

Migrating SQL on-premises databases to Azure SQL Managed Instance

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2 Introduction

This document is intended to assist with migration SQL Server on-premises database(s) or instance to Azure SQL Managed Instance. There is a step by step process documented on how to use Database Migration Assistant (DMA) and Azure Database Migration Service (DMS) to move on-premises database to SQL Managed Instance (MI).

3 Background

[Azure Database Migration Service \(DMS\)](#) is designed as a seamless, end-to-end solution for moving on-premises SQL Server databases to the cloud. DMS is a fully managed service designed to enable seamless migrations in an offline/online mode from different database sources to Azure Data services with minimal downtime. Along with DMS we can leverage [Data Migration Assistant \(DMA\)](#) to detect compatibility issues that can impact database functionality on SQL Server Managed Instance. It recommends performance and reliability improvements for your target environment.

4 Migration Process Overview

Planning for migration from SQL Server on-premises to SQL MI is a seamless task but a process-oriented approach should be followed to make the migration smooth. Here are the steps and pre-requisites to have in place before starting a migration.

4.1 Pre-requisites:

Ensure the environment for Azure SQL Managed Instance has been prepared per the following documents:

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-managed-instance-vnet-configuration>

For Managed Instance creation you need dedicate subnet inside the VNet that conforms to the following requirements:

- **Be empty:** The subnet must not contain any other cloud service associated to it, and it must not be Gateway subnet. You won't be able to create Managed Instance in subnet that contains resources other than managed instance or add other resources inside the subnet later.
- **No NSG:** The subnet must not have a Network Security Group associated with it.
- **Have specific route table:** The subnet must have a User Route Table (UDR) with 0.0.0.0/0 Next Hop Internet as the only route assigned to it. For more information, see [Create the required route table and associate it](#)
- **Optional custom DNS:** If custom DNS is specified on the VNet, Azure's recursive resolvers IP address (such as 168.63.129.16) must be added to the list. For more information, see [Configuring Custom DNS](#).
- **No Service endpoint:** The subnet must not have a Service endpoint (Storage or Sql) associated to it. Make sure that Service Endpoints option is Disabled when creating VNet.
- **Sufficient IP addresses:** The subnet must have minimum of 16 IP addresses. For more information, see [Determine the size of subnet for Managed Instances](#)

Ensure Azure Database Migration Service environment prerequisites are in place:

<https://docs.microsoft.com/en-us/azure/dms/tutorial-sql-server-to-managed-instance>

- Create a VNET for the Azure Database Migration Service by using the Azure Resource Manager deployment model, which provides site-to-site connectivity to your on-premises source servers by using either [ExpressRoute](#) or [VPN](#). [Learn network topologies for Azure SQL DB Managed Instance migrations using the Azure Database Migration Service](#).
- Ensure that your Azure Virtual Network (VNET) Network Security Group rules do not block the following communication ports 443, 53, 9354, 445, 12000. For more detail on Azure VNET NSG traffic filtering, see the article [Filter network traffic with network security groups](#).
- Configure your [Configure your Windows Firewall for source database engine access](#).
- Open your Windows Firewall to allow the Azure Database Migration Service to access the source SQL Server.
- If you are using a firewall appliance in front of your source databases, you may need to add firewall rules to allow the Azure Database Migration Service to access the source database(s) for migration, as well as files via SMB port 445.

- Create an instance of Azure SQL Database Managed Instance by following the detail in the article [Create an Azure SQL Database Managed Instance in the Azure portal](#).
- Ensure that the logins used to connect the source SQL Server and target Managed Instance are members of the sysadmin server role.
- Create a network share that the Azure Database Migration Service can use to back up the source database.
- Ensure that the service account running the source SQL Server instance has write privileges on the network share that you created.
- Make a note of a Windows user (and password) that has full control privilege on the network share that you created above. The Azure Database Migration Service will impersonate the user credential to upload the backup files to Azure storage container for restore operation.

Database Assessment has been performed to identify on prem source:

- **Instance(s)**
- **Database(s)**

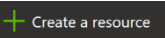
4.2 Migration Process High-level Steps

Migration process steps are key to any migration, these must be followed in the order to make sure that all dependencies and pre-steps are completed.

1. Create an Azure SQL Managed Instance
2. Create an Azure Storage Account
3. Create an Azure blob container
4. Generate Shared Access Signature (SAS) for the blob container
5. Install Database Migration Assistant (DMA) Desktop tool
6. Install Database Migration Service
7. Create a migration project to migrate on prem databases to Azure

5 Migration Process Step by Step

5.1 Create an Azure SQL Managed Instance

1. Login to the [Azure Portal](#)
2. Select  Create a resource
3. Search for Azure SQL Managed Instance
4. Select Azure SQL Managed Instance



Home > New > Marketplace > Everything > Azure SQL Managed Instance

Everything

Filter

azure sql managed instance

Results

NAME	PUBLISHER	CATEGORY
 Azure SQL Managed Instance	Microsoft	Databases
 Azure Database Migration Service	Microsoft	Databases

Azure SQL Managed Instance

Microsoft

SQL Database Managed Instance is a deployment option in Azure SQL Data compatible with SQL Server, providing out-of-the-box support for most SQL accompanying tools and services. Managed Instance also provides native virtual support for an isolated, highly-secure environment to run your applications. the rich SQL Server programming surface area in the cloud with the operational benefits of an intelligent, fully-managed database service, making Managed destination for your SQL Server workloads.

Save for later

PUBLISHER: Microsoft

USEFUL LINKS: [Documentation](#), [Pricing Details](#), [Migrate with Azure Database Migr](#)

Create

5. Click Create

6. Enter the subscription and fill details related to instance

Home > New > Marketplace > Everything > A

SQL managed instance □ ×

* Subscription
Data Migration Jumpstart POD1 ▾

* Managed instance name
kcsqlmi ✓

* Managed instance admin login
kuldeepc ✓


* Password
..... ✓

* Confirm password
..... ✓

* Resource group
DefaultResourceGroup-WEU ▾
[Create new](#)

* Location ⓘ
West US 2 ▾

* Virtual network ⓘ
Create new virtual network ▾



I acknowledge that upon creation Azure SQL Database Managed Instance will impose network configuration policy on selected virtual network to prevent service unavailability.
[Learn more](#)

[Create](#) [Automation options](#)

Note: As of 10/01/2018 Azure SQL Managed instance is GA for General Purpose tier.

Home > New > Marketplace > Everything > Azure SQL Managed Instance > SQL managed instance > Configure performance

SQL managed instance

* Confirm password
 ☒

* Resource group
 DefaultResourceGroup-WEU

* Location
 West US 2

* Virtual network
 Create new virtual network

I acknowledge that upon creation Azure SQL Database Managed Instance will impose network configuration policy on selected virtual network to prevent service unavailability. [Learn more](#)

* Pricing tier
 General Purpose: 32 GB, 16 vCores >

Monthly cost **2407.00 USD**

For the first instance in a subnet, deployment time is typically much longer than in the case of the subsequent instances and can usually take up to 6 hours to complete.

Configure performance

Feedback

General Purpose	Business Critical (preview)
For most production workloads	For IO-intensive and compute-intensive workloads.
8 / 16 / 24 vCores	8 / 16 / 24 vCores
32 GB - 8 TB storage capacity	32 GB - 1 TB storage capacity
Fast storage	Super fast storage

Compute Generation [Learn more about compute generation](#)

Gen4 ☒

Gen5 ☐

vCores [What is a vCore?](#)

16

2407.00 USD

Storage In GB. Custom amount will be rounded to the nearest value divisible by 32.

32

0.00 USD

Days of backup retention Gives you point-in-time restore capability within 7 days period.
 Enjoy your free trial. [Learn more](#) **Free**

Save money

[Automation options](#)

Note: Please consider allocating right storage information here. This will help us avoid any storage related errors during migration.

7. Click Create. Ensure that once Azure SQL Managed instance has been deployed to reserve the following for the migration step 6 of this document.
 - <https://docs.microsoft.com/en-us/azure/sql-database/sql-database-managed-instance-tutorial-portal>
 - Reserve/Obtain the following target MI information for the migration:
 - Azure Managed Instance Server name
 - Admin User credentials (User name/password)

5.2 Create an Azure Storage Account

1. Login to the [Azure portal](#).
2. In the Azure portal, expand the menu on the left side to open the menu of services, and choose All services. Then, scroll down to Storage, and choose Storage accounts. On the Storage Accounts window that appears, choose Add.
3. Enter a storage account name (kcdmsstorage).
4. Set the Account kind field to StorageV1 (based on performance requirements – Standard or Premium storage can be chosen)
5. Set replication to Read-access geo-redundant storage(RA-GRS)

6. Leave these fields set to their defaults: Deployment model, Performance, Secure transfer required.
7. Choose the subscription in which you want to create the storage account.
8. In the Resource group section, select Create New Enter name of ResourceGroup.
9. Choose the location.
10. Select Create to create the storage account

Create storage account

Basics **Advanced** Tags Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more](#)

PROJECT DETAILS

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

* Subscription

* Resource group [Create new](#)

INSTANCE DETAILS

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. [Choose classic deployment model](#)

* Storage account name

* Location

Performance ☒ Standard ☐ Premium

Account kind

Replication

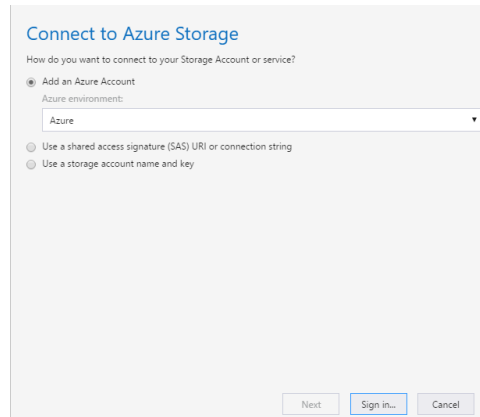
[Review + create](#) [Previous](#) [Next : Advanced >](#)

5.3 Create a blob container

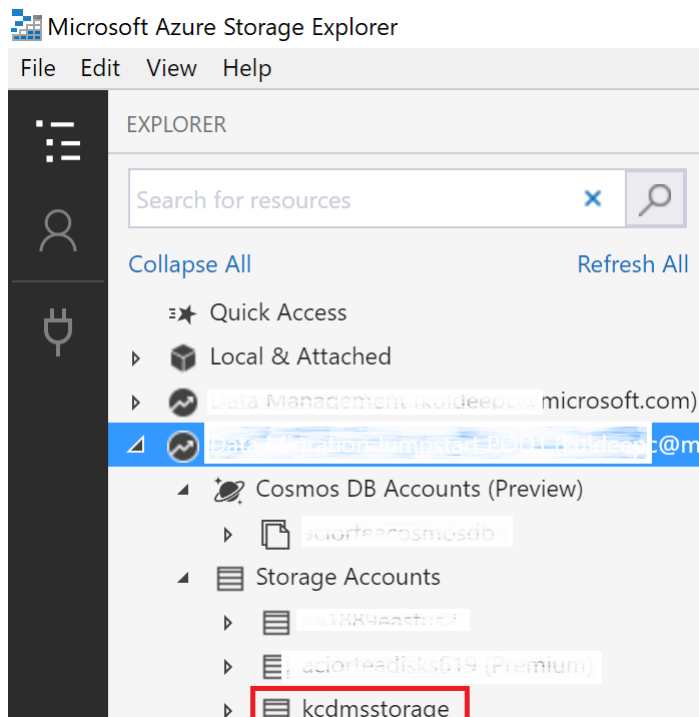
1. At a client workstation, download [Azure Storage Explorer](#) and run StorageExplorer.exe to install.



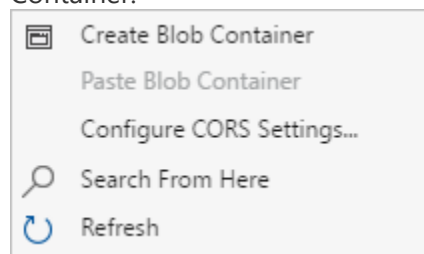
2. Open Storage Explorer and select the plug icon to connect to Azure storage.



3. Select "Sign in..." and follow the multifactor authentication requirements.
4. In the left pane, expand the storage account within which you wish to create the blob container.

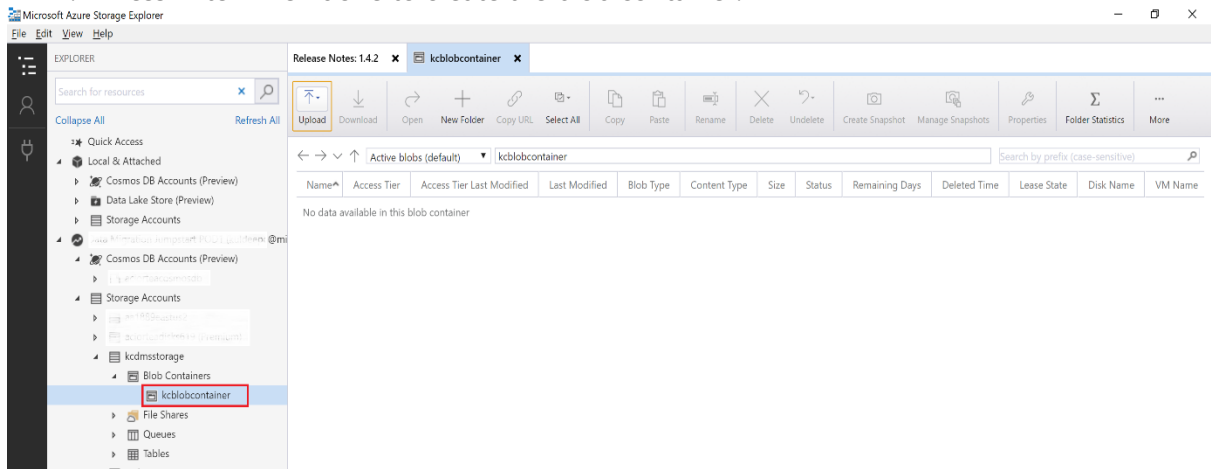


5. Right-click Blob Containers, and - from the context menu - select Create Blob Container.



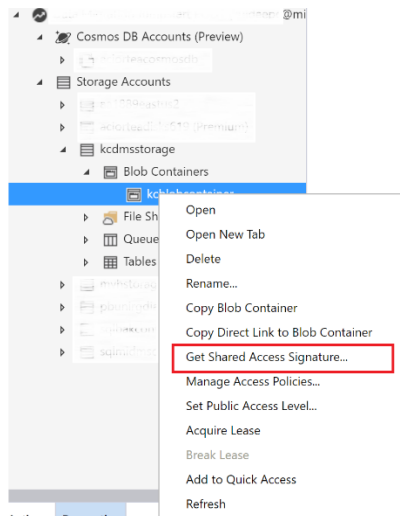
6. A text box will appear below the Blob Containers folder. Enter the blob container. See the Container name.

7. Press Enter when done to create the blob container.



5.4 Generate SAS for the blob container

1. At Azure Storage Explorer, expand to the Blob Container generated in step 3.
2. Right click and - from the context menu - select Get Shared Access Signature.



3. In the Shared Access Signature dialog, specify the policy, start and expiration dates, time zone, and access levels you want for the resource.

Microsoft Azure Storage Explorer - Generate Shared Access Signature

Shared Access Signature

Access policy: (none) ▼

Start time: 10/01/2018 04:23 PM

Expiry time: 10/02/2018 04:23 PM

Time zone:
☒ Local
☐ UTC

Permissions:

- ☒ Read
- ☒ Write
- ☒ Delete
- ☒ List

Create Cancel

4. Click Create.
5. A Shared Access Signature dialog will then display that lists the blob container along with the URI and Query Strings you can use to access the storage resource. Select Copy next to the URI you wish to copy to the clipboard.

Reserve the URI for step 6 below.

<https://kcdmsstorage.blob.core.windows.net/kcblobcontainer?st=2018-10-01T23%3A23%3A59Z&se=2018-10-02T23%3A23%3A59Z&sp=rwdl&sv=2018-03-28&sr=c&sig=PM5XcMCMxwbe3wOjdcK8gahu35sM%3D>

6. Select Close.

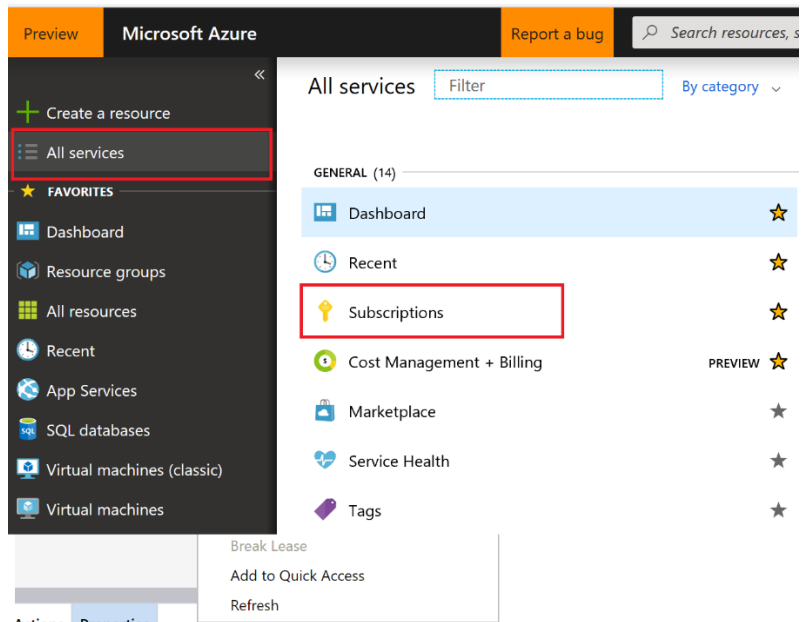
Actions	Properties
URL	https://kcdmsstorage.blob.core.windows.net/kcblobcontainer
Type	Blob Container
Public Read Access	off
Lease State	available
Lease Status	unlocked
Last Modified	Mon, 01 Oct 2018 23:29:16 GMT

Note the bottom left corner in Azure Explorer will display the status of the SAS Lease.

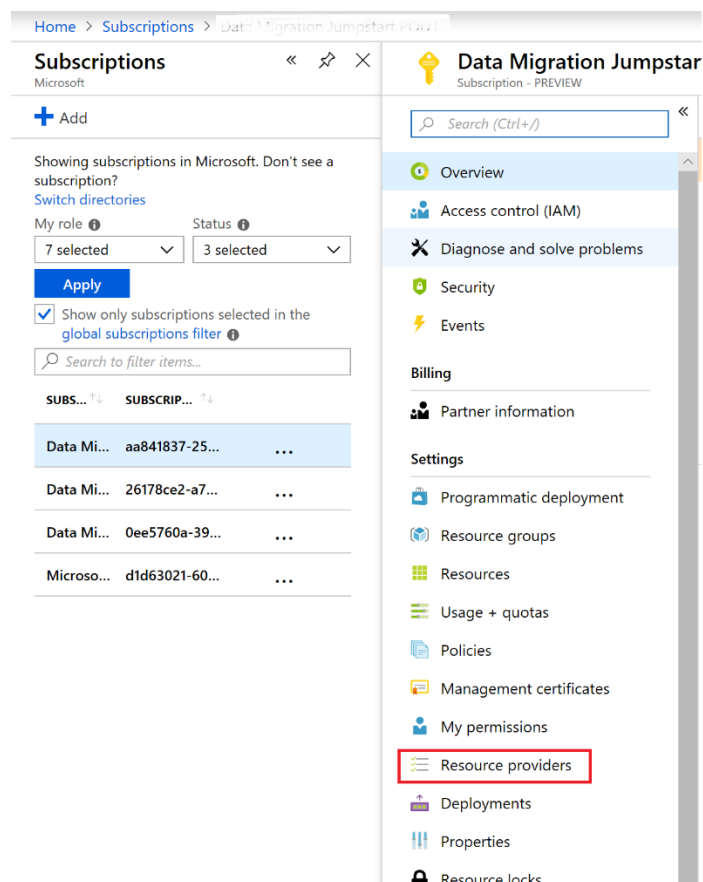
5.5 Install the Database Migration Service

1. Login to the Azure Portal

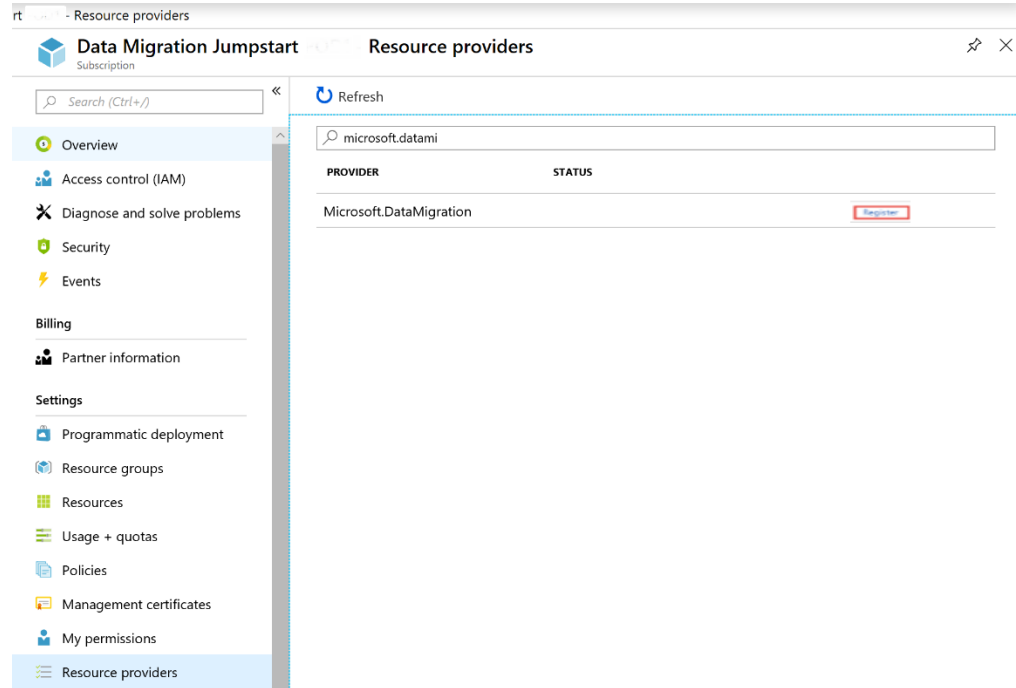
2. Register the resource provider
 - a. In the Azure portal, select **All services**, and then select **Subscriptions**.



- b. Select the subscription in which you want to create the instance of the Azure Database Migration Service, and then select Resource providers.



- c. Search for migration, then to the right of **Microsoft.DataMigration**,

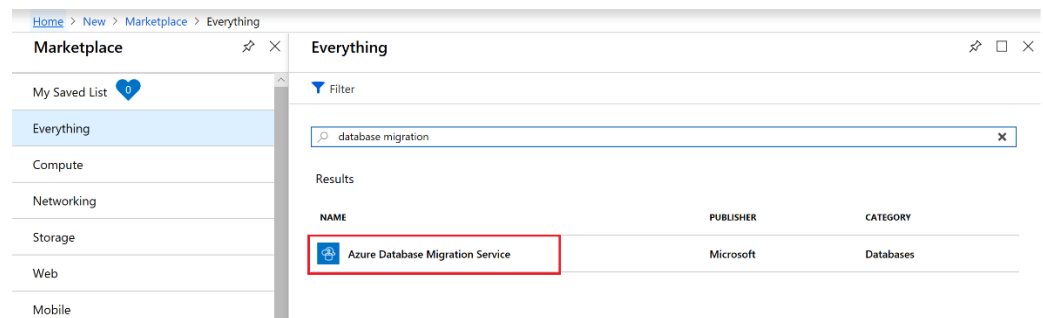


- d. Select Register.

3. Create an instance of the service

- a. Sign-in to Azure portal and Click [+ Create a resource](#)

- b. Search Azure Marketplace for "migration"



- c. Select **Azure Database Migration Service**, then select **Create**.

- d. On the Database Migration Service screen:

- Choose a Service name that is memorable and unique to identify your instance of the Azure Database Migration Service.

- Select the Azure Subscription in which you want to create the instance.
- Create a new Network with a unique name.
- Choose the Location that is closest to your source or target server.
- Select Basic: 1 vCore for the Pricing tier.

e. Click Create

Notification will be displayed when completed:

The screenshot shows the 'Microsoft.AzureDMS - Overview' page in the Azure portal. The left sidebar contains links for Overview, Outputs, Inputs, and Template. The main content area displays a green checkmark and the message 'Your deployment is complete'. Below this, it provides deployment details: Start time (10/1/2018 5:37:39 PM), Duration (16 minutes 40 seconds), and Correlation ID (5e61980b-8b02-4206-9f16-f5e0757d6aee). A table lists the resources deployed:

RESOURCE	TYPE	STATUS	OPERATION DETAILS
kcdmsservice	Microsoft.DataMigration/...	OK	Operation details
kcnetwork	Microsoft.Network/virtua...	OK	Operation details

Azure Database Migration Service is now ready to build migration projects.

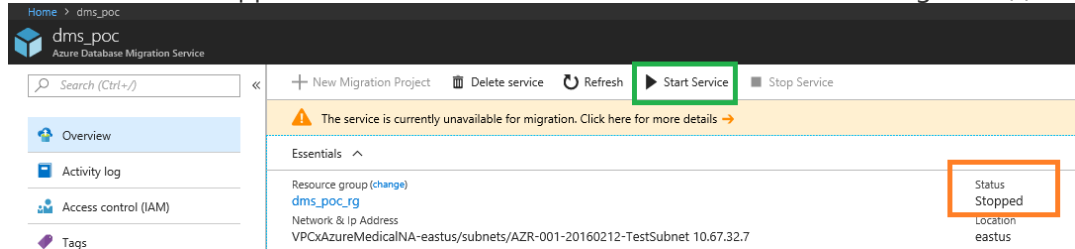
The screenshot shows the 'kcdmsservice' Overview page in the Azure portal. The left sidebar contains links for Overview, Activity log, Access control (IAM), Tags, Settings, Properties, Locks, Automation script, Support + troubleshooting, Resource health, and New support request. The main content area displays a green checkmark and the message 'Great job! Your database migration service was successfully created. You can create your first migration project now.' Below this, it provides service essentials: Resource group (KCResourceGroup), Virtual network & IP address (kcnetwork/subnets/default 10.0.0.4), Subscription name (Data Migration Jumpstart), and General Purpose (1 vCores). A table lists the migration projects:

NAME	SOURCE	TARGET	CREATED
No database migration projects to display			

At the bottom, there is a blue button labeled 'New migration project'.

5.6 Step 6 Create a migration project

1. At the Azure portal, select the Azure Database Migration Service generated in step 4.
2. If the status is "Stopped" select "Start Service" to enable the service for migration(s).



3. Select "+ New Migration Project."
4. On the New migration project screen, specify:
 - a. a name for the project
 - b. Source server type = SQL Server
 - c. Target server type = Azure SQL Database Managed Instance

Home > Resource groups > KCResourceGroup

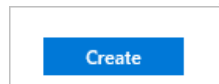
New migration project

Project name
kc_mi_migration ✓

* Source server type
SQL Server ▼

* Target server type
Azure SQL Database Managed Instance ▼

- d. Click "Create" to generate a new migration project.

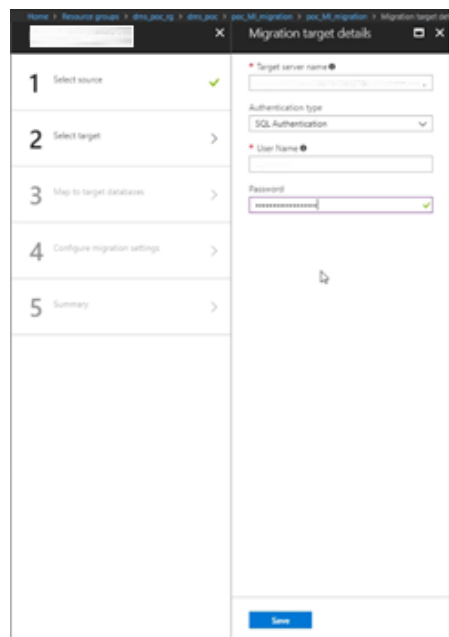
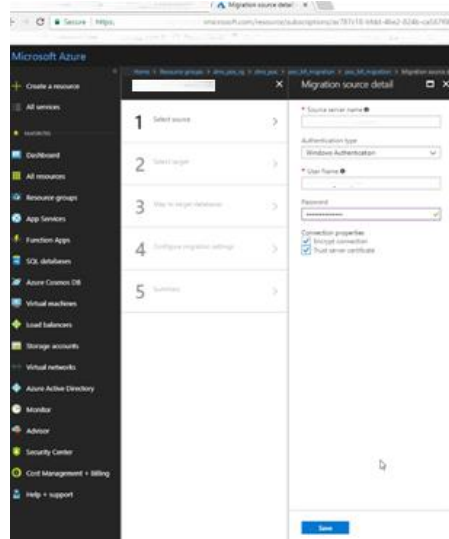


5. On the Source details screen, specify the connection details for the on prem source server.

6. Select save.
7. On the Target details screen, specify the connection details provisioned during creation of the Azure SQL Managed Instance.
8. Select "Save".
9. Scroll through the list of databases and select the database(s) to be migrated.

10. Select "Save".
11. On the Project summary screen, review and verify the details associated with the migration project.
12. Select the project generated in step 6.10 and select "+New Activity".
13. Select "Run migration" from the drop-down list and select "OK".

14. When prompted, enter the credentials of the source and target servers, and select "Save" on each details page.



15. On the "Configure migration settings" screen enter the following:
 - a. Server backup location = local share (on the on-premise database server) where DMS will generate backup(s).
 - b. User name = a member of sysadmin server role on the source database server.
 - c. Password for the user in step b.
 - d. The Azure Storage SAS URI generated in step 4.5
<https://kcdmsstorage.blob.core.windows.net/kcblobcontainer?st=2018-10-01T23%3A23%3A59Z&se=2018-10-02T23%3A23%3A59Z&sp=rwdl&sv=2018-03>

Server settings will be applied to all databases. Override individual database settings with Advanced settings.

Server settings

- Server backup location: ✓
- User name: ✓
- Password: ✓
- Storage SAS URI: ✓

Provide the SAS URI that allows DMS to access your storage account container that DMS will upload the backup files to and use for migrating databases to SQL DB Managed instance.

Please use the link below for how to create the SAS URI. Please make sure to select all permissions (Read, Write, Delete, List) on the policy window while creating the SAS URI.

<https://go.microsoft.com/fwlink/?linkid=868079>

Advanced settings ▼

Note: Ensure to use the fully qualified domain name (FQDN) when entering the local SQL backup file share name.

e. Select Save

16. On the Migration summary page, review and verify the Migration Activity details.

Home > Resources > Tools > SQL DB Migration > Migration summary

Migration summary

1	Select source	✓
2	Select target	✓
3	Map to target databases	✓
4	Configure migration settings	✓
5	Summary	>

Activity name:

Target server name:

Target server version: Azure SQL Database 12.0.2000.8

Source server name:

Source server version: SQL Server 2012 11.0.7001.0

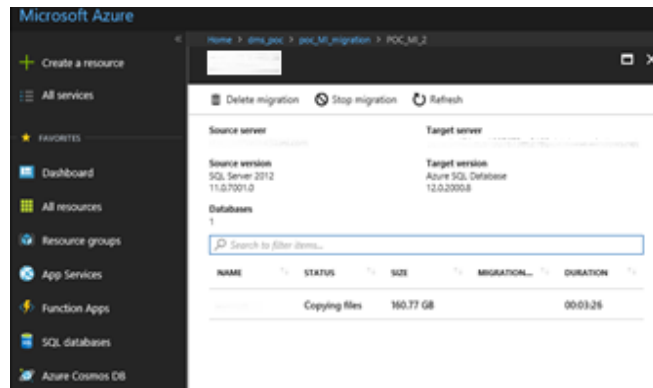
Databases to migrate: 2 of 10

Run migration

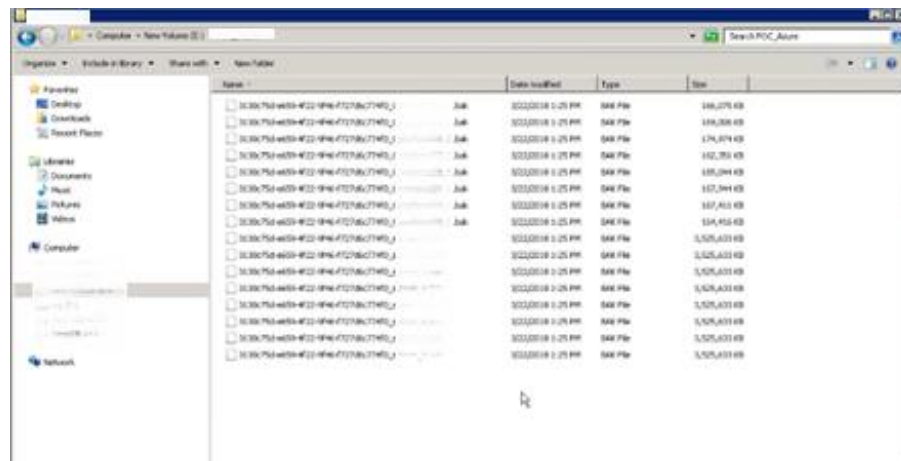
17. Select "Run migration"

5.7 Step 7 Monitoring

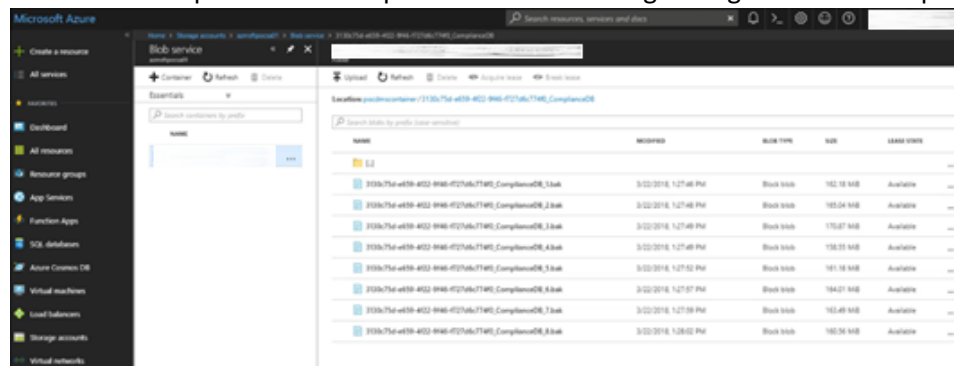
1. Monitor the migration progress by selecting the Migration activity and selecting "Refresh".



During the migration backup files will be generated at the source database's file share:

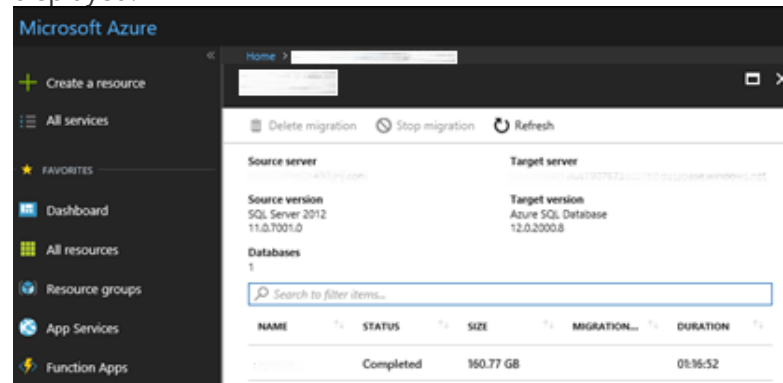


Then the backup files will be copied to the Blob Storage URI generated in step 3.



Once the restore(s) are completed the backup files will be deleted as part of the migration activity.

2. At the Azure Database Migration Project screen, select the migration activity from step 7.1. Once the migration is completed the duration of the data migration will be displayed.

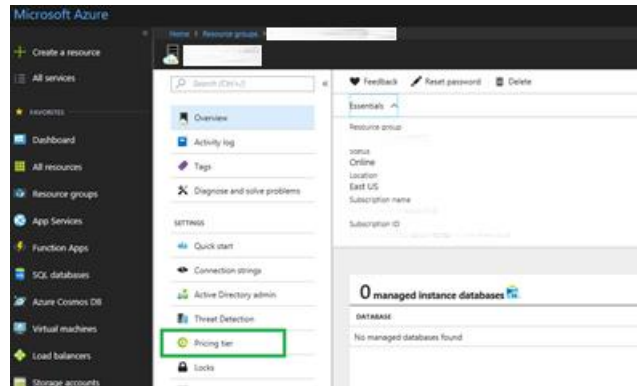


5.8 Troubleshooting MI storage capacity

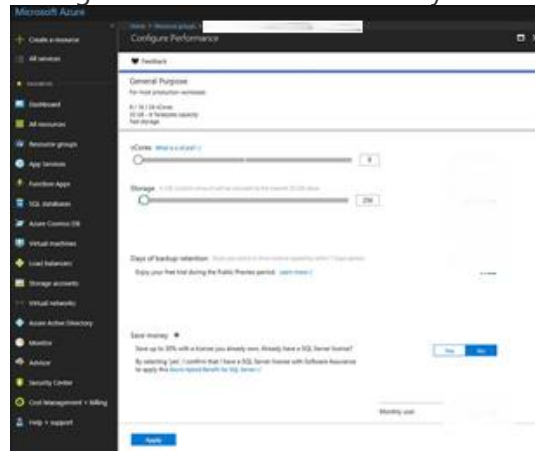
If a storage error is encountered during the migration an error such as the one below will be displayed.

Failed to restore database 'sampledb' from URLs
 'https://<storagename>.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_1.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_2.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_3.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_4.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_5.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_6.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_7.bak,https://azmsftpocsa01.blob.core.windows.net/pocdmscontainer/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb/3130c75d-e659-4f22-9f46-f727d6c774f0_sampledb_8.bak'. The managed instance has reached its storage limit. The storage usage for the managed instance cannot exceed (32768) MBs. RESTORE DATABASE is terminating abnormally. RESTORE DATABASE is terminating abnormally.

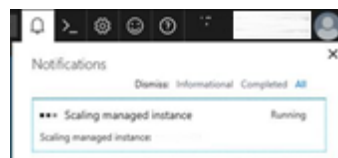
1. At the Azure portal, select the Resource group, the target Managed Instance, Pricing tier.



2. Configure Performance and modify MI storage appropriately.



3. Select "Apply".



4. Monitor MI Scaling by selecting the Notifications icon at the top right of the portal.
5. Once Scaling is complete, navigate to the migration activity and repeat steps 6.14 through 6.18.

6 Appendix

References:

Create an instance of managed instance:

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-managed-instance-tutorial-portal>

Create a storage account

<https://docs.microsoft.com/en-us/azure/storage/common/storage-quickstart-create-account?tabs=portal>

Install Azure Database Service

<https://docs.microsoft.com/en-us/azure/dms/quickstart-create-data-migration-service-portal>

Create a blob container

<https://docs.microsoft.com/en-us/azure/vs-azure-tools-storage-explorer-blobs#get-the-sas-for-a-blob-container>

Network topologies for Azure SQL DB Managed Instance

<https://docs.microsoft.com/en-us/azure/dms/resource-network-topologies>

Overview of prerequisites for using Azure Database Migration Service (DMS)

<https://docs.microsoft.com/en-us/azure/dms/resource-network-topologies>

Migrate SQL Server to Azure SQL Managed Instance

<https://docs.microsoft.com/en-us/azure/dms/tutorial-sql-server-to-managed-instance>