

# Full Stack Application Development with MS Azure Cloud

## Module 6 – Application Deployment and Management with Azure

### Lab Practical Manual

#### Topic: Azure SQL DB – Solved Question

##### Lab 1: Create a database using SQL on AZURE.

#### Create an Azure SQL Database single database

In this quickstart, you create a single database in Azure SQL Database using either the Azure portal, a PowerShell script, or an Azure CLI script. You then query the database using **Query editor** in the Azure portal.

#### Prerequisite

- An active Azure subscription. If you don't have one, create a free account.

#### Create a single database

This quickstart creates a single database in the serverless compute tier.

To create a single database in the Azure portal this quickstart starts at the Azure SQL page.

1. Browse to the Select SQL Deployment option page.
2. Under **SQL databases**, leave **Resource type** set to **Single database**, and select **Create**.


Dashboard > Azure SQL >

## Select SQL deployment option

Microsoft

[Feedback](#)

How do you plan to use the service?




**SQL databases**

Best for modern cloud applications. Hyperscale and serverless options are available.

Resource type

Single database

**Create** [Show details](#)




**SQL managed instances**

Best for most migrations to the cloud. Lift-and-shift ready.

Resource type

Single instance

**Create** [Show details](#)



**SQL virtual machines**

Best for migrations and applications requiring OS-level access. Lift-and-shift ready.

Image

**Create** [Show details](#)

3. On the **Basics** tab of the **Create SQL Database** form, under **Project details**, select the desired Azure **Subscription**.
4. For **Resource group**, select **Create new**, enter *myResourceGroup*, and select **OK**.
5. For **Database name** enter *mySampleDatabase*.
6. For **Server**, select **Create new**, and fill out the **New server** form with the following values:
  - **Server name:** Enter *mysqlserver*, and add some characters for uniqueness. We can't provide an exact server name to use because server names must be globally unique for all servers in Azure, not just unique within a subscription. So enter something like *mysqlserver12345*, and the portal lets you know if it is available or not.
  - **Server admin login:** Enter *azureuser*.
  - **Password:** Enter a password that meets requirements, and enter it again in the **Confirm password** field.
  - **Location:** Select a location from the dropdown list.

Select **OK**.

Home > Azure SQL > Select SQL deployment option > Create SQL Database >

## Configure

Feedback

Looking for basic, standard, premium?

General Purpose	Hyperscale	Business Critical
Scalable compute and storage options	On-demand scalable storage	High transaction rate and high resiliency
500 - 10,000 OPS 2-10 ms latency	500 - 104,800 OPS 1-10 ms latency	5,000 - 104,800 OPS 1-2 ms latency

Compute tier

**Provisioned**  
 Compute resources are pre-allocated  
 Billed per hour based on vCores configured

**Serverless** ✓  
 Compute resources are auto-scaled  
 Billed per second based on vCores used

Compute Hardware

Click "Change configuration" to see details for all hardware generations available including memory optimized and compute optimized options

Hardware Configuration

**Gen5**  
up to 40 vCores, up to 120 GB memory  
[Change configuration](#)

Max vCores

1 2 4 6 8 10 12 14 16 18 20 24 32 40 1 vCore

Min vCores

0.5 0.75 1 0.5 vCores

2.02 GB MIN MEMORY 3 GB MAX MEMORY

Auto-pause delay

The database automatically pauses if it is inactive for the time period specified here, and automatically resumes when database activity occurs. Alternatively, auto-pausing can be disabled.

☒ Enable auto-pause

Days Hours Minutes

0 1 0

Apply

Cost summary

Gen5 - General Purpose (GP\_Gen5\_1)  
Cost per GB  
Max storage selected (in GB)

ESTIMATED STORAGE COST / MONTH  
COMPUTE COST / VCORE / SECOND<sup>1</sup>

NOTES  
<sup>1</sup> Serverless database are billed in vCores based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

7. Leave **Want to use SQL elastic pool** set to **No**.
8. Under **Compute + storage**, select **Configure database**.
9. This quickstart uses a serverless database, so select **Serverless**, and then select **Apply**.
10. Select **Next: Networking** at the bottom of the page.

[Dashboard](#) > [Azure SQL](#) > [Select SQL deployment option](#) >

## Create SQL Database

Microsoft  
provision with smart defaults, or visit each tab to customize. [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](#)

### Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name \*

Server \* ⓘ  [Create new](#)

Want to use SQL elastic pool? \* ⓘ ☐ Yes ☒ No

Compute + storage \* ⓘ

**General Purpose**

Serverless, Gen5, 1 vCore, 32 GB storage

[Configure database](#)

[Review + create](#) [Next : Networking >](#)

11. On the **Networking** tab, for **Connectivity method**, select **Public endpoint**.
12. For **Firewall rules**, set **Add current client IP address** to **Yes**. Leave **Allow Azure services and resources to access this server** set to **No**.
13. Select **Next: Additional settings** at the bottom of the page.

## Create SQL Database

Microsoft

[Basics](#)
[Networking](#)
[Additional settings](#)
[Tags](#)
[Review + create](#)

Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'mysqlserver-12' and all databases it manages. [Learn more](#)

### Network connectivity

Choose an option for configuring connectivity to your server via public endpoint or private endpoint. Choosing no access creates with defaults and you can configure connection method after server creation. [Learn more](#)

Connectivity method \* ⓘ

☐ No access  
☒ Public endpoint  
☐ Private endpoint (preview)

### Firewall rules

Setting 'Allow Azure services and resources to access this server' to Yes allows communications from all resources inside the Azure boundary, that may or may not be part of your subscription. [Learn more](#)

Setting 'Add current client IP address' to Yes will add an entry for your client IP address to the server firewall.

Allow Azure services and resources to access this server \*

Add current client IP address \*

14. On the **Additional settings** tab, in the **Data source** section, for **Use existing data**, select **Sample**. This creates an AdventureWorksLT sample database so there's some tables and data to query and experiment with, as opposed to an empty blank database.
15. Optionally, enable Azure Defender for SQL.
16. Optionally, set the maintenance window so planned maintenance is performed at the best time for your database.
17. Select **Review + create** at the bottom of the page:

Microsoft Azure

Home > servercontoso >

## Create SQL Database

Microsoft

Basics Networking **Additional settings** Tags Review + create

Customize additional configuration parameters including collation & sample data.

### Data source

Start with a blank database, restore from a backup or select sample data to populate your new database.

Use existing data \*

None Backup **Sample**

AdventureWorksLT will be created as the sample database.

### Database collation

Database collation defines the rules that sort and compare data, and cannot be changed after database creation. The default database collation is SQL\_Latin1\_General\_CP1\_CI\_AS. [Learn more](#)

Collation ⓘ SQL\_Latin1\_General\_CP1\_CI\_AS

### Azure Defender for SQL

Protect your data using Azure Defender for SQL, a unified security package including vulnerability assessment and advanced threat protection for your server. [Learn more](#)

Advanced Data Security costs 15 USD/server/month.

Enable Azure Defender for SQL \* ⓘ Enable **Not now**

### Maintenance window

Select a preferred maintenance window from the drop down. Please note, during a maintenance event, Azure SQL Database are fully available and accessible but some of the maintenance updates require a failover as Azure takes SQL DB instances offline for a short time to apply the maintenance updates. If the database is part of elastic pool, the maintenance configuration of elastic pool will be applied. [Learn more](#)

Maintenance window System default

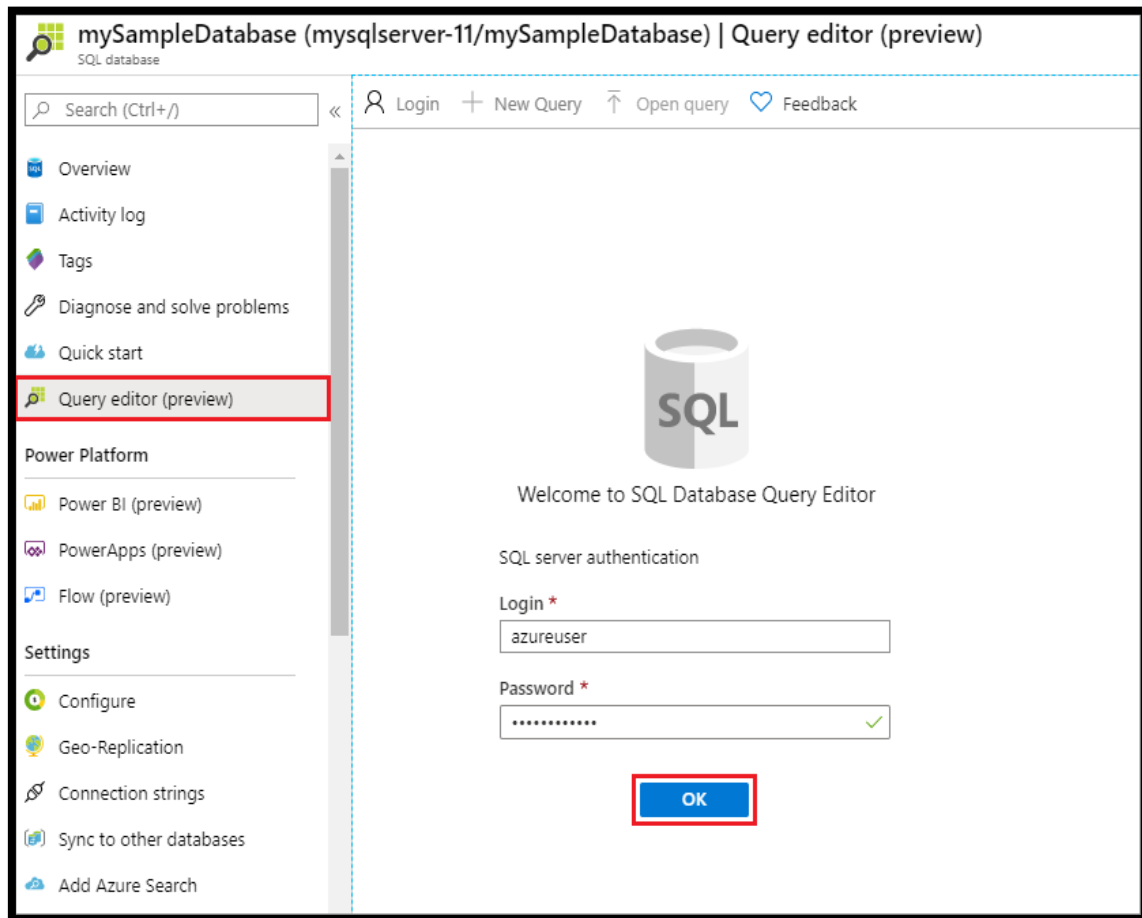
**Review + create** < Previous Next : Tags >

18. On the **Review + create** page, after reviewing, select **Create**.

### Query the database

Once your database is created, you can use the **Query editor (preview)** in the Azure portal to connect to the database and query data.

1. In the portal, search for and select **SQL databases**, and then select your database from the list.
2. On the page for your database, select **Query editor (preview)** in the left menu.
3. Enter your server admin login information, and select **OK**.

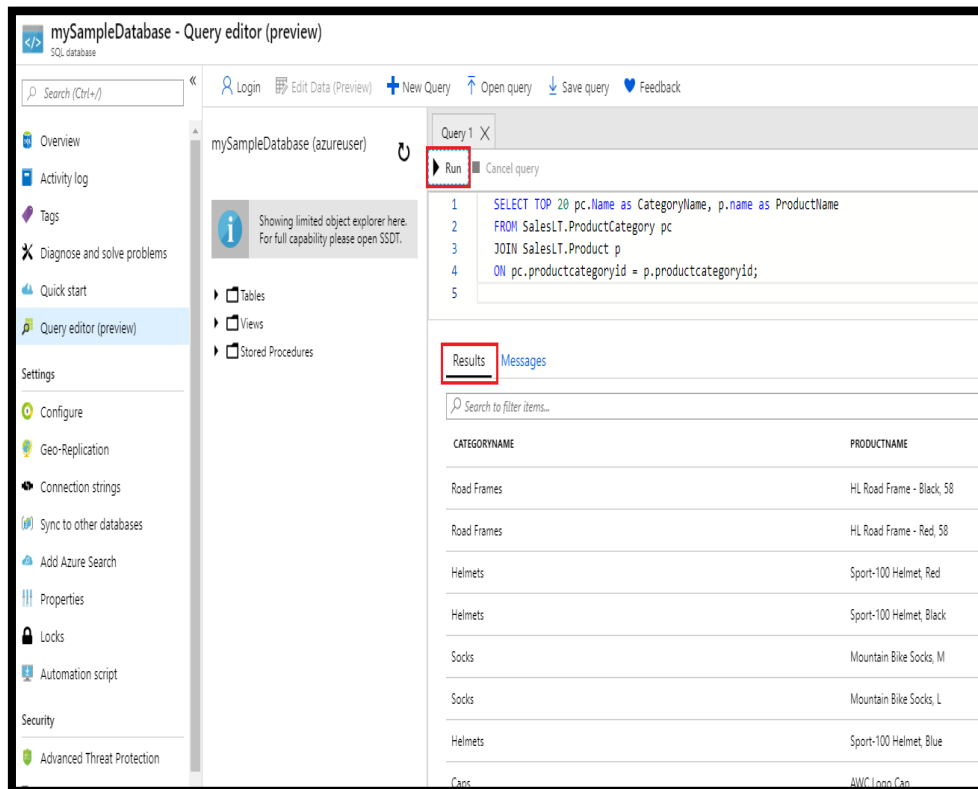


4. Enter the following query in the **Query editor** pane.

SQLCopy

```
SELECT TOP 20 pc.Name as CategoryName, p.name as ProductName
FROM SalesLT.ProductCategory pc
JOIN SalesLT.Product p
ON pc.productcategoryid = p.productcategoryid;
```

5. Select **Run**, and then review the query results in the **Results** pane.

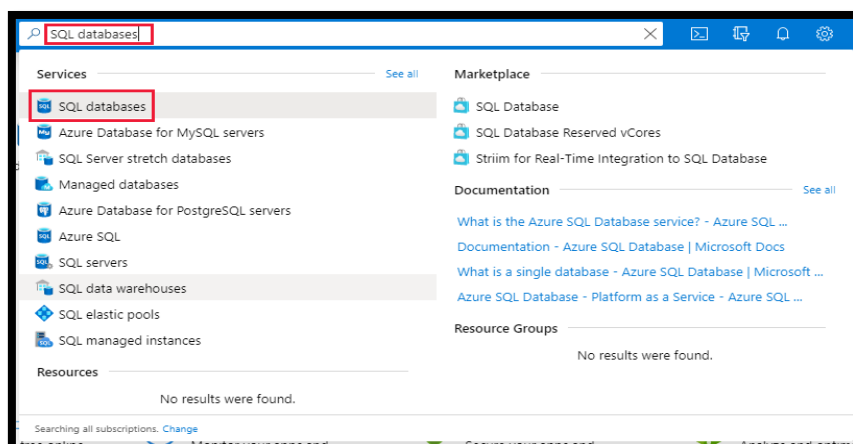


6. Close the **Query editor** page, and select **OK** when prompted to discard your unsaved edits.

### 3.6.2 Set up SQL Data Sync between databases in Azure SQL Database and SQL Server

#### Create sync group

1. Go to the Azure portal to find your database in SQL Database. Search for and select **SQL databases**.



2. Select the database you want to use as the hub database for Data Sync.



### SQL databases

Microsoft

+ Add
⌚ Reservations
≡ Edit columns
🔄 Refresh
🏷️ Assign tags
🗑️ Delete






Try our new Azure SQL resource browser! This experience offers a unified view of all your SQL Server resources in Azure as well as improv

**Subscriptions:** APEX C+L - Aquent Vendor Subscriptions – Don't see a subscription? [Open Directory](#) + [Subscription settings](#)

All resource groups

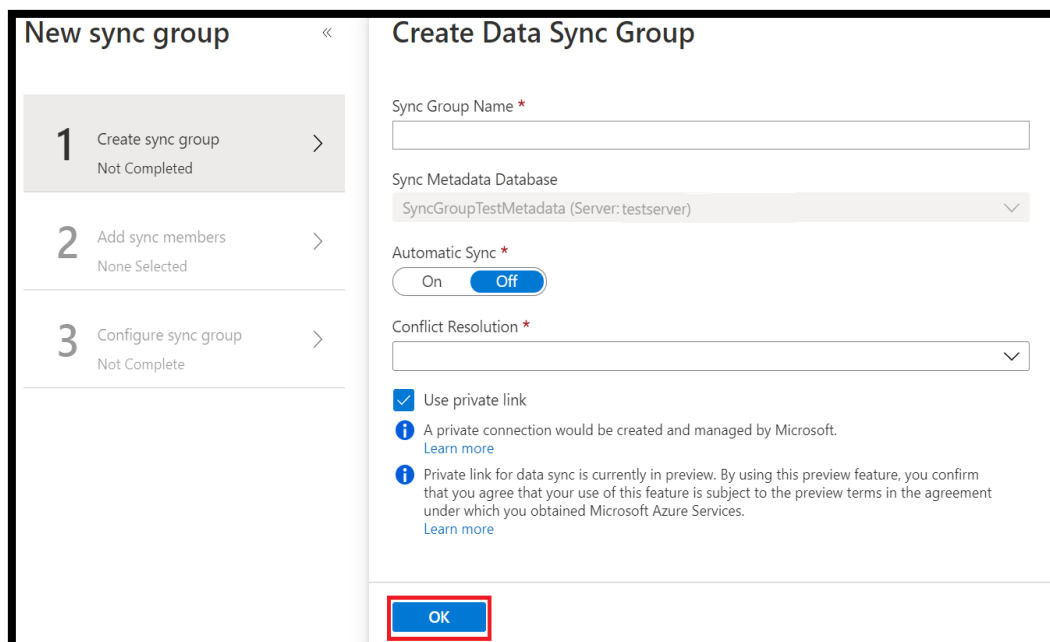
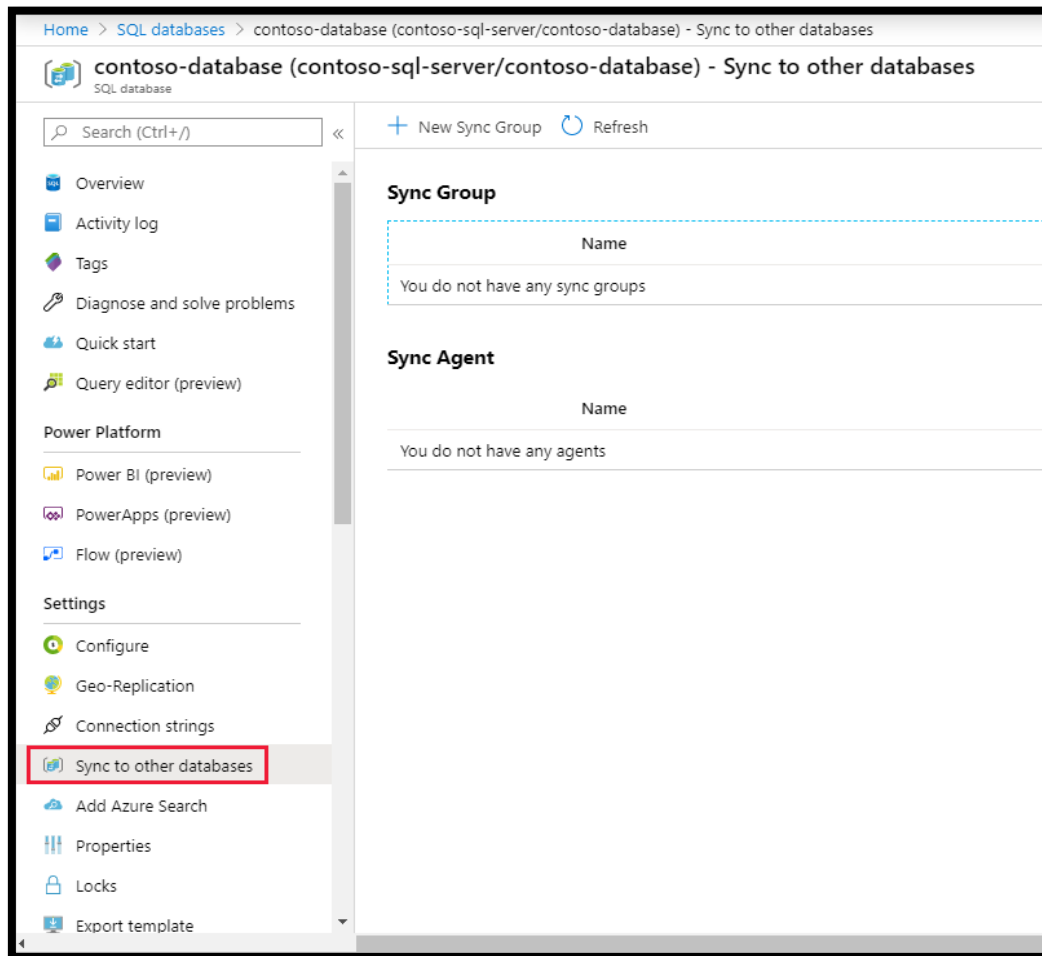
All locations

5 items

<input type="checkbox"/> Name ↑↓	Status	Replication role	Server
<input type="checkbox"/>  contoso-adventure	Online	None	contososql
<input type="checkbox"/>  <b>contoso-database</b>	Online	None	contoso-sql-server
<input type="checkbox"/>  contoso-dest	Online	None	contososql
<input type="checkbox"/>  contoso-new_server	Online	None	contososql
<input type="checkbox"/>  contoso-test	Online	None	contososql

**Note:** The hub database is a sync topology's central endpoint, in which a sync group has multiple database endpoints. All other member databases with endpoints in the sync group, sync with the hub database.

- On the **SQL database** menu for the selected database, select **Sync to other databases**.



On the **Create Data Sync Group** page, change the following settings:

- On the **Sync to other databases** page, select **New Sync Group**. The **New sync group** page opens with **Create sync group (step 1)**.

**TABLE 25**

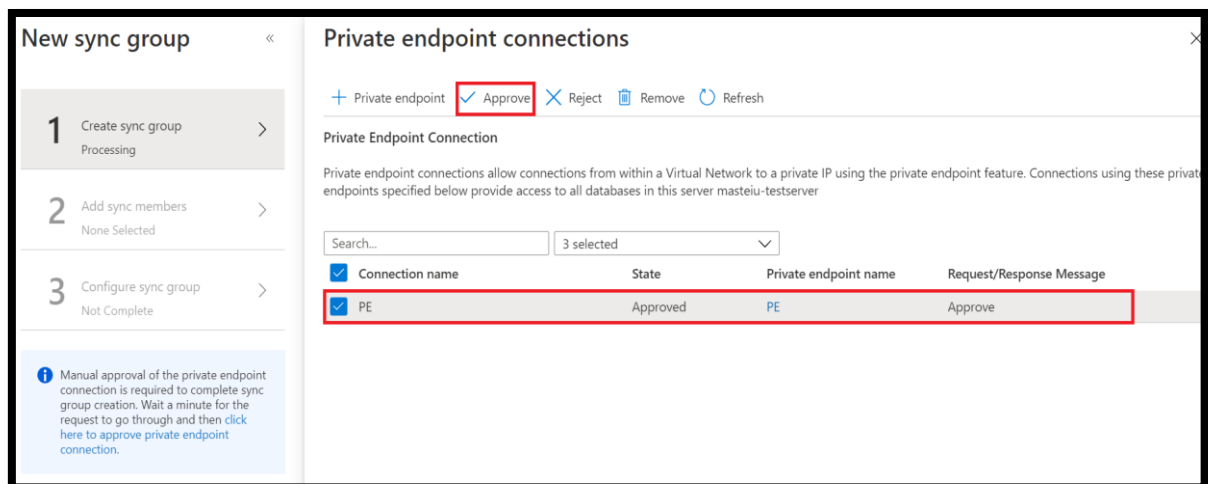
Setting	Description
<b>Sync name</b>	Enter a name for the new sync group. This name is distinct from the name of the database itself.
<b>Sync Metadata database</b>	<p>Choose to create a database (recommended) or to use an existing database.</p> <p>If you choose <b>New database</b>, select <b>Create new database</b>. Then on the <b>SQL Database</b> page, name and configure the new database and select <b>OK</b>.</p> <p>If you choose <b>Use existing database</b>, select the database from the list.</p>
<b>Automatic Sync</b>	<p>Select <b>On</b> or <b>Off</b>.</p> <p>If you choose <b>On</b>, enter a number and select <b>Seconds, Minutes, Hours</b>, or <b>Days</b> in the <b>Sync frequency</b> section.</p> <p>The first sync begins after the selected interval period elapses from the time the configuration is saved.</p>
<b>Conflict resolution</b>	<p>Select <b>Hub win</b> or <b>Member win</b>.</p> <p><b>Hub win</b> means when conflicts occur, data in the hub database overwrites conflicting data in the member database.</p> <p><b>Member win</b> means when conflicts occur, data in the member database overwrites conflicting data in the hub database.</p>
<b>Use private link</b>	Choose a service managed private endpoint to establish a secure connection between the sync service and the hub database.

**Note:** Microsoft recommends to create a new, empty database for use as the **Sync Metadata Database**. Data Sync creates tables in this database and runs a frequent workload. This database is shared as the **Sync Metadata Database** for all sync groups in a selected region and subscription. You can't change the database or its name without removing all sync groups and sync agents in the region. Additionally,

an Elastic jobs database cannot be used as the SQL Data Sync Metadata database and vice versa.

Select **OK** and wait for the sync group to be created and deployed.

5. On the **New Sync Group** page, if you selected **Use private link**, you will need to approve the private endpoint connection. The link in the info message will take you to the private endpoint connections experience where you can approve the connection.



**New sync group**

- 1 Create sync group  
Processing
- 2 Add sync members  
None Selected
- 3 Configure sync group  
Not Complete

Manual approval of the private endpoint connection is required to complete sync group creation. Wait a minute for the request to go through and then [click here to approve private endpoint connection](#).

**Private endpoint connections**

+ Private endpoint **Approve** X Reject Remove Refresh

**Private Endpoint Connection**

Private endpoint connections allow connections from within a Virtual Network to a private IP using the private endpoint feature. Connections using these private endpoints specified below provide access to all databases in this server masteiu-testserver

Search... 3 selected

Connection name	State	Private endpoint name	Request/Response Message
PE	Approved	PE	Approve

## Add sync members

After the new sync group is created and deployed, **Add sync members (step 2)** is highlighted on the **New sync group** page.

In the **Hub Database** section, enter existing credentials for the server on which the hub database is located. Don't enter *new* credentials in this section.

New sync group

1

Create sync group  
datasync-group2

✓

2

Add sync members  
None Selected

>

3

Configure sync group  
Not Complete

>

Select sync members

Hub Database

<database>

\* Username

\* Password

Member Database

Add an Azure Database

>

No Azure SQL database available

Add an On-Premises Database

>

No On-Premises database available

OK

Configure Azure Database

NewSyncGroup

Sync Member Name \*

Subscription \*

Azure SQL Server \*

Azure SQL Database

Sync Directions \*

Username \*

Password \*

☐ Use private link

OK

## To add a database in Azure SQL Database

In the **Member Database** section, optionally add a database in Azure SQL Database to the sync group by selecting **Add an Azure SQL Database**. The **Configure Azure SQL Database** page opens.

On the **Configure Azure SQL Database** page, change the following settings:

**TABLE 26: TO ADD A DATABASE IN AZURE SQL DATABASE**

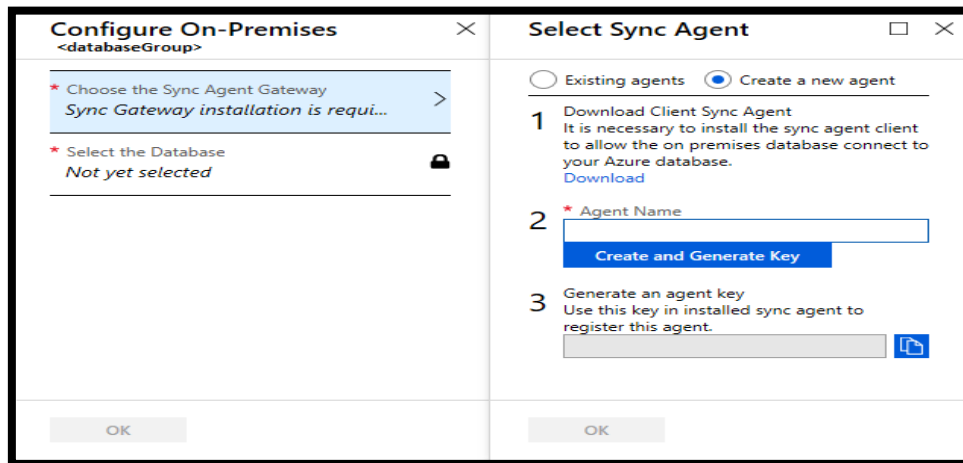
Setting	Description
<b>Sync Member Name</b>	Provide a name for the new sync member. This name is distinct from the database name itself.
<b>Subscription</b>	Select the associated Azure subscription for billing purposes.
<b>Azure SQL Server</b>	Select the existing server.
<b>Azure SQL Database</b>	Select the existing database in SQL Database.
<b>Sync Directions</b>	Select <b>Bi-directional Sync</b> , <b>To the Hub</b> , or <b>From the Hub</b> .
<b>Username and Password</b>	Enter the existing credentials for the server on which the member database is located. Don't enter <i>new</i> credentials in this section.
<b>Use private link</b>	Choose a service managed private endpoint to establish a secure connection between the sync service and the member database.

Select **OK** and wait for the new sync member to be created and deployed.

To add a SQL Server database

In the **Member Database** section, optionally add a SQL Server database to the sync group by selecting **Add an On-Premises Database**. The **Configure On-Premises** page opens where you can do the following things:

1. Select **Choose the Sync Agent Gateway**. The **Select Sync Agent** page opens.



2. On the **Choose the Sync Agent** page, choose whether to use an existing agent or create an agent.

If you choose **Existing agents**, select the existing agent from the list.

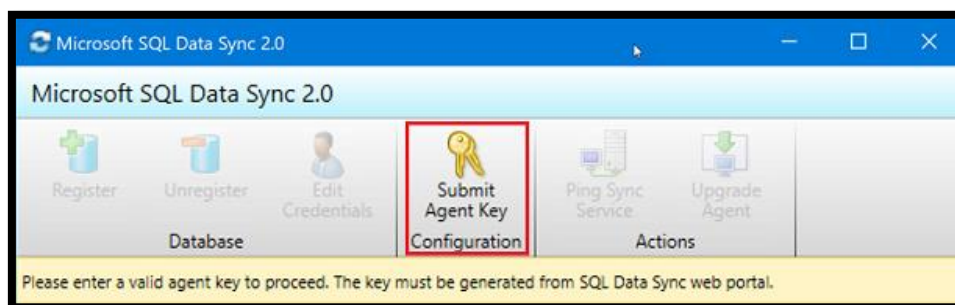
If you choose **Create a new agent**, do the following things:

1. Download the data sync agent from the link provided and install it on the computer where the SQL Server is located. You can also download the agent directly from Azure SQL Data Sync Agent.

### Important

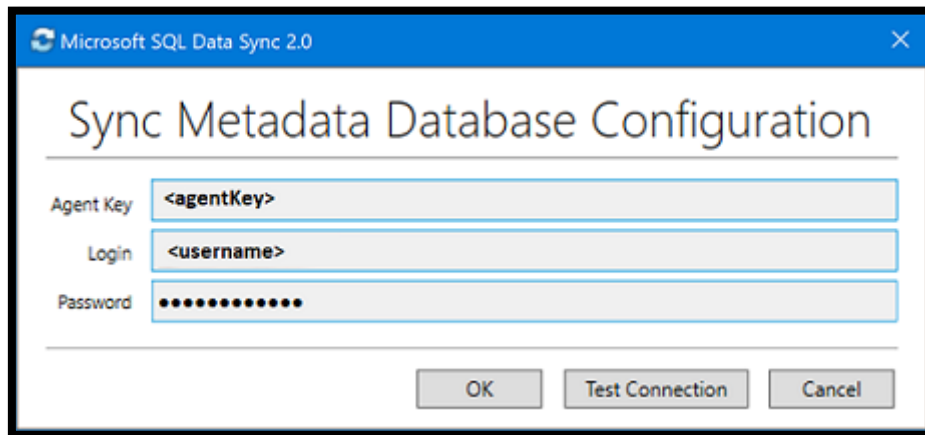
You have to open outbound TCP port 1433 in the firewall to let the client agent communicate with the server.

2. Enter a name for the agent.
3. Select **Create and Generate Key** and copy the agent key to the clipboard.
4. Select **OK** to close the **Select Sync Agent** page.
3. On the SQL Server computer, locate and run the Client Sync Agent app.



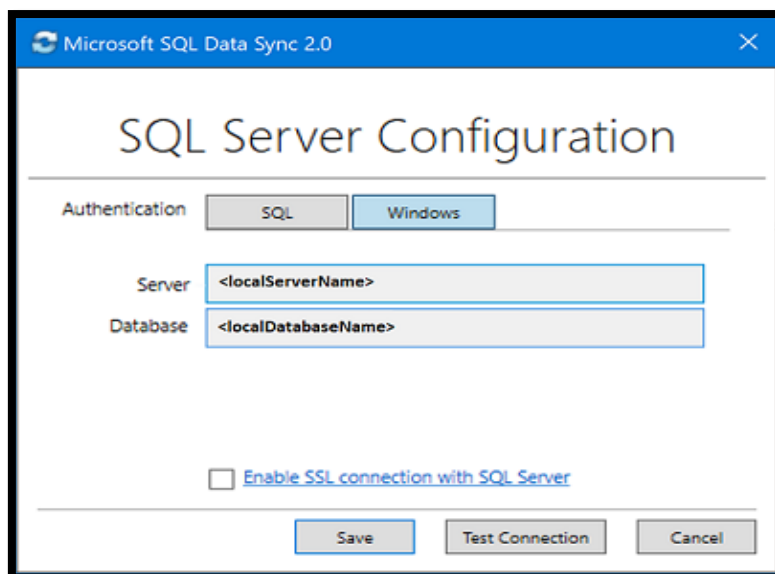
1. In the sync agent app, select **Submit Agent Key**. The **Sync Metadata Database Configuration** dialog box opens.

2. In the **Sync Metadata Database Configuration** dialog box, paste in the agent key copied from the Azure portal. Also provide the existing credentials for the server on which the metadata database is located. (If you created a metadata database, this database is on the same server as the hub database.) Select **OK** and wait for the configuration to finish.



**Note-** If you get a firewall error, create a firewall rule on Azure to allow incoming traffic from the SQL Server computer. You can create the rule manually in the portal or in SQL Server Management Studio (SSMS). In SSMS, connect to the hub database on Azure by entering its name as

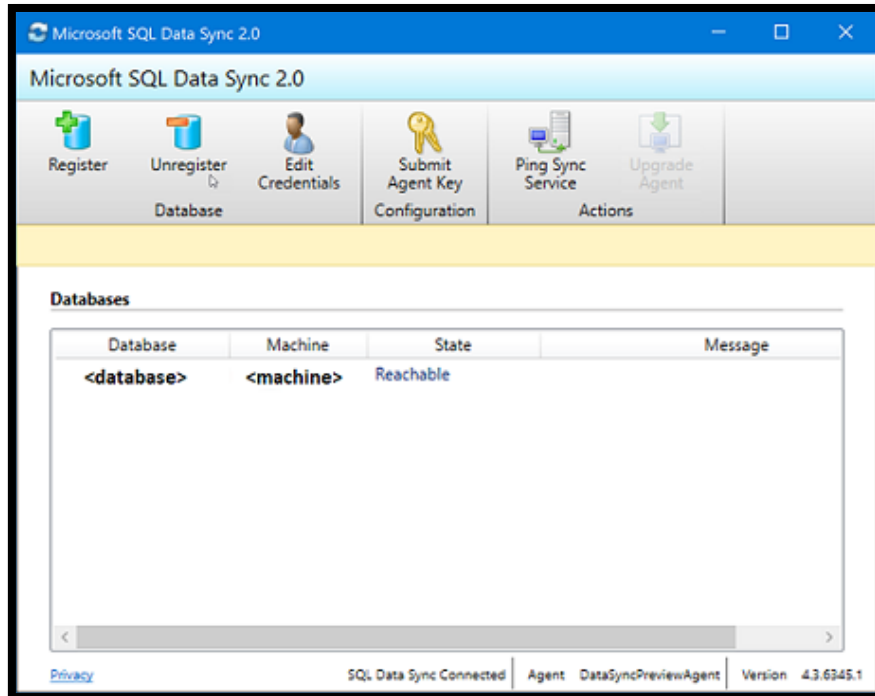
<hub\_database\_name>.database.windows.net.



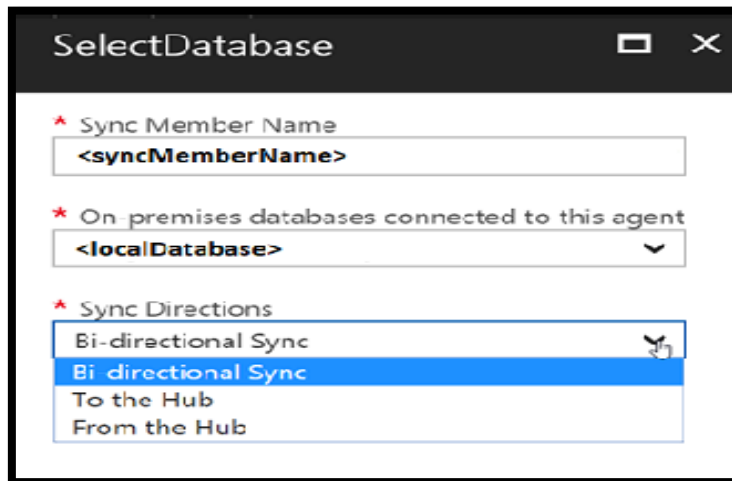
3. Select **Register** to register a SQL Server database with the agent. The **SQL Server Configuration** dialog box opens.
4. In the **SQL Server Configuration** dialog box, choose to connect using SQL Server authentication or Windows authentication. If you choose SQL Server authentication,



enter the existing credentials. Provide the SQL Server name and the name of the database that you want to sync and select **Test connection** to test your settings. Then select **Save** and the registered database appears in the list.



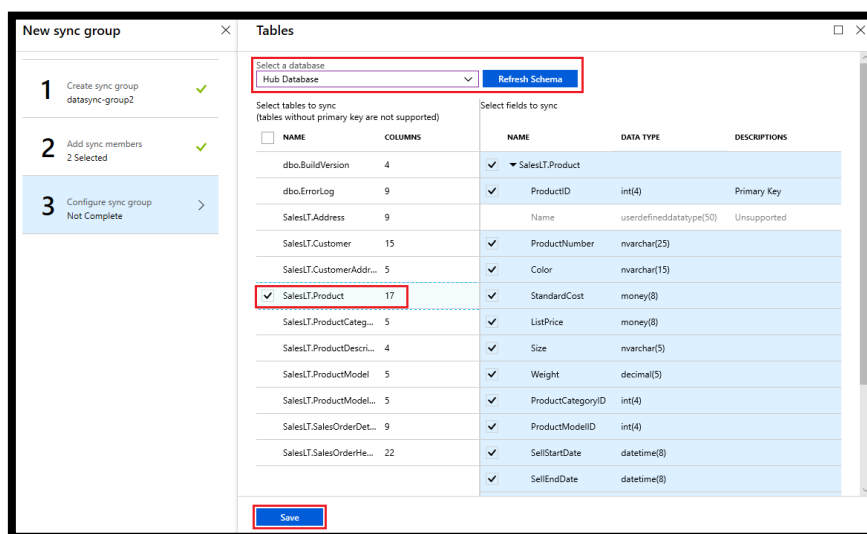
1. Close the Client Sync Agent app.
2. In the portal, on the **Configure On-Premises** page, select **Select the Database**.
3. On the **Select Database** page, in the **Sync Member Name** field, provide a name for the new sync member. This name is distinct from the name of the database itself. Select the database from the list. In the **Sync Directions** field, select **Bi-directional Sync, To the Hub, or From the Hub**.
4. Select **OK** to close the **Select Database** page. Then select **OK** to close the **Configure On-Premises** page and wait for the new sync member to be created and deployed. Finally, select **OK** to close the **Select sync members** page.



Note: To connect to SQL Data Sync and the local agent, add your user name to the role *DataSync\_Executor*. Data Sync creates this role on the SQL Server instance.

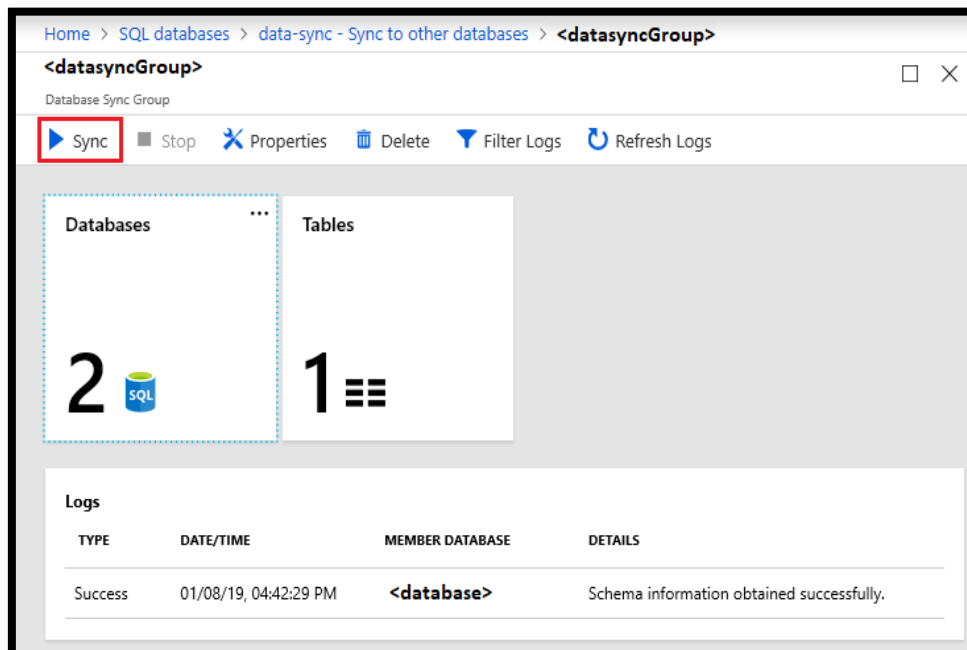
### Configure sync group

After the new sync group members are created and deployed, **Configure sync group (step 3)** is highlighted in the **New sync group** page.



1. On the **Tables** page, select a database from the list of sync group members and select **Refresh schema**.
2. From the list, select the tables you want to sync. By default, all columns are selected, so disable the checkbox for the columns you don't want to sync. Be sure to leave the primary key column selected.
3. Select **Save**.
4. By default, databases are not synced until scheduled or manually run. To run a manual sync, navigate to your database in SQL Database in the Azure portal,

select **Sync to other databases**, and select the sync group. The **Data Sync** page opens. Select **Sync**.



**Activity:** This practical activity gives a quick start to learner about relational database through SQL commands. User will create a single database and perform SQL operations using SQL DDL, DML commands to create database tables and insert data. Also, data can be updated and truncated later. This gives idea of how cloud relational databases can be worked with.