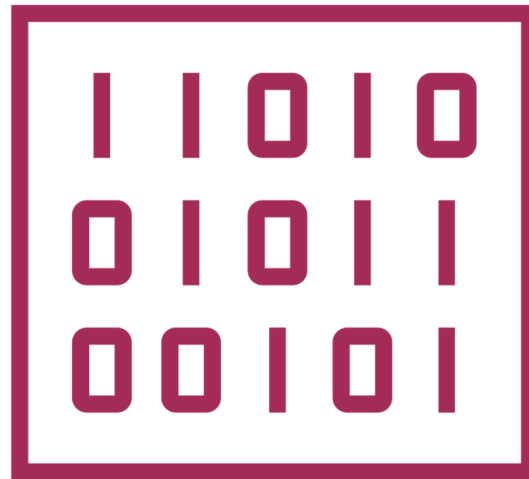


## Structured Data

Azure SQL Database

Azure Database for MySQL

Azure Database for  
PostgreSQL



## Unstructured Data

Azure Blob Storage

Azure File Storage

Azure Disk Storage



## Semi-structured Data

Cosmos DB

# Overview



**Relational database products in Azure**

**Azure Cosmos DB**

**Azure Storage Accounts**

**Azure Blob Storage**

**Transferring data to Azure**



# Managed Relational Database Products in Azure

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SQL Server on  
Virtual Machines

Full control over the SQL Server

Can provision from the Azure Marketplace

Flexible pricing options

Automated updates scheduling

Managed Backup to Microsoft Azure



Azure SQL Database

Fully managed platform-as-a-service

Always running the latest version of SQL Server

Flexible pricing model

- Vcores
- DTU's

Single database or Elastic Pool

Automatic scaling

Service tiers for different workloads



Azure SQL  
Managed Instance

Broadest set of SQL Server capabilities

Benefits of managed platform

Deploy VM onto your own VNET

Lift-and-shift with minimal changes





Azure Database  
for MySQL

Open-source tools and platform compatibility

MySQL Community Edition

Flexible pricing options

High-availability

Dynamic scalability

Encryption

Automated patching and backup





Azure Database  
for PostgreSQL

Supports complex data structures

Geometric data types

Extensions for GIS, etc.

Managed database features

Single server

Hyperscale (Citus)

- Faster response time
- Larger datasets (100GB+)



# Cosmos DB for Semi-structured Data Storage

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Azure Cosmos DB

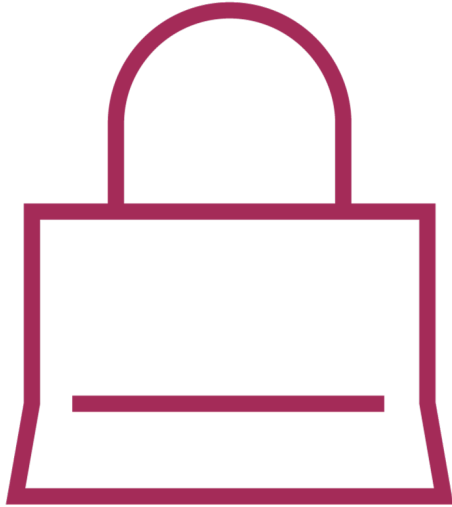
**Globally distributed**

**Multi-modal**

**Fast response times**

**Ability to scale rapidly and globally**

# Cosmos DB Use Cases



## Retail Applications

Attributes can vary  
and change over time

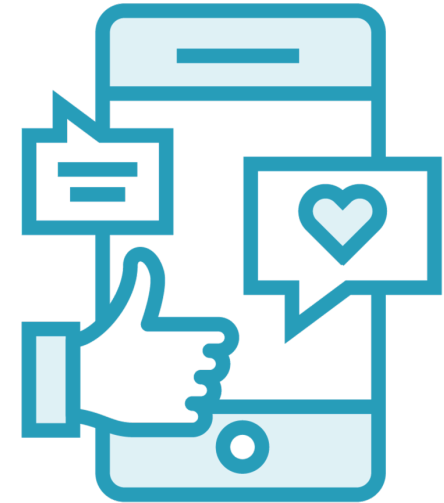
Flexible schema



## Gaming Applications

Millions of  
simultaneous updates

Millisecond reads



## Social Media Applications

Flexible data schemas  
needed for user generated  
content





Azure Cosmos DB

Elastically scale throughput and storage across any number of Azure regions

Add or remove regions easily

Backed by SSD storage

Consistency options to ensure distributed data is updated



# Cosmos DB APIs

SQL API

Cassandra

Mongo DB

Gremlin

Azure Table  
Storage



# Azure Storage Accounts

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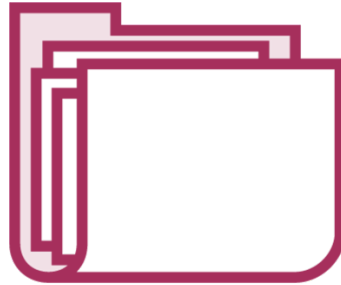




# Azure Storage Services



Blob Storage



File Storage



Disk Storage

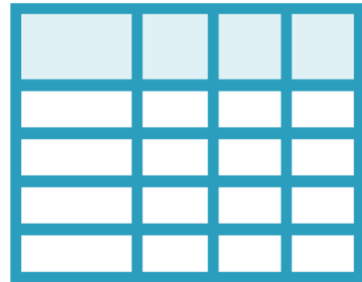
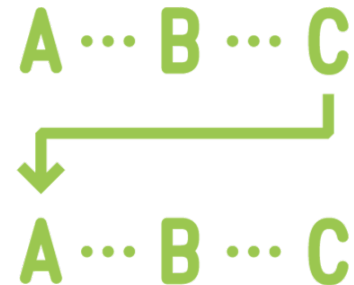


Table Storage

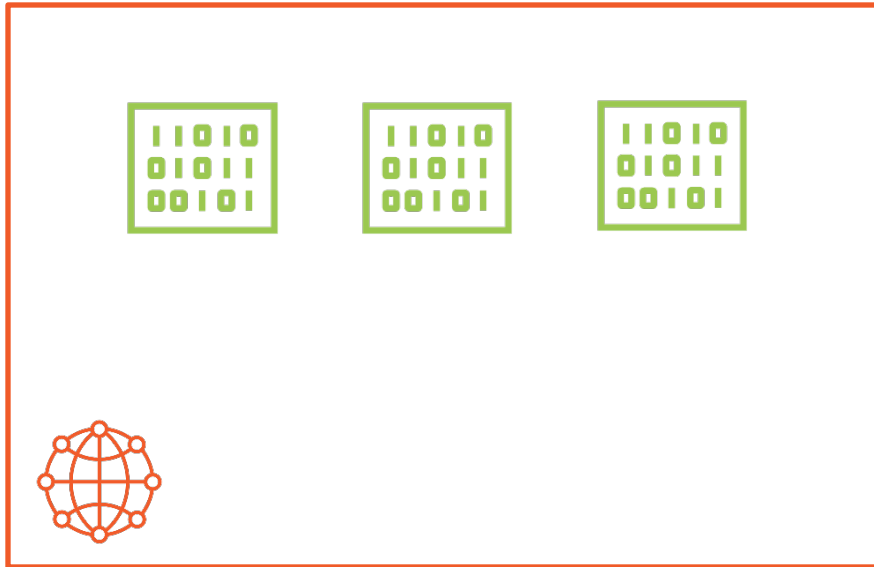


Queue Storage



# Locally Redundant Storage (LRS)

## Region A

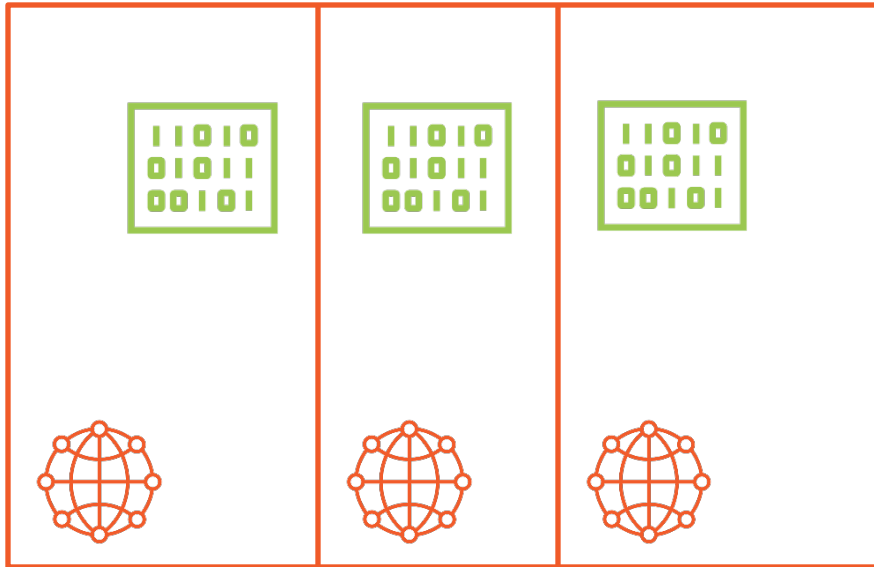


## Region B



# Zone Redundant Storage (ZRS)

Region A



Region B

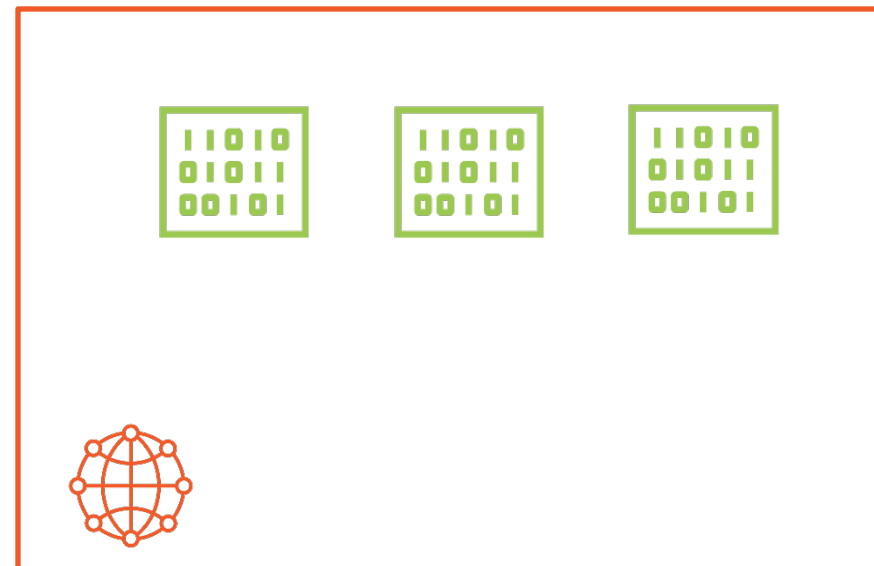


# Geo Redundant Storage (GRS)

## Region A

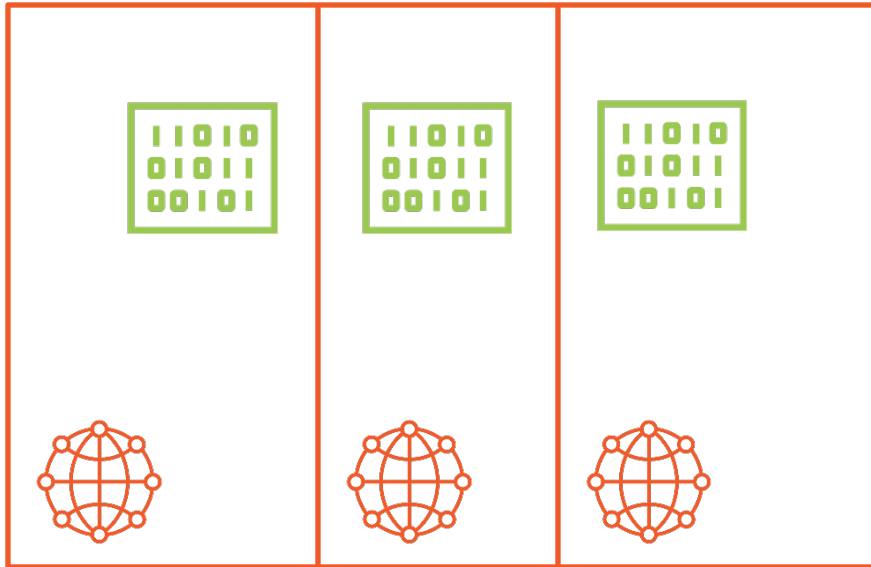


## Region B

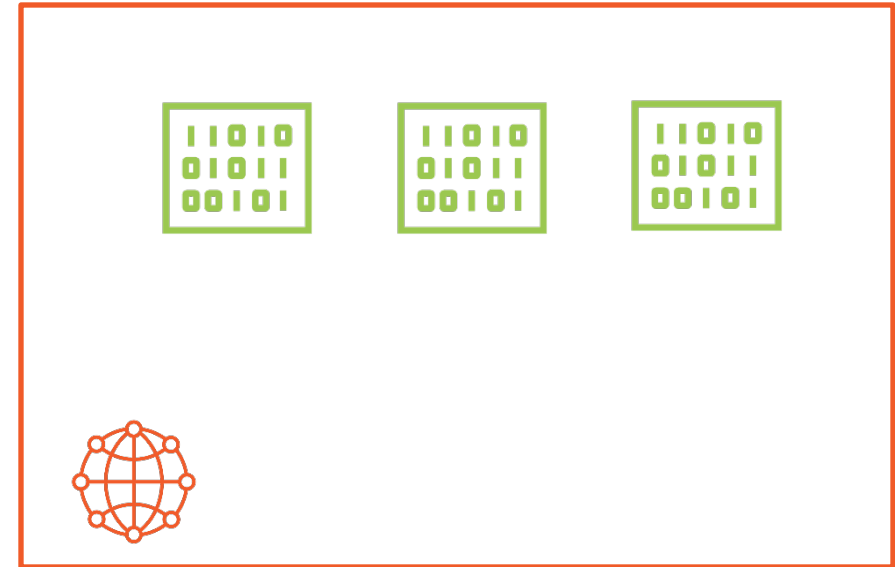


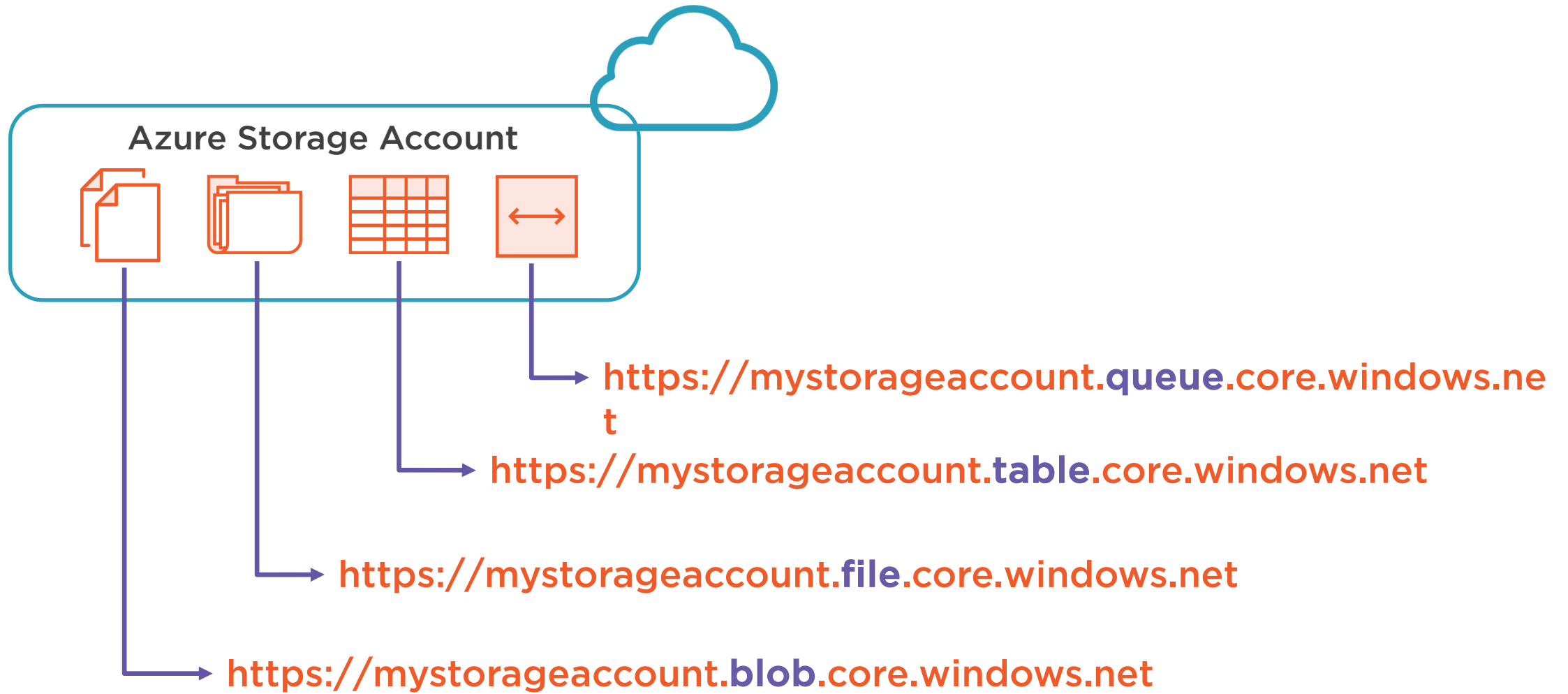
# Geo Zone Redundant Storage (GZRS)

## Region A



## Region B





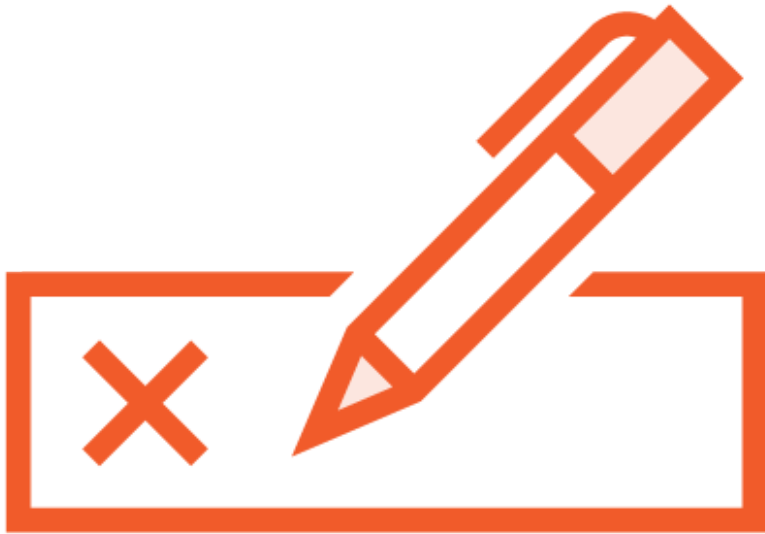
# Authorization to Data

RBAC in Azure AD

Storage Account  
Keys

Shared Access  
Signatures





**Shared Access  
Signature**

## **Security token string**

- “SAS Token”

## **Scope to**

- Storage Account
- Services, i.e. Blob or File
- Individual containers and blobs

## **Start and end validity period**

## **Contains permissions**



# Shared Access Signature example

<https://myaccount.blob.core.windows.net/container1/file1.pdf?sv=2017-07-29&st=2018-04-30T19%3A19%3A19Z&se=2018-05-01T19%3A19%3A19Z&sr=b&sp=rl&sip=168.1.5.60-168.1.5.70&spr=https&sig=pk9oGEPqYyu0K4Gutfreq9n0CJqgnjyYgkEwcIEl8lO%3D>



# Programmatic Access to Storage Accounts

REST APIs

SDKs

PowerShell

Azure CLI

Azure Storage  
Explorer

AzCopy





Azure Files

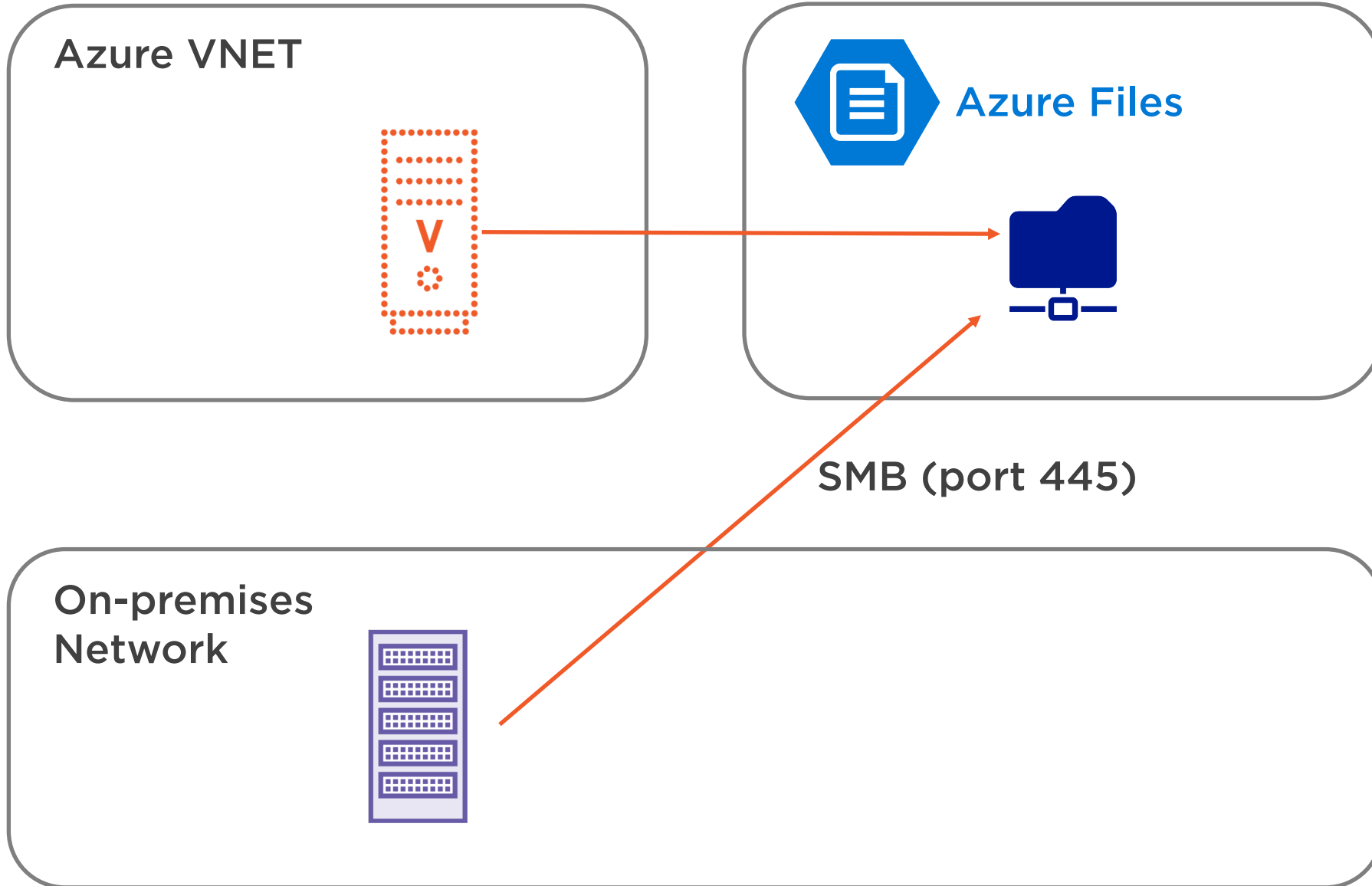
## **Supports the SMB protocol**

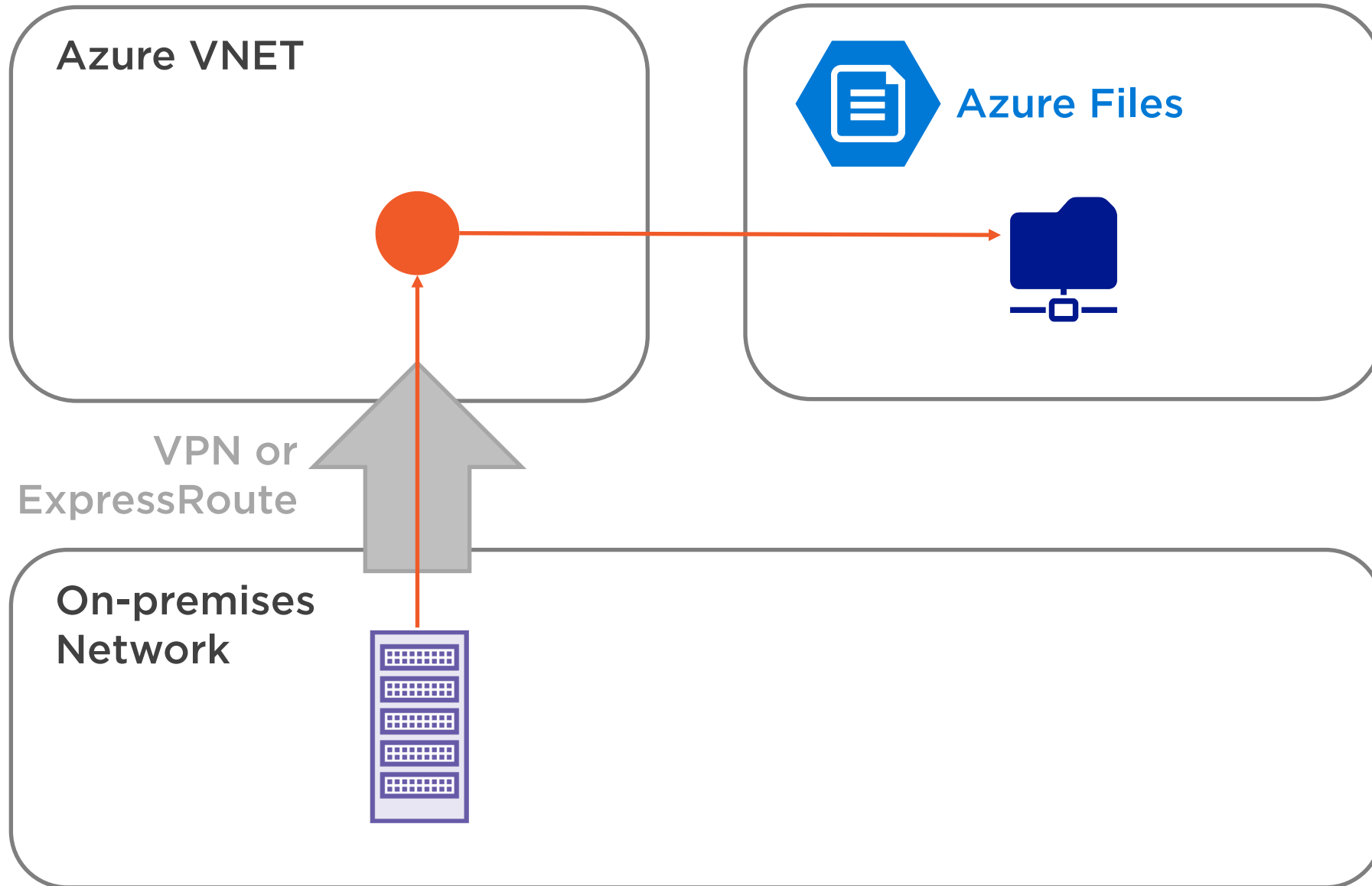
- Attach to multiple VMs
- File share with drive letter

## **Good for migration scenarios**

## **Files accessible through REST interface**

- Mechanisms for restricting access





Azure VNET



Azure Files



On-premises  
Network

Azure File Sync



Sync  
Agent



# Blob:

Acronym for **B**inary **L**arge **O**Bject

# Unstructured data:

Data that doesn't adhere to a particular data model or definition



# Blob Types



## **Block Blob**

Composed of blocks



## **Append Blob**

Can only Append Blocks

Ideal for logs



## **Page Blob**

8TB max blob size

VM disks and databases

Frequent random  
read/write applications





# Cost Factors



# Blob Access Tiers



Hot Tier

Highest storage cost  
Lowest data access  
cost



Cool Tier

Lower storage cost  
Higher data access  
cost



Archive Tier

Lowest storage cost  
Highest data retrieval  
cost  
Data is offline



# Blob Service Features

**Blob Snapshots**

**Blob Leases**

**Soft Delete**

**Static Website  
Hosting**

**CDN Integration**

**Azure Search  
Integration**



# Data Transfer Options

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**Azure Database  
Migration Service  
(DMS)**

**Managed Service to migrate database data  
to Azure data platforms**

- On-premises databases
- Azure databases
- Amazon Web Services

Microsoft Azure



Azure SQL  
Database



On-premises

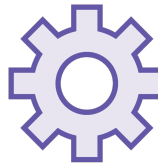


Microsoft Azure



Azure SQL  
Database

On-premises





Azure Database  
Migration Service  
(DMS)

Create target database in Azure

Assess source database for compatibility

Create instance of Azure DMS

Configure source and target databases

Migrate data

Switchover production applications



# Data Transfer Considerations



Amount of data to transfer



Frequency of data transfer



Available network bandwidth



# Online Data Transfer Options

Azure Storage  
Explorer

Azure Portal

AzCopy

PowerShell /  
Azure CLI

Storage Client  
Libraries

Azure Data  
Factory



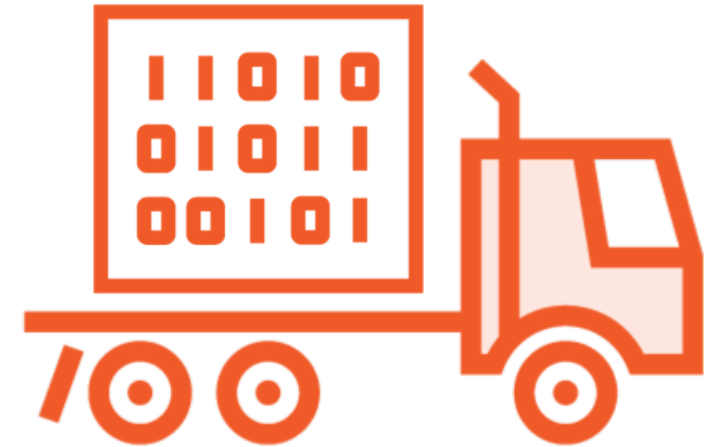
# Azure Data Box



**Data Box Disk**  
Solid State Disks  
35TB per order  
USB 3.0 connection



**Data Box**  
Device on network  
80TB capacity  
RJ45 or SFP+ 10GbE



**Data Box Heavy**  
1PB Capacity  
40GbE connection



Import / Export  
Service

Ship your own disks

For Azure Blob or File Service

Can use for exporting data from Azure also

Prepare drives with encryption software



# Data Centre Solutions

**Azure Data  
Box Gateway**

**Azure File  
Sync**

**Azure Data  
Box Edge**



# Module Summary



Up Next:

Exploring Azure Platform Solutions

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