# Migrate SQL Server to Azure MI Without Getting a Migraine

# HELLO!

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10+ years DBA experience
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MBA IT Management
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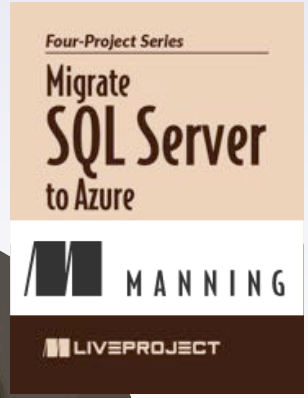



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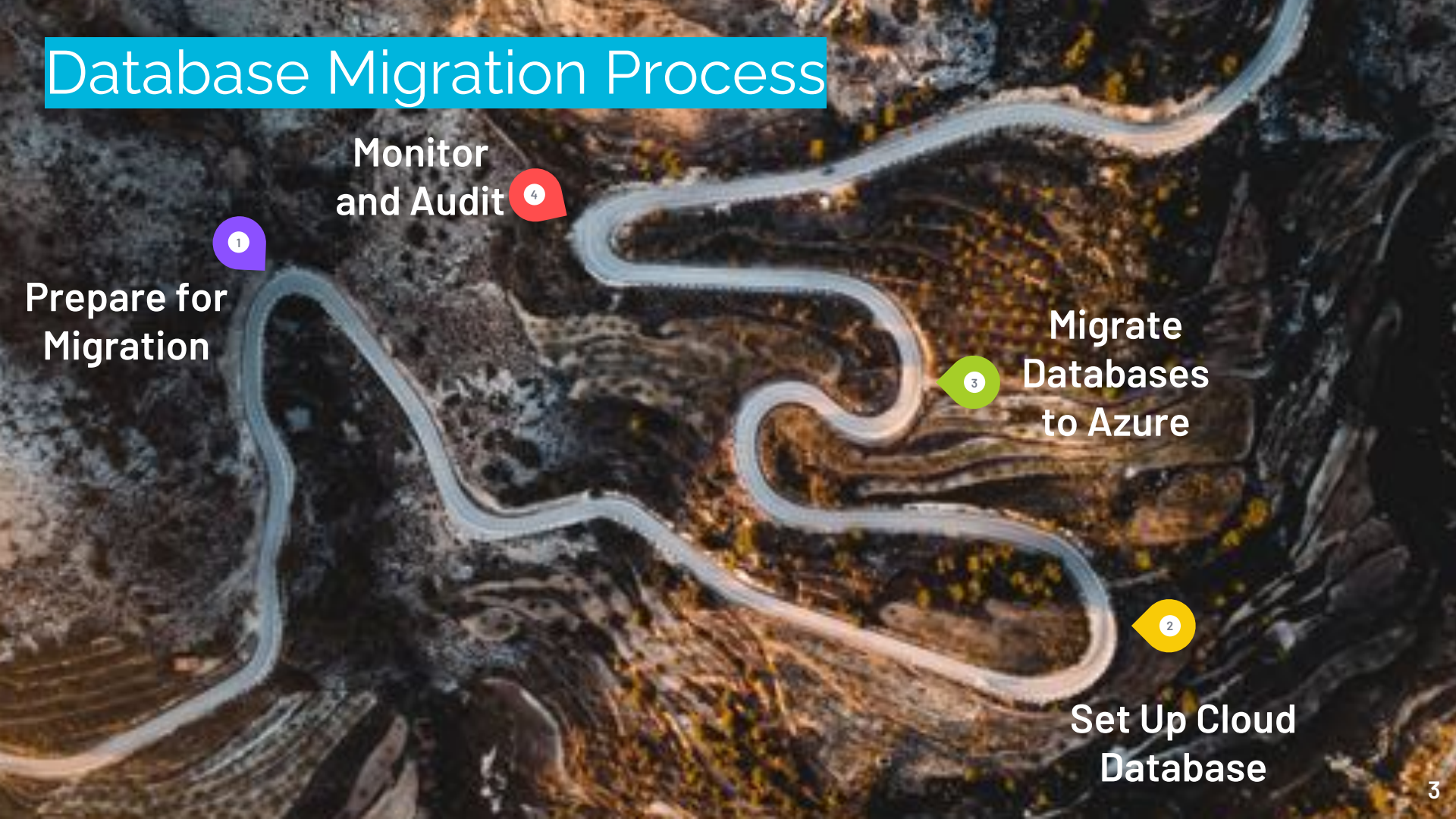
# Database Migration Process

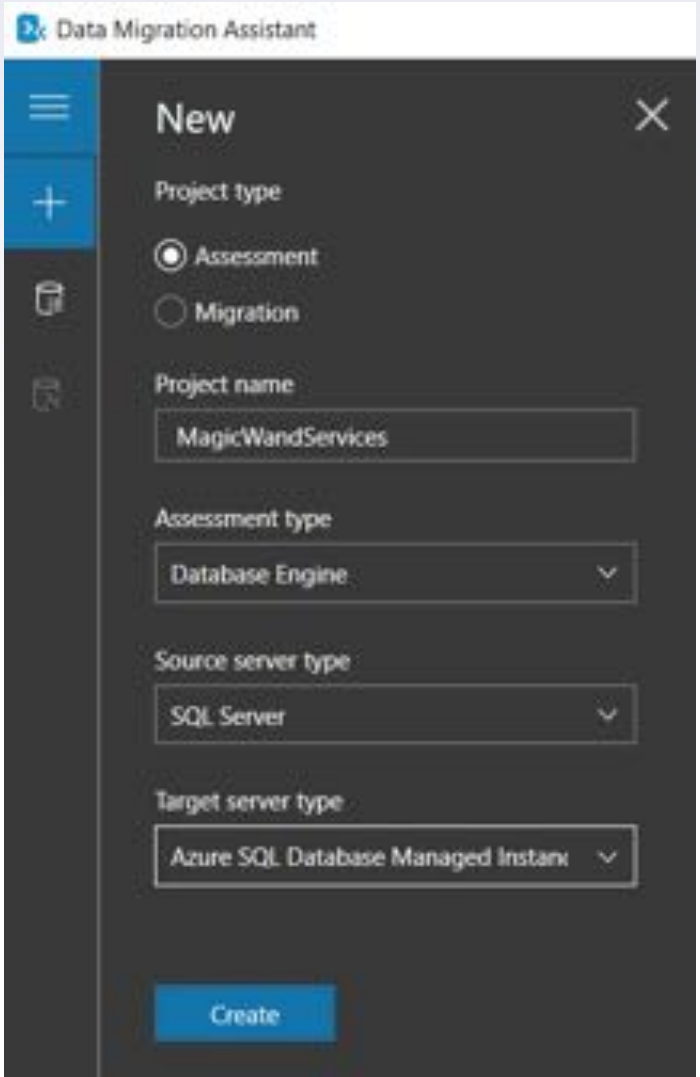


# 1 Prepare for Migration

- **Analyze/Audit**
  Using Microsoft Data Migration Assistant and SQL Server Audit
- **Clean Up**
  Remove unsupported and unused objects
- **Create Checklist**
  Catalogue items migrating to the cloud

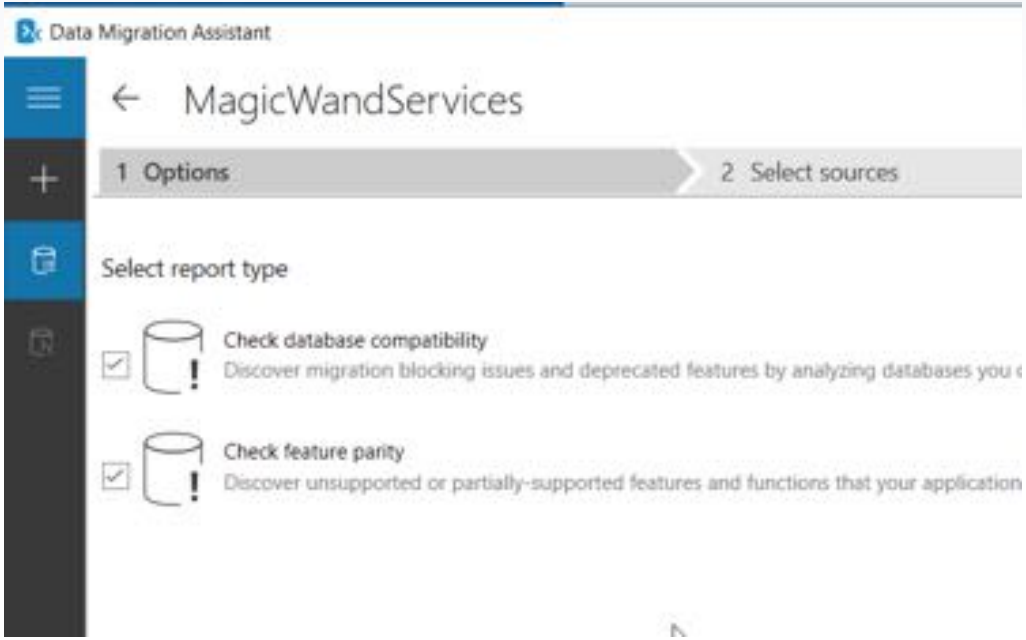
# Microsoft Data Migration Assistant (DMA)

**Enables you to upgrade to a modern data platform by detecting compatibility issues that can impact database functionality on your new version of SQL Server**



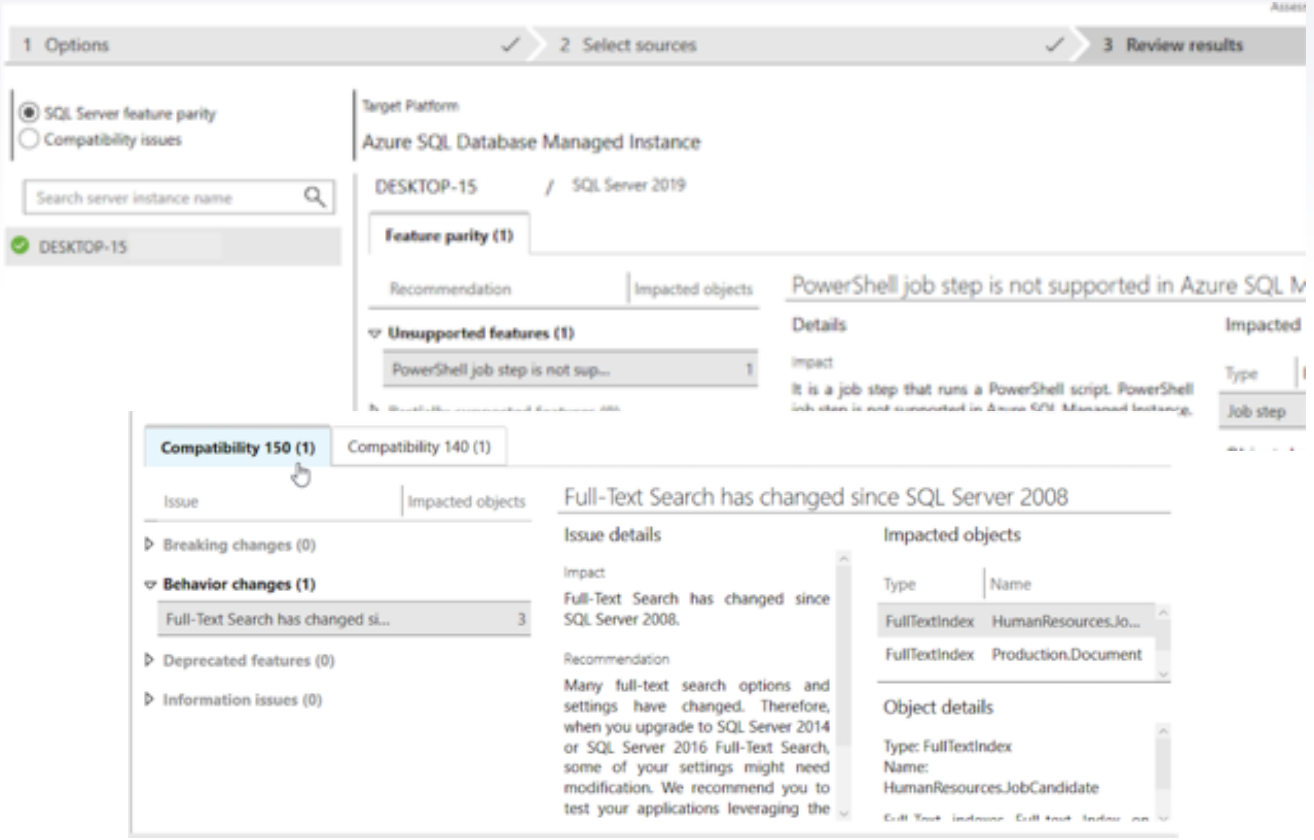
Note that the Microsoft Data Migration Assistant won't warn you about all issues you might encounter. **This is why it's always important to test your migrations from start to finish in a lower environment.**

# DMA Configuration



Azure uses Azure Active Directory, as opposed to Active Directory. This means that when your users are logging in with a domain account, it will change the way they have to log in.

# DMA Results


1 Options
2 Select sources
3 Review results
SQL Server feature parity
Compatibility issues
Search server instance name
DESKTOP-15
Target Platform
Azure SQL Database Managed Instance
DESKTOP-15 / SQL Server 2019
Feature parity (1)
Recommendation
Impacted objects
Unsupported features (1)
PowerShell job step is not sup... 1
PowerShell job step is not supported in Azure SQL M
Details
Impact
It is a job step that runs a PowerShell script. PowerShell
Impacted
Type
Job step
Compatibility 150 (1)
Compatibility 140 (1)
Issue
Impacted objects
Breaking changes (0)
Behavior changes (1)
Full-Text Search has changed si... 3
Deprecated features (0)
Information issues (0)
Full-Text Search has changed since SQL Server 2008
Issue details
Impact
Full-Text Search has changed since SQL Server 2008.
Recommendation
Many full-text search options and settings have changed. Therefore, when you upgrade to SQL Server 2014 or SQL Server 2016 Full-Text Search, some of your settings might need modification. We recommend you to test your applications leveraging the
Impacted objects
Type
Name
FullTextIndex HumanResources.Jo...
FullTextIndex Production.Document
Object details
Type: FullTextIndex
Name:
HumanResources.JobCandidate

# SQL Server Audit Tips

- I use this on all prod servers to audit DDL and security changes
- For migrations, I may audit more to see if something is in use or not
- Be careful to not over audit

# Prepare for Migration

- Analyze/audit
- Clean up
- Create checklist

# 2 Set Up Cloud Database

- **Create a Baseline**
  Check configuration settings with a SQL script
- **Create Azure SQL Managed Instance**
  Create MI via the Azure portal
- **Migrate Server-Level Objects**
  Using a PowerShell module named dbatools

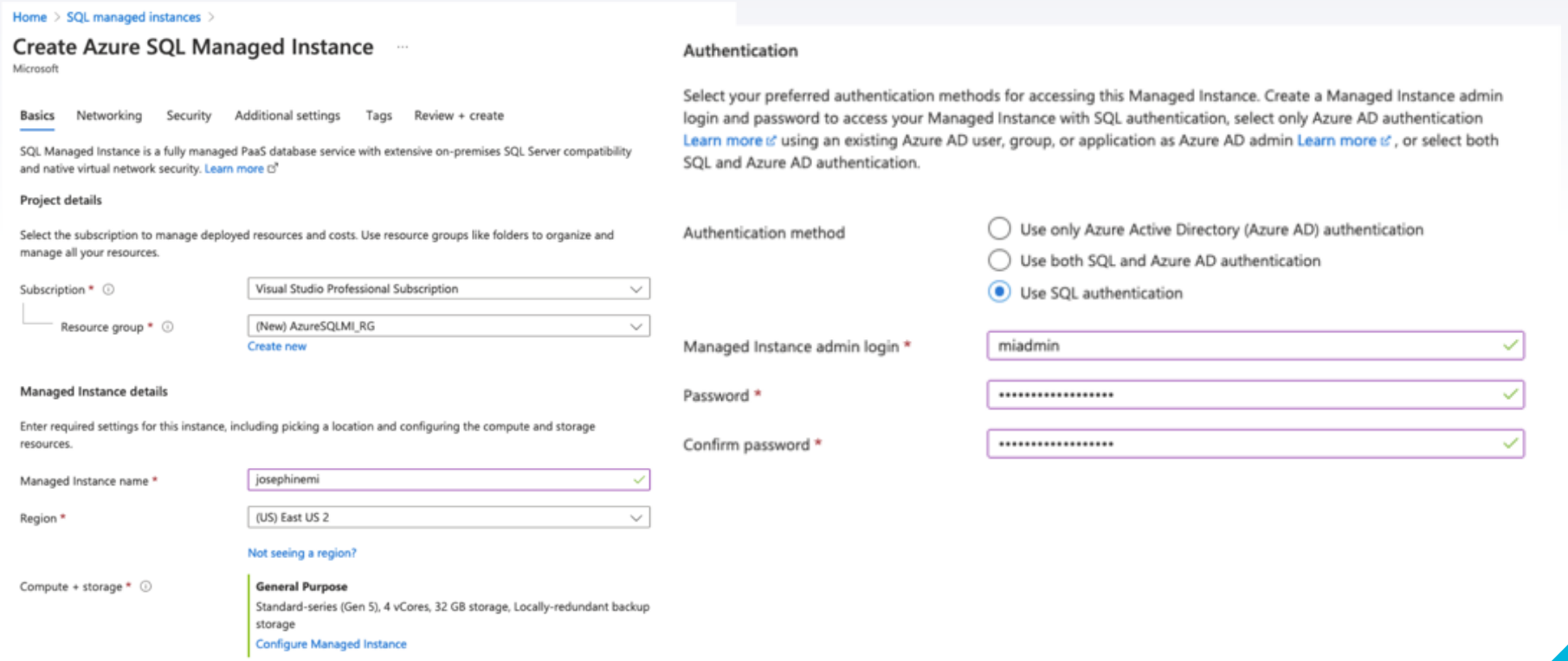
# Create Configuration Baseline

```
/*setup for querying SQL Server configuration */
DECLARE @tf TABLE (TraceFlag nvarchar(35), status bit,global bit, session bit)
INSERT INTO @tf execute('DBCC TRACESTATUS(-1)');

DECLARE @config TABLE (
    name nvarchar(35),
    default_value sql_variant
)

/*not all of these settings are in all versions of sql server*/
INSERT INTO @config (name, default_value) VALUES
('access check cache bucket count',0),
('access check cache quota',0),
('ADR cleaner retry timeout (min)', 0),
('ADR Preallocation Factor', 0),
('Ad Hoc Distributed Queries',0),
('affinity I/O mask',0),
('affinity64 I/O mask',0),
('affinity mask',0),
('affinity64 mask',0),
('Agent XPs',0), --Changes to 1 when SQL Server Agent is started. Default value is
('allow filesystem enumeration', 0),
('allow polybase export', 0),
('allow updates',0),
('awe enabled',0),
('backup checksum default', 0),
```

Very important information about costs

A single managed instance Standard-series Gen 5 will cost approximately $1/hour depending on your subscription

# Create Managed Instance

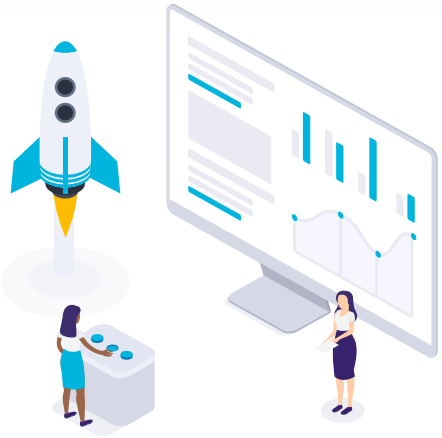


Azure SQL Managed Instance requires use of a dedicated vnet.

Make sure to check with your networking team to make sure you don't configure this incorrectly.

# Tips for Managed Instance

- It can take up to 6 hours to create.  30 min create is in preview, but not available in all subscriptions.
- Start/stop is in preview, but not available in all subscriptions
- For testing, you can enable public endpoint, but don't do this for production
- To connect via SSMS with public endpoint: yourminame.**public**.xxxxxxxxxxxx.database.windows.net, 3342



# Migrate Server-Level Objects

- Using dbatools
  - Install module in PowerShell

```
$scred = Get-Credential sa
$dcred = Get-Credential miadmin
$params = @{
  Source = "your_sql_server_name"
  Destination = "copy_your_mi_name_from_azure,3342"
  SourceSqlCredential = $scred
  DestinationSqlCredential =$dcred
}

Start-DbaMigration @params -Force -Exclude Databases -Verbose
```

# Set Up Cloud Database

- Create baseline
- Create managed instance
- Migrate server-level objects

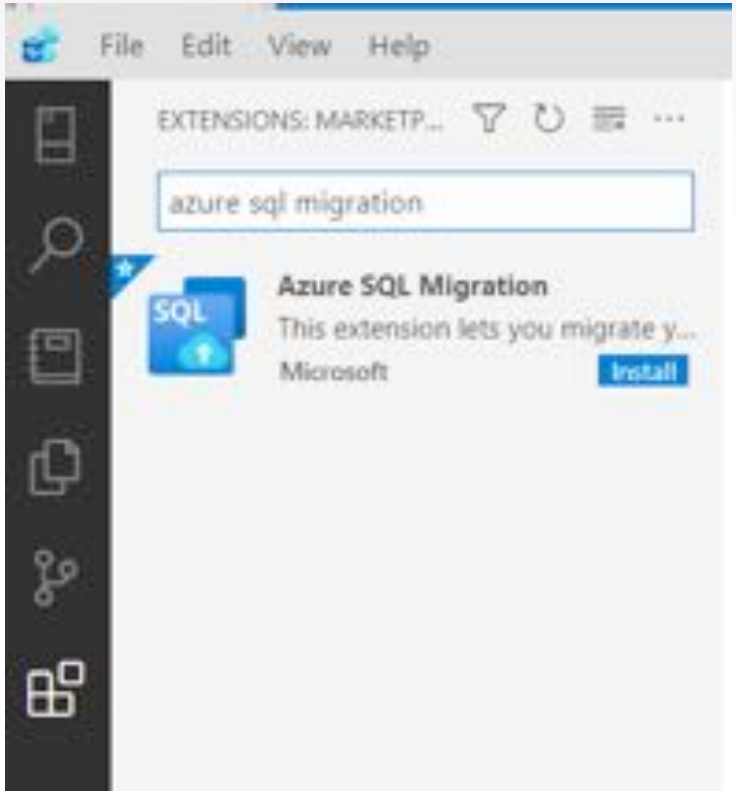
# 3 Migrate Databases To Azure

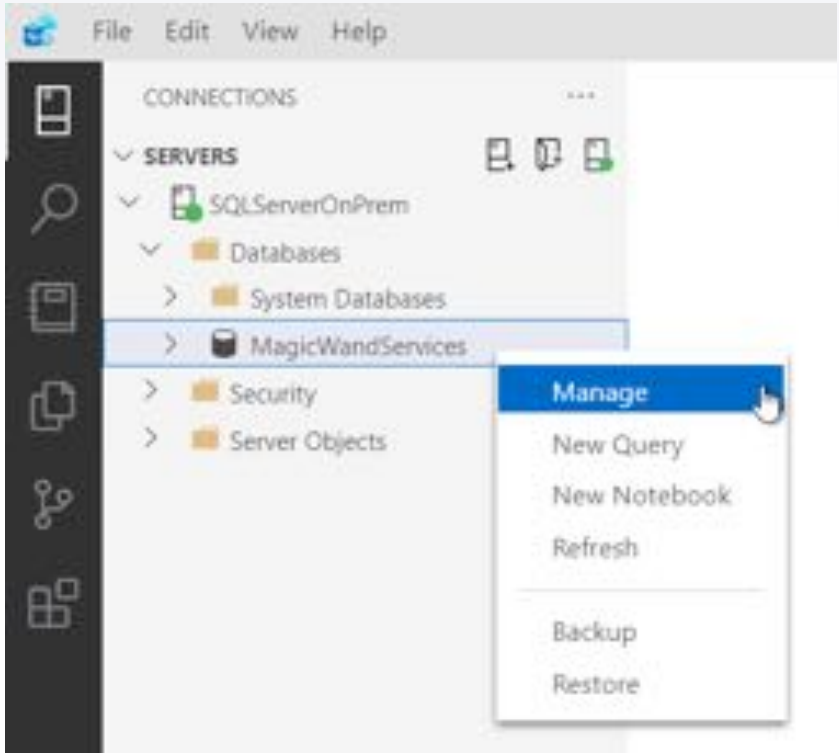
- **Set Up Database Migration Service (DMS)**
  Using Azure portal and Azure Data Studio (ADS)
- **Perform Online Migration**
  Using Azure Data Studio
- **Verify Migration**
  Check database configuration settings with a SQL script

# Before You Set Up DMS

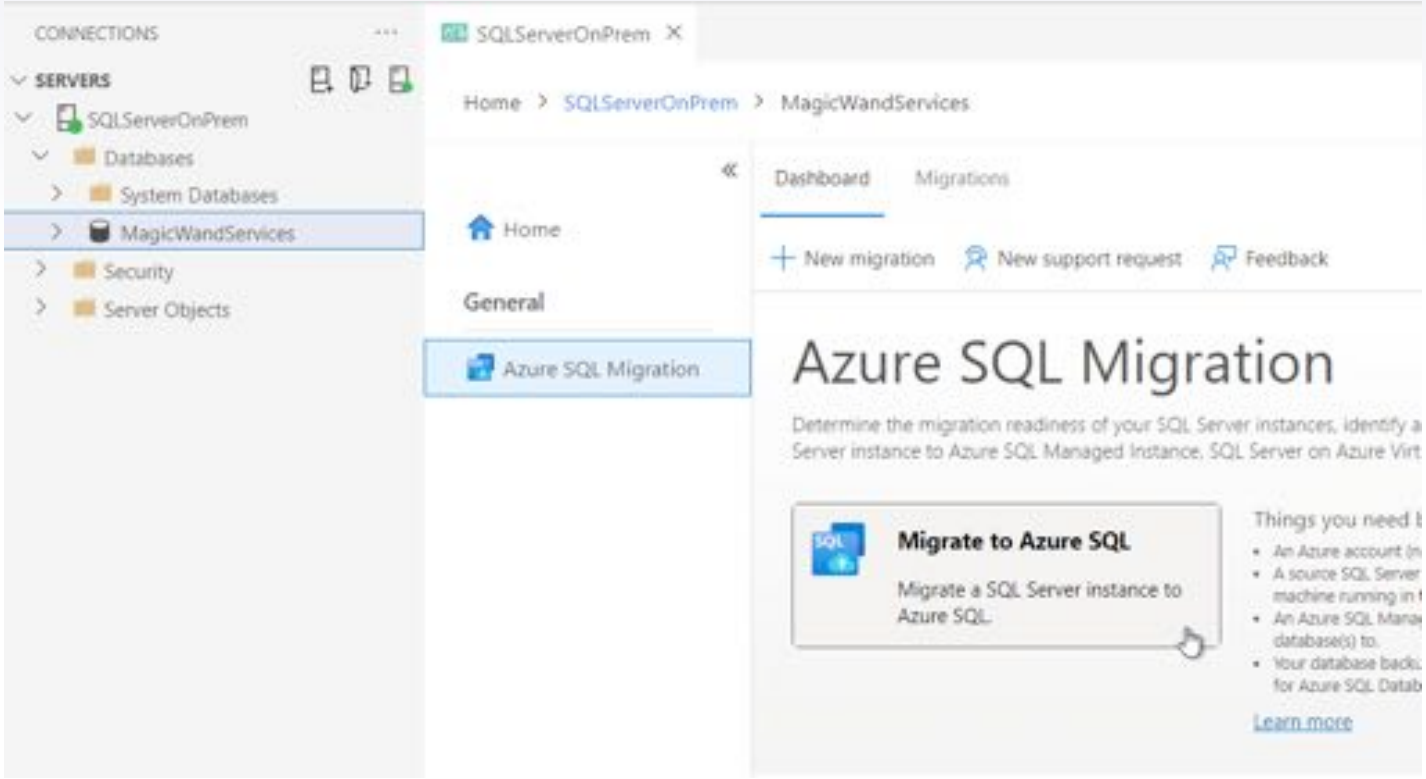
- Configure a VPN or ExpressRoute
- Register Microsoft.DataMigration
- Create a storage account
- Take a full backup of your on-premises database WITH CHECKSUM

# Setting up DMS in ADS



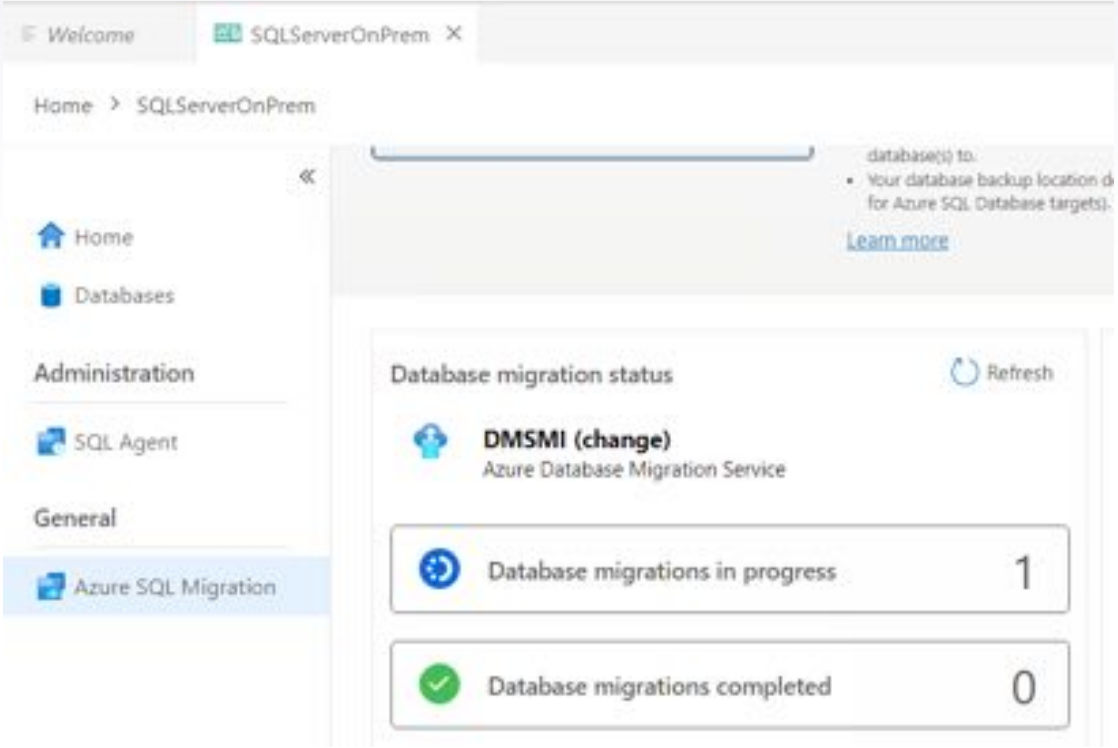
# Set Up Migration in ADS



# Steps to Set Up Migration

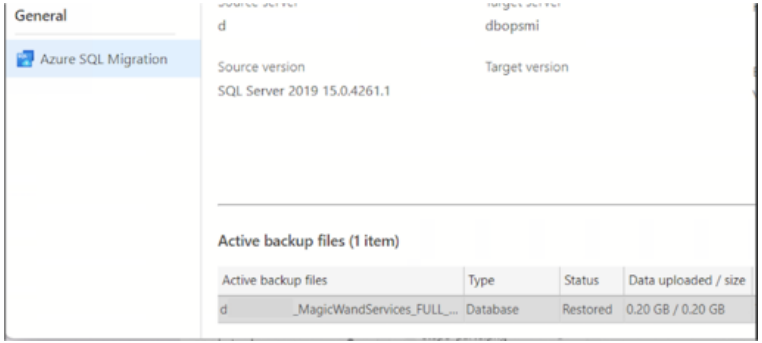
- Step 1: Databases for assessment
- Step 2: Assessment results and recommendations
- Step 3: Azure SQL target setup
- Step 4: Migration Mode
- Step 5: Data source configuration
- Step 6: Azure Database Migration Service – includes installing self hosted integration runtime
- Step 7: Summary

# Migration Status in ADS



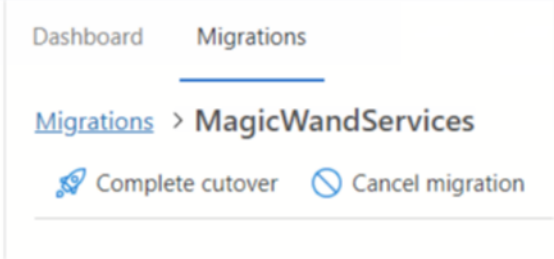
# Begin Online Migration

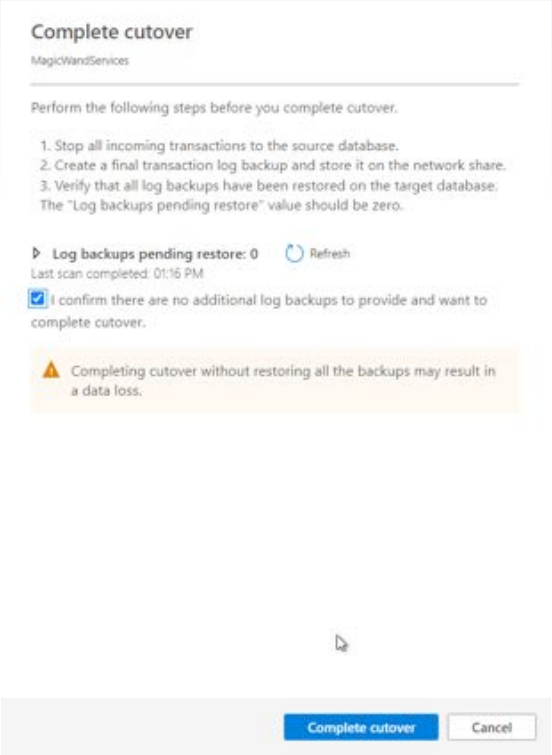
- Stop applications and users from using the on-premises database
- Take a final log backup WITH CHECKSUM
- Verify final backup is restored
- Don’t take your on-prem db offline



# Complete Online Migration

- **Click Complete Cutover**



# Verify Migration & Migrate DB Settings

```
DECLARE @dbname varchar(20);
SET @dbname = 'MagicWandServices';

DECLARE @config TABLE (
    name nvarchar(35),
    value sql_variant
)

INSERT INTO @config (name, value)
SELECT name, CASE
             WHEN value = 1 then 'ON'
             WHEN value = 0 then 'OFF'
             ELSE value
             END AS value
FROM sys.database_scoped_configurations
WHERE name <> 'MAXDOP'

INSERT INTO @config (name, value)
SELECT name, value
FROM sys.database_scoped_configurations
WHERE name = 'MAXDOP'


SELECT name = CONCAT('DBCONFIG:',dsc.name), dsc.value, is_value_default,
              'USE ' + @dbname +'; ALTER DATABASE SCOPED CONFIGURATION SET ' + dsc.name + '=' + convert(nvarchar(35), c.value) + ';' as SQLscript
FROM sys.database_scoped_configurations dsc
INNER JOIN @config c
ON c.name = dsc.name
WHERE is_value_default <> dsc.value
```

# Migrate Databases to Azure

- Set up DMS
- Perform online migration
- Verify migration

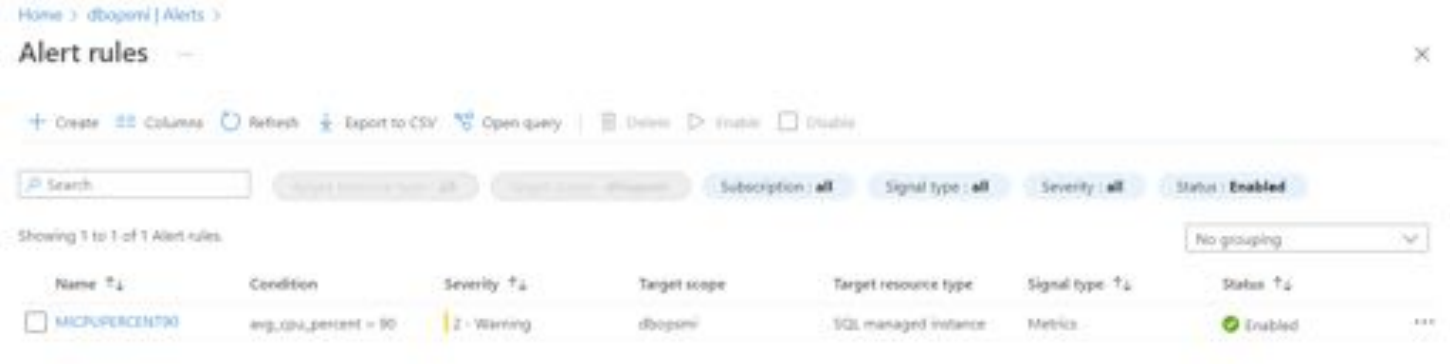
# 4 Monitor and Audit

- **Configure Auditing**
  Using SQL Server Audit
- **Configure Alerting**
  Monitor and alert on things such as CPU usage
- **Security Check**
  Make sure your MI complies with CIS benchmarks

# SQL Server Audit with MI tips

- **Create a storage account to hold the audit files**
- **Use URL for audit destination**
- **Query that URL to get audit data**

# Monitoring/Alerting Tips

- **Make sure to monitor and alert on things like**
  - **CPU usage**
  - **Memory usage**
  - **Storage space used**
- 

# Security Check Tips

- Use the PowerShell module dbachecks
  - CIS benchmarks help you ensure your managed instance is as secure as possible.
  - Must install Pester module

```
$Date = Get-Date -Format "yyyy-MM-dd"
 Invoke-DbcCheck -Show Fails -SqlInstance "dbopsmi.public.rand0m1234.database.windows.net,3342" -SqlCredential (Get-Credential yourmiadmin) `
 -ExcludeCheck Backup, HADR, Domain, LogShipping, AgentServiceAccount, IdentityUsage, FutureFileGrowth, FKCKTrusted, GuestUserConnect, `
 ValidDatabaseOwner, InvalidDatabaseOwner, InstanceConnection, SqlEngineServiceAccount, TempDbConfiguration, BackupPathAccess, DefaultFilePath, `
 DAC, MaxMemory, OrphanedFile, ServerNameMatch, MemoryDump, SupportedBuild, DefaultBackupCompression, ErrorLog, CrossDBOwnershipChaining, DefaultTrace, `
  OLEAutomationProceduresDisabled, RemoteAccessDisabled, SystemFull, UserFull, UserDiff, Userrog `
  -Passthru | Convert-DbcResult | Set-DbcFile -FilePath C:\windows\temp\ -FileName DbcCheck_$Date -FileType csv
```

# Monitor and Alert

- Configure auditing and alerting
- Security check

# Migrating to MI

**Prepare to Migrate**

Analyze and audit your on-premises database server, clean up unused and unsupported objects, and prepare a checklist

**Set Up Cloud Database**

Create a baseline of your on-premises db server, create MI, and migrate server-level objects

**Migrate Databases to Azure**

Create DMS, do online migration, and verify migration

**Monitor and Alert**

Configure auditing, alerting, and do a security check

**100%**

**Total success!**

# Want the whole picture?
# Get the Manning liveProject Series.

# Resources

- Manning liveProject Series
- Migrate Without a Migraine GitHub Repository
- Managed Instance Features
- SQL Server Audit Presentations and Code
- dbatools PowerShell module
- dbachecks PowerShell module

# Credits

Special thanks to all the people who made and released these awesome resources for free:

- Presentation template by SlidesCarnival
- Illustrations by Sergei Tikhonov
- Photographs by Unsplash

# THANKS!

## Any questions?

You can find me at:

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