Designing for Storage High Availability

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Overview

Understand Azure storage replication

- Replication options
- Design your replication topology

Storage account types

- Different features
- Pricing model

Demo: Creating a storage account

Overview

Virtual machine managed disks

How to protect managed disks

- Snapshots
- Backups

Azure site recovery service

- In case of disaster recovery

Storage high availability SQL

- Geo-replication

Understanding Azure Storage Replication

Azure storage

- SQL database
- Virtual machine scale set

Storage accounts

- Blobs
- Queues
- Files
- Tables
- Disks

Storage account types

- Different features
- Different pricing models

General-purpose v1 and v2

- V1 = legacy account
- V2 should be used

Types of objects

- Blobs, files, queues, tables

FileStorage accounts

- Files-only storage

BlobStorage accounts

- Blob-only storage

Performance options

- Standard
- Premium

Performance Options

Standard

Lowest cost
Used for archiving

Premium

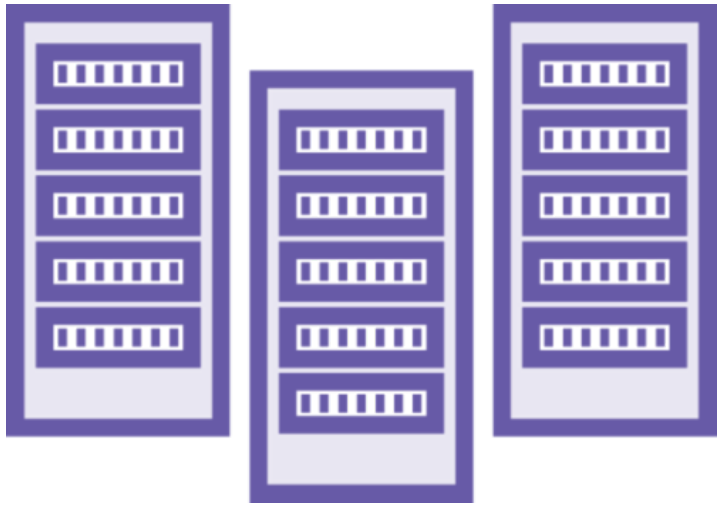
Best performance
Azure SQL database

How replication works

Azure keeps multiple copies

- Planned and unplanned scenarios
- Hardware failure

Provides for data redundancy



Locally-redundant storage - LRS

Single physical location in primary region

Three copies of data are kept

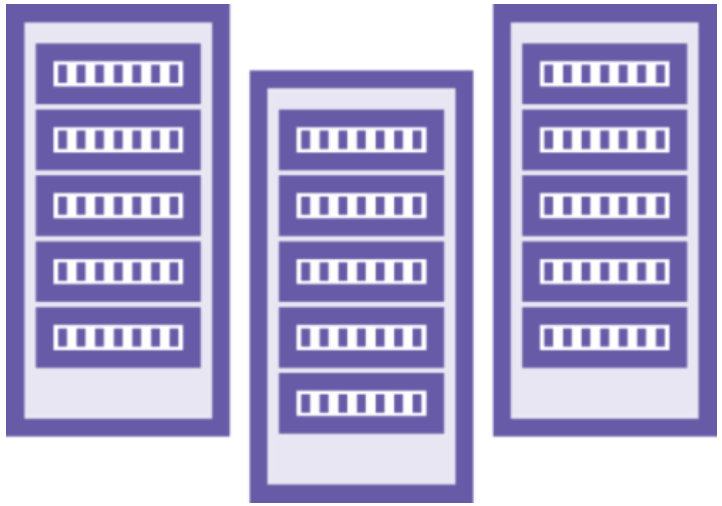
Can be affected

- Hardware failure
- Natural disaster

No guarantee data will be recoverable

Provides at least 11 nines availability

- 99.999999999%



Zone-redundant storage - ZRS

Data replicated to 3 availability zones

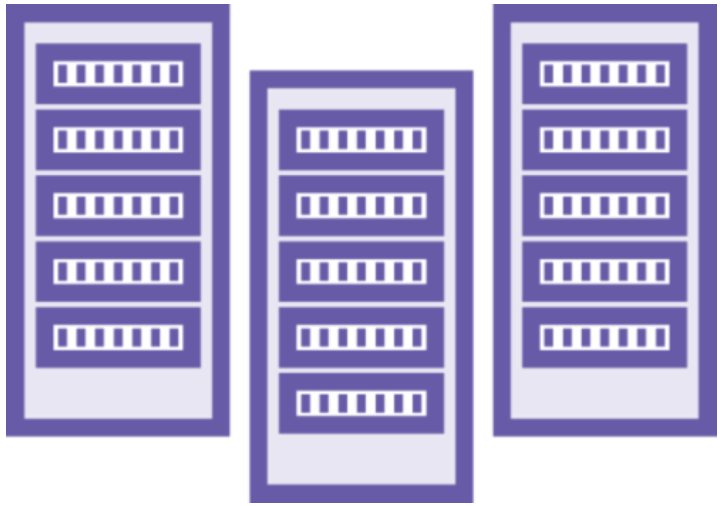
- Within a primary region
- Resides in different physical locations

In case of failure

- Azure will update DNS entries
- Write and read operations

Provides at least 12 nines availability

- 99.9999999999%



Geo-redundant storage - GRS

Geo-zone-redundant storage - GZRS

Geo-redundant storage - GRS

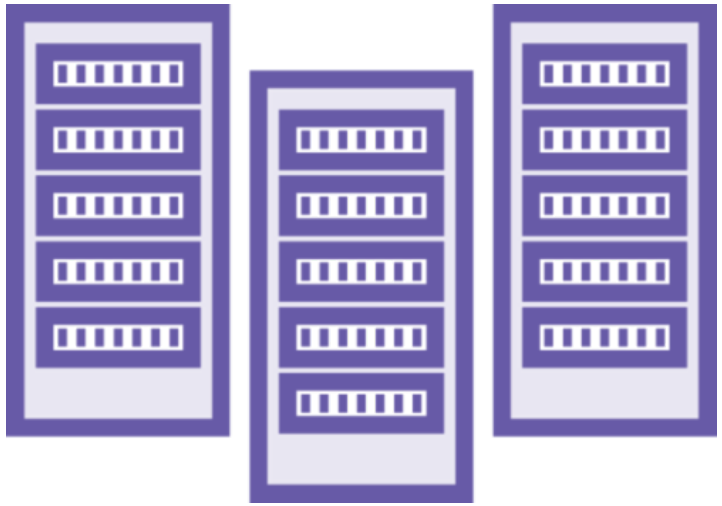
- Locally-redundant storage is used
- 3 copies in a single physical location
- Within the primary region

Asynchronous replication

- To a single physical location
- Within the secondary region

Provides at least 16 nines availability

- 99.9999999999999%



Geo-zone-redundant storage - GZRS

Synchronous replication

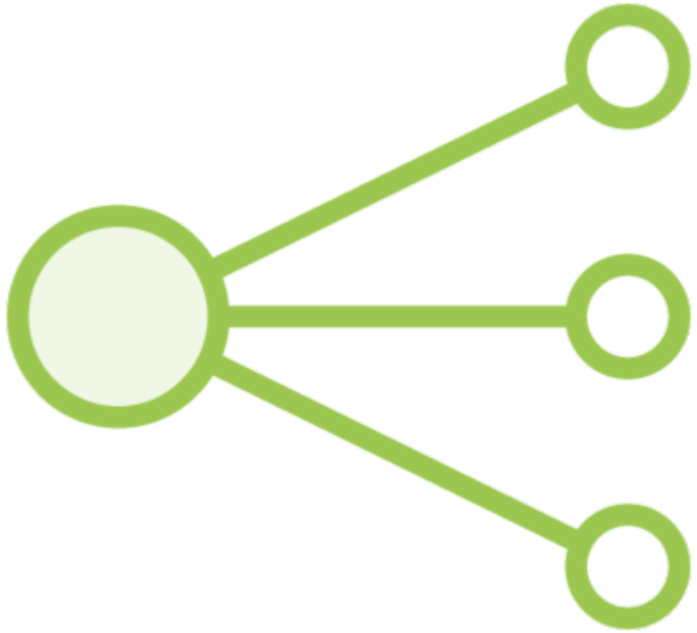
- Across 3 availability zones
- Within the primary region

Asynchronous replication

- To another single physical location
- Within the secondary region

Provides at least 16 nines availability

- 99.9999999999999%



Asynchronous replication

- Can cause loss of data

Recovery point objective - RPO

- Set to be under 15 minutes

Enabling read access to secondary region

- Without initiating a failover

Read-access geo-redundant storage

- RA-GRS

Read-access geo-zone-redundant storage

- RA-GZRS

Virtual Machine Managed Disks

Azure deployments

- Virtual machine scale set
- SQL database
- Azure virtual machine

Virtual machine high availability

- Managed disks
  - Disk size
  - Disk type

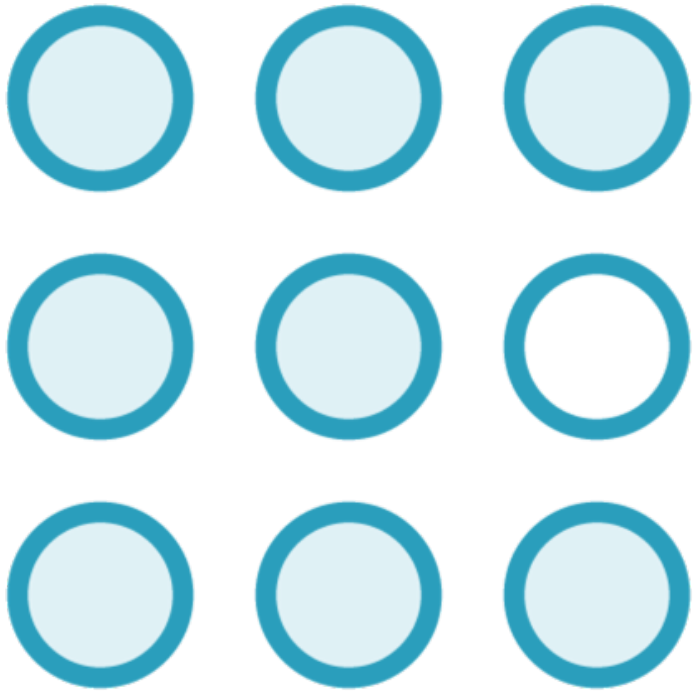
Azure Managed Disk Types

Ultra disks
Check for availability
Designed for heavy workloads

Standard SSD
Typical use:
Web servers - DEV

Premium SSD
Production environment
Performance

Standard HDD
No frequent access
Archiving



High availability by design

- Three replicas
- Infrastructure managed by Microsoft
- 5 nines SLA = 99.999%

50 000 virtual machine disks

- Within a subscription per region

Using an availability set

- Replicas are isolated from one another
- Different storage scale units
- Azure virtual machine

In case of outage

- Data is still accessible
  - Storage scale units

Virtual Machine Snapshots and Backups

High availability with managed disks

- Snapshot
- Backup

Disaster recovery scenario

- Revert to a previous state

Virtual disk snapshot

- Copy of a disk attached to a VM
  - Operating system disk
  - Any data disk

Managed Disks Snapshots

Full

Read-only copy of the virtual disk

Incremental

Based on the differences with previous snapshot

Virtual machine backups

- Keep data persistent
- Backup policy

Azure backup service

- Recovery point
- Snapshot of the managed disks

Recovery services vault

- Stores recovery points

Azure site recovery service

- Disaster recovery
- High availability

Workload replication

- From primary to secondary site
- Data still accessible during outage

Benefits

- Physical server replication to Azure
- Different platforms
- Different operating systems

Azure Site Recovery Service

Ability to test failovers in disaster recovery scenarios

No disruption to production or replication

Summary

Storage account types

- Azure SQL database
- Azure virtual machine
- Storage is a key component

Storage performance

- Standard
- Premium

Summary

How Azure replication works

- Multiple copies are kept
- Planned and unplanned maintenance

Azure storage replication

- Locally-redundant storage
- Zone-redundant storage
- Geo-redundant storage
- Geo-zone-redundant storage

Summary

Virtual machine managed disks

- Multiple copies are kept

Persistence and disaster recovery

- Managed disks snapshots
- Virtual machines backups

Azure SQL geo-replication

- High availability for databases