

Designing for High Availability on Microsoft Azure

DESIGNING FOR AZURE HIGH AVAILABILITY



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Overview



Designing high availability

- Azure autoscale
- Horizontal and vertical scaling

Storage high availability

- Replication options

Network redundancy

Application redundancy

- Azure SQL database
- Azure app service



Overview



Azure global infrastructure

- Provides highly available applications
- Regions
- Paired regions

Availability sets

Availability zones

Fault domains and update domains

HA support for Azure key services



Understanding the Azure Global Infrastructure





Paired regions

- Within the same geographical location
- Regional pair

Planned maintenance

- Regions updated one after the other
 - Applications are still accessible

Disaster recovery

- Recovery of at least one region by pair

Examples of Azure Regional Pairs

Regional pair A
Canada Central

Regional pair B
Canada East

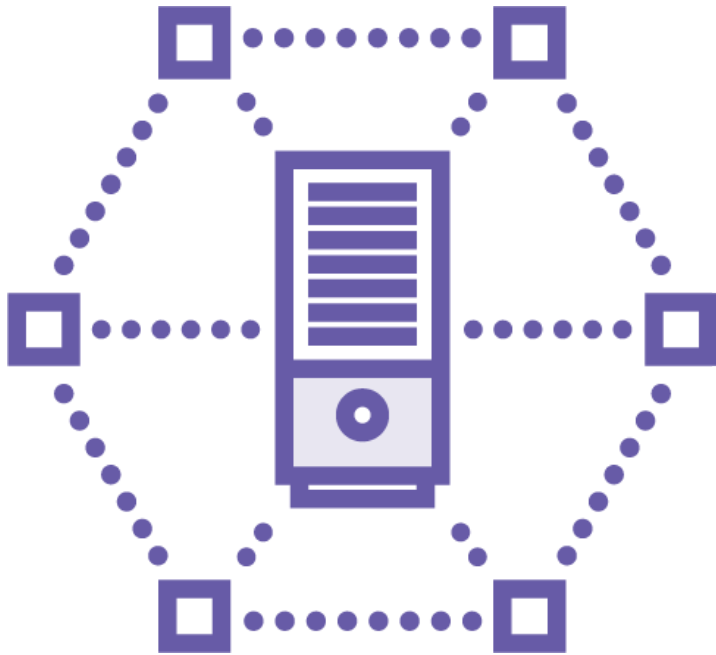
East US paired with West US

**East US 2 paired with Central
US**



Availability Sets and Availability Zones



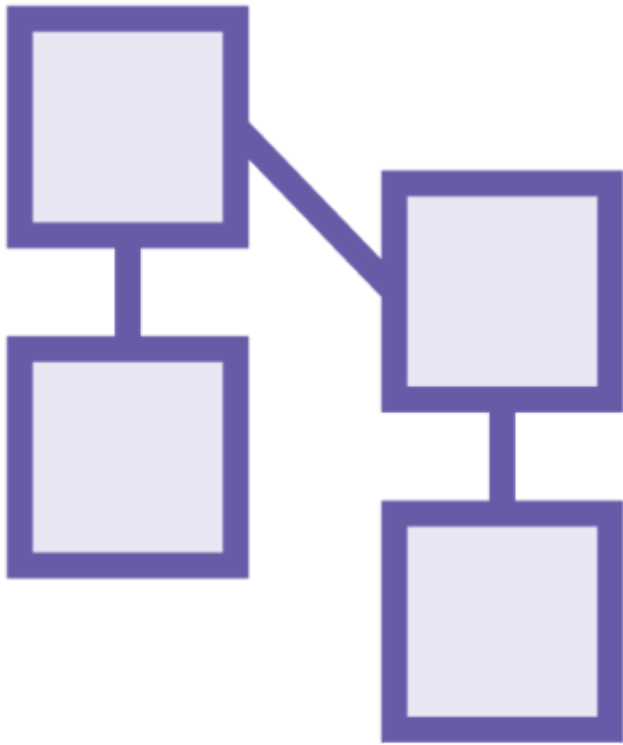


Availability set

- HA within a physical datacenter
- Within a single region

Virtual machine isolation in a logical group

- Multiple physical servers
 - Storage
 - Network infrastructure
 - Power supply units



Update and fault domains

Update domains

- VMs can be rebooted at the same time
- Planned and unplanned maintenance

Fault domains

- Shared resources
 - Power source
 - Networking
 - Storage

Azure Availability Zones

Unique physical locations within an Azure region

Consist of one or more independent datacenters

Service level agreement (SLA) of 99.99%



Fault Domains and Update Domains

VM1

**Fault domain 0
Update domain 0**

VM2

**Fault domain 1
Update domain 1**



Availability Zones Types

Zonal services

Resources deployed within a specific zone

Zone-redundant

Resources replicated to other zones



High Availability and Azure Key Services



High Availability and Azure Key Services

**Azure virtual
machines:**

**Linux
Windows**

**Virtual machine
scales sets:**

**Elastic group of
VMs**

**Azure Kubernetes
(AKS)**

**Azure App Service
environments**



High Availability and Azure Key Services

Azure Active Directory Domain Services

Azure AD DS

Managed disks

Zone-redundant storage



High Availability and Azure Key Services

**Standard load
balancer**

**Standard IP
address**

**ExpressRoute
gateway**

VPN gateway

**Azure SQL
database**

Azure Cosmos DB



Summary



Azure global infrastructure

- Regions in different countries
- Regional pairs

Azure availability sets

- Isolated virtual machines
- Distributed across multiple servers
- Within a single region

Fault domains – update domains

- Planned and unplanned maintenance



Summary



Azure availability zones

- One or more data centers
- Independent resources
 - Networking
 - Power source

Availability zones and key services

- Azure virtual machines
- Managed disks
- Azure SQL database
- Azure Cosmos DB

