Thwarting Disaster for SQL Server on Azure VM

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MVP – Data Platform

Friend of Redgate

Denny Cherry & Associates

Certified IT professionals to help achieve IT goals

Clients ranging from small business to Fortune 10 corporations

Help save on costs while improving IT reliability and solving challenges

My Slides & Demos

https://bit.ly/mypresentationfiles

Agenda

Defining a Disaster

Levels of DR Solutions

Automated Database Backups

Azure Backup for Disks

Azure Backup for SQL

Azure Backup for VMs

Demos

Q&A

Slides & Demos
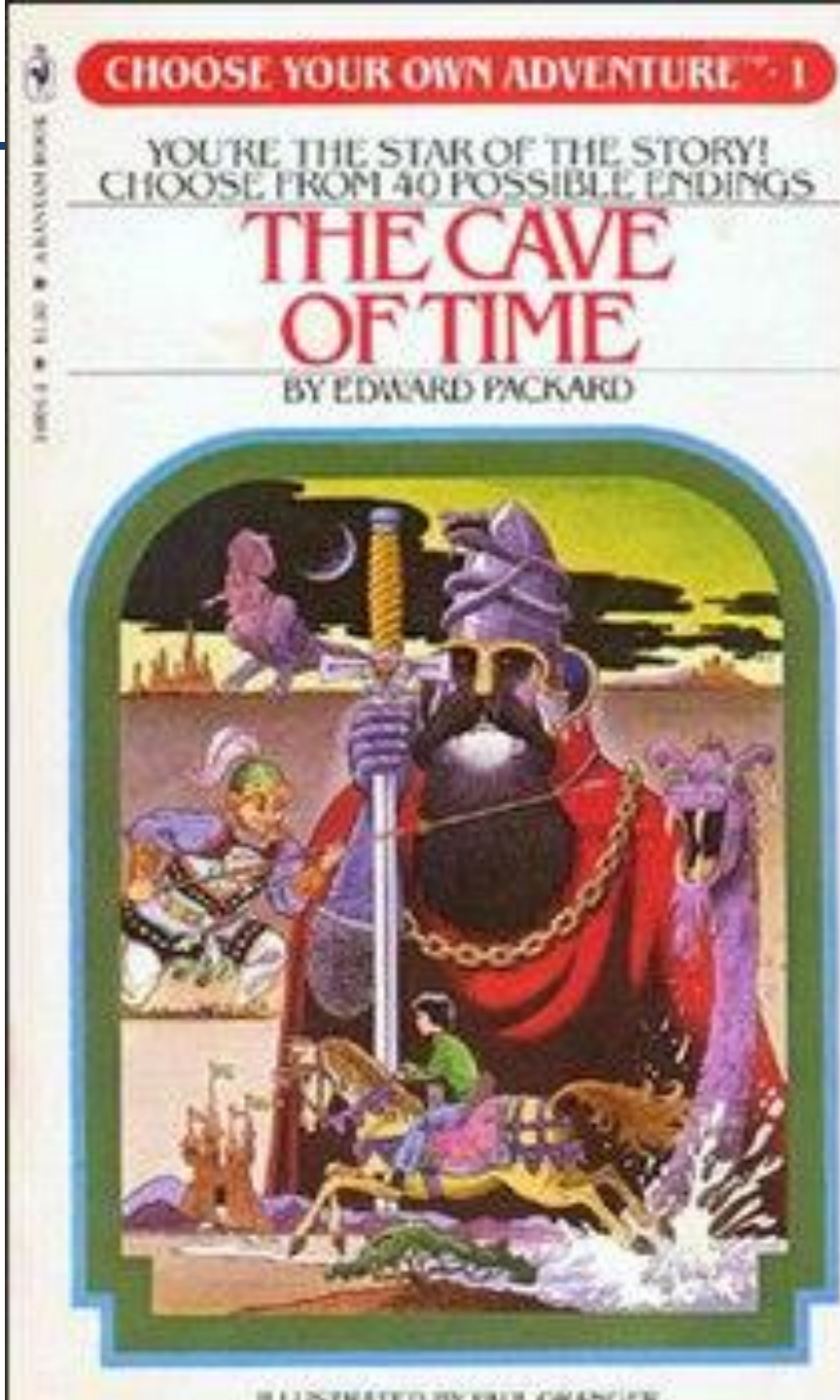
Disasters - What is thy name

Choose Your Azure Outage

Power Surge

Snow in the data center

Fiber Cable Cut

Thunderstorms

Disasters

What are they?

When do you act on DR?

What is your recovery process?

What is your RPO?

What is your RTO?

Disaster Recovery Levels

Level 0: What's RPO/RTO?

Level 1: We have RPO/RTO defined, but nothing in place. We're in trouble.

Level 2: We have SOMETHING in place, but its outside RPO/RTO values.

Level 3: We have a defined response, but it's barely inside RPO/RTO values.

Level 4: We have a defined response, and it exceeds defined RPO/RTO values.
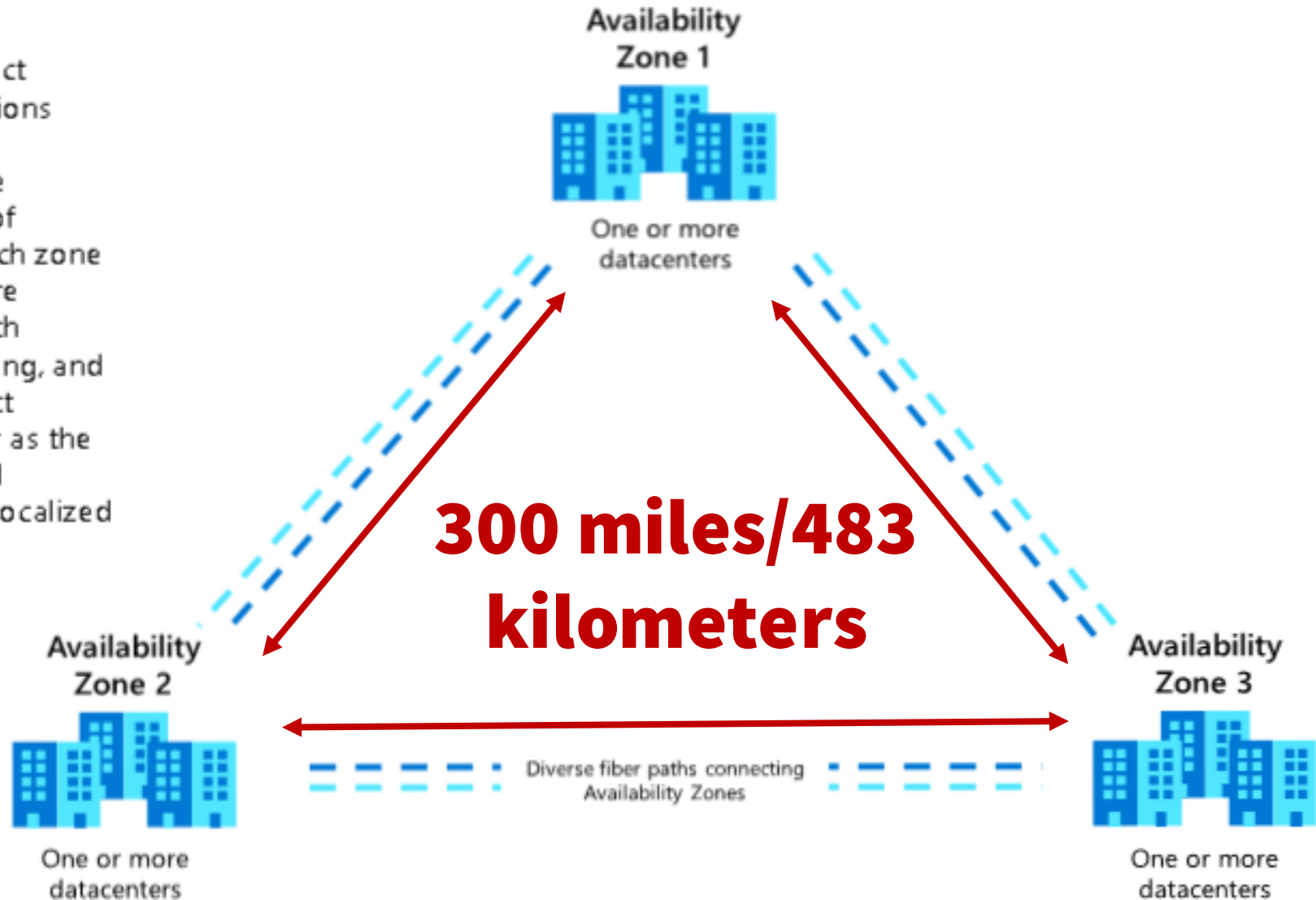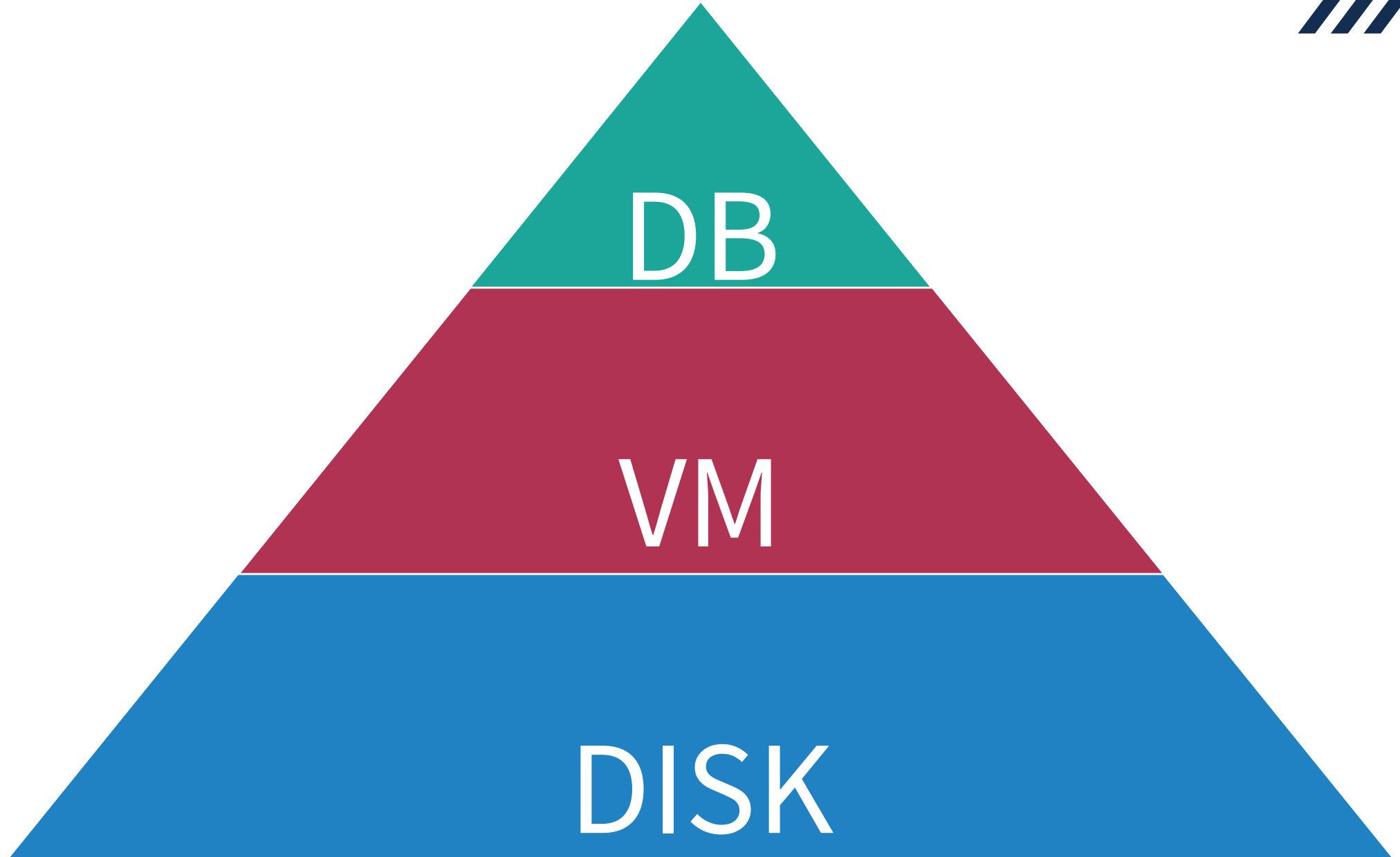
Disaster Recovery data should reside outside a radius of 150 miles (241 kilometers) or more from the primary data center

Azure Region

Composed of three distinct physical and logical locations within an Azure Region, Availability Zones provide synchronous replication of applications and data. Each zone is made up of one or more datacenters equipped with independent power, cooling, and networking. This construct eliminates the datacenter as the single point of failure and reduces the exposure to localized failure events.

Availability Zone 1

One or more datacenters

Availability Zone 2

One or more datacenters

Availability Zone 3

One or more datacenters

300 miles/483 kilometers

Diverse fiber paths connecting Availability Zones

The following solutions get confusing and change rapidly.

You have been warned

Automated Backup

Managed in the SQL Server Configuration blade in the portal

Superset for Managed Backup

Uses a customer managed storage account

Backups can be encrypted

Backups are retained for 90 days

Automated Backups

Restores are performed manually via TSQL

SQL Server 2016 or higher -

     System database backups

     Manual backup schedules & time options

     Defined full & transaction log backup frequency

Portal Blade Look

azsqlvm-bkup01 | Backups
SQL virtual machine

🔍 Search «

⚙ Feedback

Overview
Access control (IAM)
Tags
Diagnose and solve problems

Settings
Configure
Storage Configuration
Updates
Backups
High Availability
SQL best practices assessment
Properties

Automated backup
Configure backups for databases in your virtual machine. All your SQL Server databases in this virtual machine will be backed up automatically per the settings you choose. If you decide to change settings via SQL Server Managed Backup in the future, the new settings will override the Automated Backup settings.

| Automated backup | Disable **Enable** |

| Retention period (days) | 30 |

Storage account *	**sqlbits2024sqlbackups / sqlbackups (Standard_RAGRS)**
	https://sqlbits2024sqlbackups.blob.core.windows.net/
	Select storage account

| Encryption | **Disable** Enable |

| Backup system databases ⓘ | Disable **Enable** |

| Configure backup schedule | **Automated** Manual |

Automatically take full and log backups based on log growth

Azure Backup for SQL

Utilizes a Recovery Services Vault

Provides single pane of glass for management across multiple VMs running SQL Server
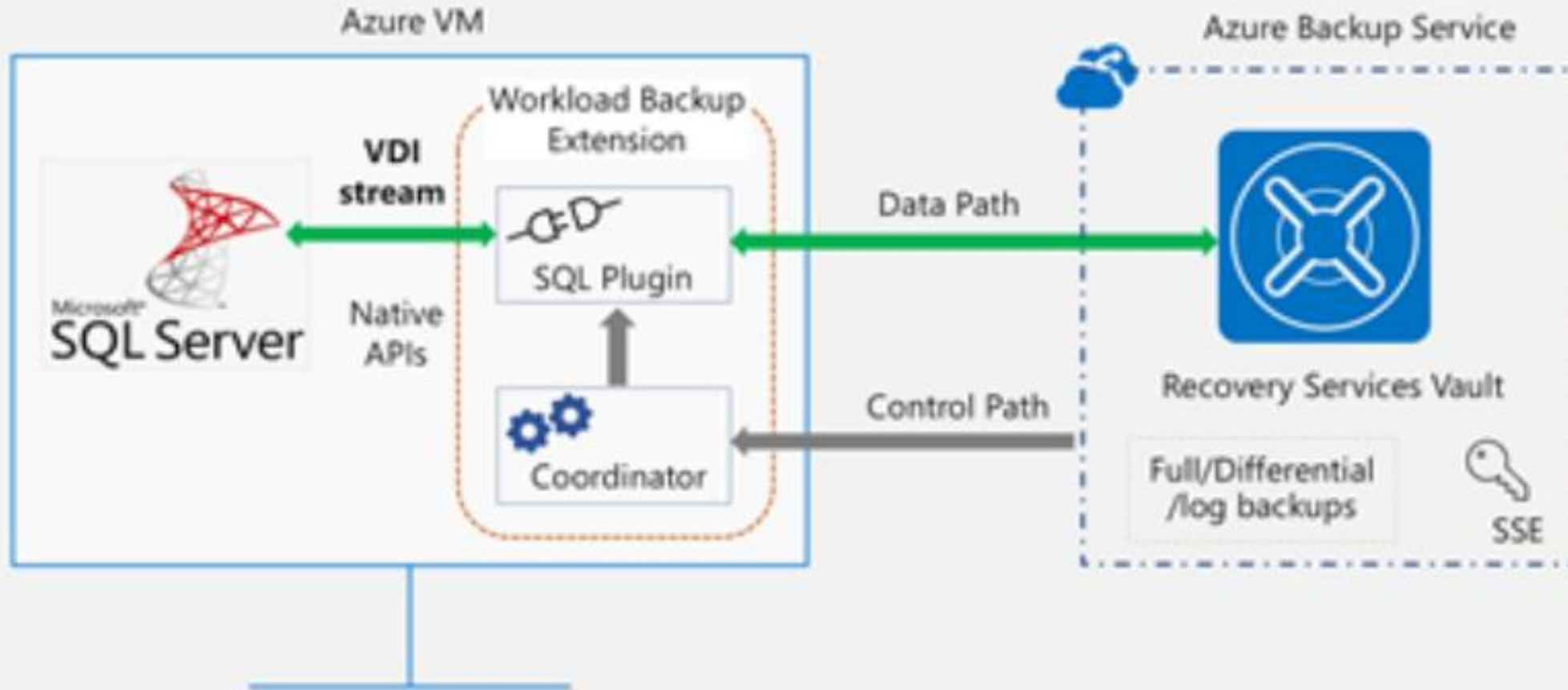
Restores are managed from the portal

Features

RPO is limited to 15-minutes minimum

Honors Availability Group backup preferences

Able to define custom policies

Azure Backup for SQL Server

Settings

Specify the vault

Specify the policy

Policies

Policy name ⓘ

JohnsTest ✓

Full backup

Backup frequency
Weekly on Sunday at 7:30 PM Eastern Standard Time

Retention of weekly backup point
Retain backup taken every week on Sunday at 7:30 PM for 104 Week(s)

Retention of monthly backup point
Retain backup taken every month on First Sunday at 7:30 PM for 60 Month(s)

Retention of yearly backup point
Retain backup taken every year in January on First Sunday at 7:30 PM for 10 Year(s)

Differential Backup

Backup frequency
Weekly on Monday, Tuesday, Wednesday, Thursday, Friday, Saturday at 2:00 AM Eastern Standard Time

Retained for
30 days

Log Backup

Backup frequency
Every 15 minutes

Retained for
15 days

ℹ Log backup for DBs in simple recovery model will be skipped.

Crash Consistent

Synonymous to pulling the power plug on the VM

Contains on-disk data

Anything in memory is not included

Taken every 5 minutes

Application Consistent

Both on-disk data and memory data is included

Utilizes the Volume Shadow Copy Service (VSS)

Takes longer to generate the snapshot

Potentially affects performance

Frozen I/O

Can cause issues with heavy workloads

Monitor accordingly

	2/24/2024 1:45:36 PM	spid62	Database 'model' originally suspended for snapshot backup in session 62 successfully resumed in session 62.
	2/24/2024 1:45:36 PM	spid60	I/O was resumed on database master. No user action is required.
	2/24/2024 1:45:36 PM	spid63	I/O was resumed on database msdb. No user action is required.
	2/24/2024 1:45:36 PM	spid62	I/O was resumed on database model. No user action is required.
	2/24/2024 1:45:35 PM	spid60	I/O is frozen on database master. No user action is required. However, if I/O is not resumed promptly, you could cancel the backup.
	2/24/2024 1:45:35 PM	spid63	I/O is frozen on database msdb. No user action is required. However, if I/O is not resumed promptly, you could cancel the backup.
	2/24/2024 1:45:35 PM	spid62	I/O is frozen on database model. No user action is required. However, if I/O is not resumed promptly, you could cancel the backup.

Azure Backup for Disks

Backup vault must be in the same region

Must assign a policy before assigning the disk

Create a backup from the Vault, not the disk

Utilizes incremental backups

500 snapshot limit

Azure Backup for Disks

Ad-hoc backups are not pushed to the Backup vault

Ultra/Premium V2 disks - backup schedule
with *Hourly* frequency of only 12 hours
and *Daily* frequency.

Everything else, backup schedule with *Hourly* frequency
(of 1, 2, 4, 6, 8, or 12 hours) and *Daily* frequency.

Limits

Setting	Maximum limit
Max Backup Policies per Backup Vault	5000
Backup Instances per Backup Vault	5000
Daily On-demand backups per backup instance	10
Restores allowed in a day per backup instance	10

Azure Backup for VMs

Provides backup at the VMs level

Requires recovery services vault

Allows for individual disk protection

Utilizes application consistent snapshots

Does not require the VM to be shut down

Pricing

Pricing based on VM size

Size of each instance	Azure Backup price per month
Instance < or = 50 GB	$5 + storage consumed
Instance is > 50 GB but < or = 500 GB	$10 + storage consumed
Instance is > 500 GB	$10 for each 500 GB increment + storage consumed

Policies

Defined policies for flexibility

Create your own policy to match
organizational requirements

○ Enhanced

  ✓ Multiple backups per day

  ✓ Up to 30 days operational tier retention

  ✓ Support for Trusted Launch Azure VM

  ✓ Support for VMs with Ultra Disks and
    Premium SSD v2

○ Standard

  ✓ Once-a-day backup

  ✓ Up to 5 days operational tier retention

Azure Site Recovery

Azure Site Recovery
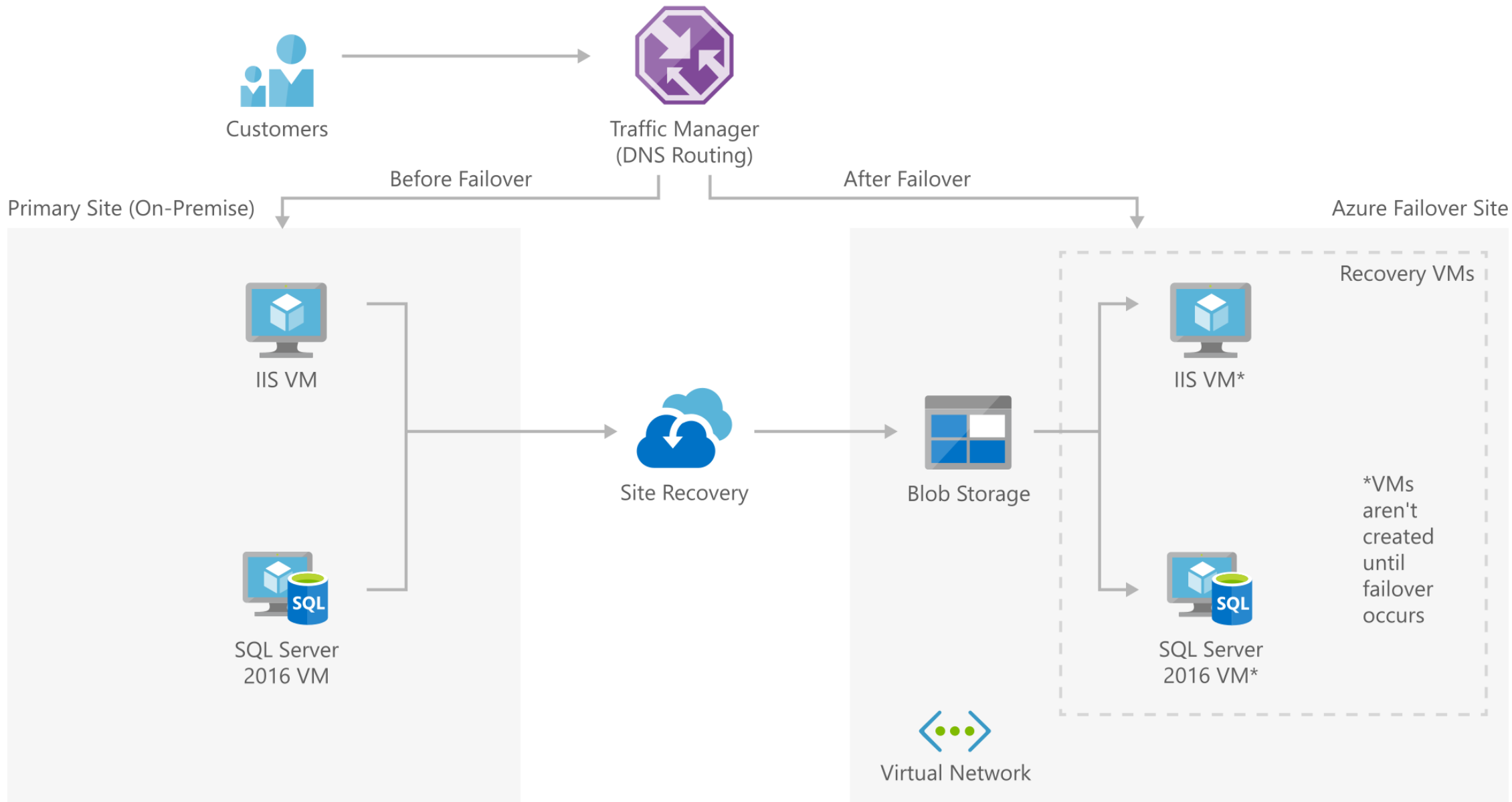
$25 + storage costs per instance

Requires storage account

Need to consider additional components like domain controllers & network topology

Allows for non-destructive test failovers

High-churn availability ⟶ **WARNING**

Plan Accordingly

Target settings

General settings	Source	Target	Info
Subscription	*Microsoft Azure Sponsorship (*	Microsoft Azure Sponsorship (af11... ⌄	
VM resource group	*SQLBIts2024*	(new) SQLBIts2024-asr-1 ⌄	
Virtual network	*az-vnet-sqlbits2024*	(new) az-vnet-sqlbits2024-asr ⌄	
Availability	*Single instance*	[Single instance] Availability set Availability zone	
		Not Applicable ⌄	
Proximity placeme...	*Not Applicable*	Select ⌄	

Blade Level Control

Create a virtual machine ...

Login with Azure AD ⓘ ☐

⚠ This image does not support Login with Azure AD.

Auto-shutdown

Enable auto-shutdown ⓘ ☐

Site Recovery

Enable Disaster Recovery ⓘ ☑

Secondary region * ⓘ | (US) East US ⌄

Secondary subscription ⓘ | Microsoft Azure Sponsorship (af11b486-3e53-4077-b62e-f08f0e83ff65) ⌄

Recovery Services vault * ⓘ | SQLBackups ⌄
Create new

Site Recovery policy * ⓘ | (new) 24-hour-retention-policy ⌄
Create new

Availability options ⓘ | No infrastructure redundancy required ⌄

Update settings | Allow ASR to manage ⌄

Automation account * | (new) SQLBackup-gci-asr-automationaccount ⌄

Free DR License

If you have software assurance…

Summary

Level up beyond Level 0

Multiple options are available

Not exhaustive list, scripting can be your friend

Something is better than nothing

Test thoroughly

Questions?
Answers!

Please provide feedback!

Feedback